

36601

ADMINISTRATION REPORTS
OF SUBORDINATE OFFICERS
OF THE
DEPARTMENT OF AGRICULTURE
MADRAS
FOR 1951-52



R
J. 211YN57
N54
36601



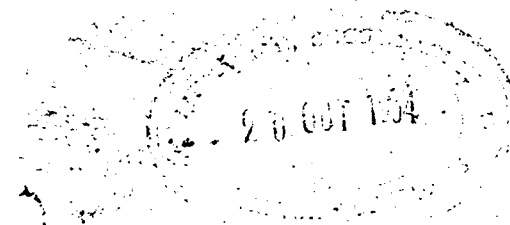
MIN
OF
FC

ADMINISTRATION REPORTS
SUBORDINATE OFFICERS OF THE
DEPARTMENT OF AGRICULTURE

MADRAS

FOR

1951-52



Study
taken
taken
taken and li

The second
September 1951
zianagaram ar
ari, Sirugup

PRINTED BY THE SUPERINTENDENT
GOVERNMENT PRESS
MADRAS
1954

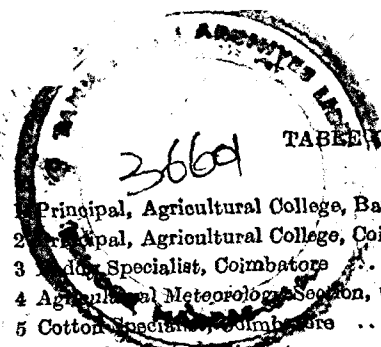


TABLE OF CONTENTS.

1 Principal, Agricultural College, Bapatla	14
2 Principal, Agricultural College, Coimbatore	15
3 Specialist, Coimbatore	16
4 Agricultural Meteorology Section, Coimbatore	17
5 Cotton Specialist, Coimbatore	18
6 Millet Specialist, Coimbatore	19
7 Oil-seeds Specialist, Coimbatore	20
8 Pulses Specialist, Coimbatore	21
9 Fruit Specialist, Coimbatore	22
10 Sugarcane Specialist, Anakapalle	23
11 Government Agricultural Chemist, Coimbatore	24
12 Government Entomologist, Coimbatore	25
13 Government Mycologist, Coimbatore	26
14 Government Lecturing and Systematic Botanist, Coimbatore	27
15 Bio-Chemist, Kodur	28
16 Assistant Agricultural Engineer (Research), Coimbatore	29
17 Lecturer in Agriculture, Coimbatore	30
18 Assistant Agricultural Chemist, Government Malt Factory, Coimbatore	31
19 State Marketing Section	32
20 Deputy Director of Agriculture, Visakhapatnam	33
21 Deputy Director of Agriculture, Eluru	34
22 Deputy Director of Agriculture, Guntur	35
23 Deputy Director of Agriculture, Cuddapah	36
24 Deputy Director of Agriculture, Vellore	37
25 Deputy Director of Agriculture, Tanjore	38
26 Deputy Director of Agriculture, Madurai	39
27 Deputy Director of Agriculture, Coimbatore	40
28 Curator, Government Botanic Gardens, Ootacamund	41
29 Crop and Plant Protection Officer (Entomology), Coimbatore	42
30 Crop and Plant Protection Officer (Entomology), Bapatla	43
31 Crop and Plant Protection Officer (Mycology), Coimbatore	44
32 Crop and Plant Protection Officer (Mycology), Bapatla	45
33 Special Deputy Director of Agriculture (Crop Sampling), Madras	46
34 Seed Development Officer, Kakinada	47
35 Seed Development Officer, Vellore	48
36 Seed Development Officer, Tanjore	49
37 Seed Development Officer, Bellary	50
38 Seed Development Officer, Coimbatore	51
39 Assistant Agricultural Engineer, Soil Conservation Scheme, Bellary	52
40 Assistant Agricultural Engineer, Soil Conservation Scheme, Ootacamund	53
41 Assistant Agricultural Engineer, Tractor Workshop, Bapatla	54
42 Assistant Agricultural Engineer, Tractor Workshop, Coimbatore	55
43 Cytogeneticist Section, Coimbatore	56
44 Cytogeneticist Section, Bapatla	57

MINISTRATION REPORTS OF SUBORDINATE OFFICERS OF THE DEPARTMENT OF AGRICULTURE, MADRAS, FOR 1951-52.

ADMINISTRATION REPORT OF THE PRINCIPAL, AGRICULTURAL COLLEGE, BAPATLA, FOR THE YEAR 1951-52.

1. *Charge.*—Sri P. Venkatramaiah, M.A., B.Sc. (Edin.), continued to be the Principal till the date of his demise on 23rd October 1951 when Sri M. Satyanarayana, Senior Lecturer in Agriculture, assumed full additional charge of the post. I took over the Principalship from Sri M. Satyanarayana on 5th December 1952 and continued in that capacity to the end of the year.

2. *Admissions.*—The admissions for the year 1952-53 are not yet over. The Government have constituted a Selection Committee consisting of four members and fixed 90 as the total seats in the College including reserve quota for Orissa and readmissions of failed students.

3. *The College.*—The College was opened for the second and final year classes on 16th June 1952. The lectures and practical classes were held as prescribed in the syllabus. There were 72 students in the final, 76 students in the second and 80 in the first year classes during 1951-52.

The students who had been admitted in the year 1949 in the first year class appeared for the final B.Sc. (Ag.) Degree examination in March-April 1952. Out of 72 students who sat for the examinations, 48 were successful, three of them securing first class.

Detailed information on the number of candidates who appeared for the examinations and who came out successful during 1951-52 is given hereunder :—

Class.	Number appeared.	Number passed and completed.	Percentage.
(1)	(2)	(3)	(4)
B.Sc. (Ag.)	83	50	60
Do.	81	59	73
Do.	72	48	67

Students' tour.—The students of the first, second and final year classes taken on educational tours during the year. The first year students were taken to the Agricultural Research Station, Lam, and the work on crops and livestock were explained.

The second year students were taken on tour for ten days (12th to 22nd September 1951) to visit Maruteru, Rajahmundry, Samalkot, Anakapalle and Vizianagaram and for another week (27th January to 2nd February 1952) to Hari, Siruguppa and Hospet. They were also taken to the Indian Lea

Tobacco Company, Limited, Chirala, to study grading, redrying, packing, marking and cold-storage of cigarette tobacco and to Duggirala to study the harvest, curing, power polishing and storage of turmeric.

The students of the final year class were on tour to Kodur, Coimbatore, Bangalore, Coonoor, Ootacamund and Hosur for one fortnight from 15th to 30th September 1951. They were taken to Guntur to study Agriculture, Economics, Tobacco Market Committee and Agricultural Botany, and to Duggirala to study the working of the Land Mortgage Bank.

5. *Scholarships.*—The following were the scholarships awarded during 1951-52 :—

Scholarships.	First year.	Second year.	Third year.
(1)	(2)	(3)	(4)
Scholarships for Scheduled castes and Backward Communities (Central Government).	..	1 O. Prabhakara Rao.	1 L. Venkateswara Rao.
Harijan Welfare Department Scholarships, Madras.	1 P. Sethu Madhavarao. 2 T. Sambasiva Rao. 3 G. Chandra Rao. 4 P. Vasudeva Rao.	1 N. Shanmugam. 2 T. Sivasankaram. 3 K. V. Subba Rao. 4 M. Venkoji Rao. 5 B. Chandra Rao. 6 P. S. V. Rama Rao.	1 R. Thirunavukarasu. 2 S. Masilamani. 3 N. Malyadri. 4 J. Koteswara Rao. 5 T. Satchidanatham. 6 E. S. Devadattam. 7 P. Venkateswararao.
College Scholarships :— For Muslims .. For Backward Communities.	1 Mahaboob Sheriff. 1 P. V. S. Narayana Rao. 2 V. Venkateswara Rao. 3 P. V. Krishna Rao. 4 Mohamed Sultan Mohiddin. 5 P. Audiseshaiah.	1 Syed Mohiddin .. 1 T. V. Ramamurthi. 2 S. Dhilleshwararao. 3 B. Ramarao. 4 P. Purnachandra Rao. 5 M. B. Krishna Rao.	1 Baza Sheriff. 1 S. Anjaneyulu. 2 K. P. Subramanya. 3 Adapa Venkata Rao. 4 L. Karunakara Rao. 5 K. Rosireddi.
Merit	Nil	1 K. Mukteswara Rao. 2 J. Gopalakrishna.	1 P. Narasimha Rao. 2 A. Venugopala Rao.

6. *Board of Honorary Visitors.*—The Board of Honorary Visitors met on 28th July 1951 and 18th February 1952, presided over by the Collector, Guntur.

The following resolutions were passed on 28th July 1951 and 18th February 1952 :—

(i) The Board appreciates the progress made by the Tractor Workshop for Guntur during the half-year ending June 1951, and requests the Government to increase the number of tractors at the College to meet the requirements of the district.

(ii) The Board recommends that the Government be pleased to sanction for the provision of tip up chairs for the lecture halls.

(iii) The Board recommends that the Government be pleased to sanction for the layout of sports grounds, and construction of students pavilion and tennis courts at a very early date.

(iv) The Board requests the Collector to cause to expedite the acquisition of the wet land area in the new farm so that it may be cultivated in season.

(v) The Board recommended that the construction of a third hostel, residential buildings and residential buildings at the College farm might be taken up during 1952-53 in order to relieve congestion in the present accommodation of the students, to give proper facilities for imparting instruction on dairy and veterinary sciences and for developing and running a new farm in an orderly manner.

(vi) The Board recommended that the Tractor Workshop must be permitted to undertake repairs of tractors and pumping sets owned by private individuals by prescribing schedule rates.

(vii) The Board recommended that the flooring in all M.B. sheds must be laid with cement concrete as otherwise the life of the valuable machinery is likely to get reduced by dust and sand especially in a place like Bapatla.

Action was taken on these recommendations and sanction of the Government was sought.

Sri M. Kalidas, Sri P. V. Krishnayya Chowdary and Sri B. Ramachandra Reddy, honorary visitors, were taken to different sections of the College on 21st December 1951, 24th December 1951 and 18th February 1951, respectively.

As the term of the honorary visitors was over, the following were appointed as non-official members for a period of three years from 12th February 1952 :—

(1) Sri M. Bapineedu, B.Sc. (Cornell), M.Sc. (California), No. 5-A, Wabrays Road, Royapettá, Madras.

(2) Sri G. Anavarna Reddy, M.A., M.Sc., Anantapur P.O., Cuddapah district.

(3) Sri T. N. Venkata Subba Reddy, landholder, Madanapalle P.O., Chittoor district.

(4) Sri A. Gopalakrishnaiah, K.C.P., Limited, Vuyyur P.O., Krishna district.

(5) Sri P. L. Narasimha Raju, landholder, Jonnavala P.O. (via Vizianagaram, Visakhapatnam district).

7. *College Hostel.*—The general health of the students during the year was good. The Warden (Principal) had the assistance of a Deputy Warden, two Assistant Wardens and a Lady Warden till 11th October 1951 when one of the posts of Assistant Wardens was retrenched and the designation of the other post was changed to Junior Deputy Warden. The post of the Lady Warden was abolished with effect from 1st March 1952.

Vegetarian messes and one non-vegetarian mess were run during the year. The following are the particulars relating thereto :—

	Average daily attendance.	Average daily mess rate.
(1)	(2)	(3)
Vegetarian section (each mess)	47	Rs. 1 7 4
Non-vegetarian section	81	1 7 2

The ground floor of the new hostel block was occupied from 19th August 1951 accommodating 48 students and releasing of the rented buildings in the town. The second floor of the new hostel was taken over and occupied vacating other private buildings rented as hostels, with effect from 1st December 1951. Only one building was rented for the Lady's Hostel and vacated on 20th April 1952 soon after University examinations of the final year were over.

8. *Students' Club*.—Sri M. R. Balakrishnan, Lecturer in Chemistry, continued to be the Vice-President of the Club.

During the year 25 meetings (including debates) were held.

The annual Club Day was celebrated on 16th February under the presidency of Sri B. M. Lakshmipathy Mudaliar, B.E., M.E., A.M.I.E., Joint Director of Agriculture.

The College teams took part in all the games for the tournaments of the D. zone of the Andhra University held at Guntur in December 1951.

9. *Library*.—The following books and publications were added to the library during the year :—

(a) Books—674.

(b) Periodicals—568 (issues).

(c) Bulletins—110.

Two thousand nine hundred and ninety-two books to the members of the College staff, 3,542 books to the students and 45 books to other departmental officers were issued on loan during the year.

10. *Botanic gardens*.—The garden was extended and live hedges were raised along pathways in the rest-house area and in front of 'L' Block, the new office buildings of the Farm Manager, Botanic Gardens, and new hostel. A small lawn was raised by the side of the rest-house during the year. A new pond was dug behind 'L' Block and cannas were planted. Routine operations like pruning, weeding, manuring, turfing and general cleaning were attended to regularly.

A large number of ornamental, medicinal, economic and other miscellaneous plants were introduced placing indents on various nurseries and by collection at Ootacamund.

The fern house in the garden was repaired during the year. A plot in front of the hostel building was put under vegetable cultivation to serve as specimen crops for the benefit of students and to supply the hostel requirements to a small extent. Gourds of different kinds, lablab and cowpea varieties, tomatoes, chillies, lady's finger, brinjals, greens of all kinds, exotic vegetables like cabbage, cauliflower and lettuce, were grown in the area.

During the year fencing the College estate with barbed wire to prevent trespass, was taken up and partly finished. The whole southern block was cleared by felling palmyra trees, ploughed and made fit for cultivation.

11. *College farm*.—(a) *Acquisition*.—Out of a total area of 477.01 acres proposed for acquisition, 147.08 acres were acquired during the year bringing the total area acquired so far to 433.09 acres. Proceedings are in progress for the resumption of the remaining area as well. The farm area is divided

into two blocks by the Southern Railway line, the lands situated on the northern side of the railway line are for cultivation of crops and those on the southern side are reserved for residential buildings, veterinary hospital, etc. The cultivated area has been divided into four blocks, viz., southern block, wet-land block, orchard block and northern block.

(b) *Reclamation*.—Formation of bunds and channels in the new area proposed for paddy cultivation, levelling in orchard block and portions in northern block, strengthening and formation of a pathway on the drain bund, and deepening of existing tank were the various items of reclamation attended to during the year.

(c) *Season*.—The total rainfall received during the period under report was 34.16 inches distributed over 49 rainy days as against 25.98 inches distributed over 46 rainy days received in the previous fasli. The south-west monsoon commenced early in the last week of May and the rainfall received during this period was 19.10 inches as against 17.52 inches of rainfall for the corresponding period of the last year. The early setting up of the monsoon with equitable distribution was favourable for early sowings and good performance of punasa crops. 5.25 inches of rainfall was received in the north-east monsoon period as against 5.65 inches of the corresponding period of the previous year. Due to the uneven distribution of the rainfall the sowing of Pyru crops like horsegram, wheat, jonna had to be delayed. As a result of the severe drought that prevailed during the months of October to December, the crop growth and yields were far below normal. There was an unusual precipitation of 7.37 inches of rainfall recorded in May 1952 as against 0.14 inches of the previous year. The rainfall which commenced on 18th May 1952, developed into a cyclone as a result of depression in the Bay of Bengal on 21st and continued till 23rd May. Due to the heavy gale, the standing crops of banana and sugarcane were damaged besides a heavy fall of premature fruits in mango and sapota. The rainfall was helpful for the preparatory cultivation of Punasa crops and reclamation of newly acquired lands.

(d) *Salient features*.—In the study of the performance of 65 paddy strains released from different stations, MTU. 3 of the early duration series, MTU. 2 of the medium duration series and MTU. 7, MTU. 19 and SLO. 18 of late duration series recorded maximum yields of 6,000 lb., 5,400 lb., and 5,000 lb. of grain per acre during first-crop season. Of the eight varieties under trial, Co. 21 gave the maximum yield followed by SLO. 12 and MTU. 15 with 2,740 lb., 1,920 lb. and 1,460 lb., respectively, in the second-crop season. P. 12 and MTU. 16 were found to be the best yielders with 5,600 lb. and 5,200 lb. per acre among the four varieties tried under partial submersion. Early sown paddy (before August 15) gave 41 per cent increase in yield over late sown (before September, 15th) crop.

Of the five varieties of sugarcane tried as plant and ratoon crops, Co. 449 closely followed by Co. 527 gave maximum yields of 29.5 and 27.29 tons per acre as plant crop while Co. 527 topped the list with 20.2 tons as ratoon crop. The quality of jaggery was best in Co. 527.

Two strains of Anakapalle ragi, viz., AKP. 2 and AKP. 6 were compared with local in 'Punasa' under rainfed conditions and in 'Pyru' under sh irrigation. In 'Punasa', AKP. 2 recorded a maximum yield of 1,533 lb. followed by AKP. 6 with 1,533 lb. In 'Pyru', AKP. 6 recorded a maximum yield of 2,789 lb. as against 2,747 lb. of AKP. 2. The yield of was poor and the duration was also comparatively longer.

Four improved strains of redgram were compared with local under rainfed conditions in sandy soils. Strain 2900 and 2745 recorded 13.06 per cent increase in yield over local. Strain 2900 grown as pure crop in sandy soil recorded an acre yield of 570 lb. of grain while the same strain grown mixed with arika recorded acre yields of 379 lb. grain and 207 lb. of arika.

Three strains TMV. 1, TMV. 2 and TMV. 3 of groundnut were grown along with local in sandy soils and sandy loams. The trial was conducted under early and late sown conditions in sandy soils. In sandy soils, local gave maximum yields of 1,409 lb. per acre under early sowings and TMV. 1 followed by TMV. 3 recorded higher yields under late sowings. In sandy loams, local and TMV. 3 recorded maximum yields of 1,506 lb. and 1,550 lb., respectively.

Of the four indigenous types grown under rainfed conditions in sandy soils Kasi gogu followed by Kaki gogu gave higher yields of 1,600 lb. and 1,100 lb. of fibre per acre.

An experiment with P. 216 F cotton variety to determine the optimum time of sowing and to assess the response to manuring with nitrogen in rice fallows under irrigated conditions revealed that early sowings up to the last week of January recorded 527 lb. kapas and manuring increased the yields by another 22 per cent over no manure series. A quantity of 13,700 lb. of green matter per acre was obtained for application as green manure to succeeding paddy crop.

Seven hybrid varieties of tomatoes received from New Delhi were compared with local in randomized blocks. Hybrid 9 followed by Deshi recorded maximum yields of 4,381 lb. and 3,728 lb. in sandy soils. Of the sixteen other promising varieties introduced from abroad. Hybrid No. 3 topped the acre yields with 7,639 lb. A summary of the two years' trial reveals that Deshi of New Delhi and local are suitable for the sandy soils.

Wynaad cucumber sown in Punasa season gave 10,800 lb. of fruits as against 1,725 lb. of local per acre. In pyru season the yields were same at 4,500 lb. level.

Of the three varieties of grasses under study, Napier grass over 36,140 lb., buffalo grass 30,430 lb. and Guinea grass 19,900 in 3 to 6 cuttings, on sandy loams.

Sesbania speciosa grown along irrigation channels of pyru ragi and wheat gave 2,000 lb. of green matter per acre, while as pure green manure crop after harvest of paddy, it gave 54,000 lb. of green matter.

Two acres of tobacco nurseries were sown with pure selfed H.S. 9 seed for supply of seedlings to 60 acres of seed farm area in Guntur district. 414,000 seedlings were supplied to the 60 acre seed farm besides 137,000 seedlings sold to other ryots. A profit of Rs. 129 per acre was realized.

Pestalozia palmarum on coconut was successfully controlled by Bordeaux mixture spraying. A trial with calcium arsenate, lead arsenate, gammexane and DDT. 50 sulphur for the control of *Epilachna* and mite attack on brinjal was conducted and the results indicated that DDT. 50 sulphur was very effective followed by arsenate sprayings as the next best in efficiency among the treatments.

The following quantities of seeds and plants were distributed : 19,290 paddy, 1,166 lb. ragi and other crops, 551,000 tobacco seedlings, 1,430 fruit plants, 28,493 other seedlings and cuttings, 59.5 lb. vegetable seeds and 1 seed packets were supplied to the districts.

THE DEPARTMENT OF AGRICULTURE, MADRAS, 1951-52

A trial was conducted on storage of superphosphate in Alakathine gunnies as against the normal storage with single and double gunnies. The Alakathine film lining was found to withstand the acid action of superphosphate even up to a period of one year while single and double gunnies got deteriorated in three to four months. There was a reduction in the weight of the contents during the first fortnight due to loss of moisture in all the treatments.

Five thousand nine hundred and fifty-five fruit plants and seedlings of economic trees were planted during Vanamahotsava Week. Five thousand eight hundred and sixty-two of them survived. Other seedlings numbering 50,000 were planted in the wet land area. Six thousand seven hundred seedlings and 6 lb. of seed was supplied to the public.

Four exhibitions were conducted and suitable prizes in the shape of implements were given to the most successful exhibitors during the quarterly celebrations of Farmers' Day.

A three-inch filter point was successfully driven in the orchard area to a depth of 30 feet and a discharge of 4,300 gallons per hour were recorded with a 2.7 HP. petrol engine pumpset. The feasibility of driving filter points at suitable places for irrigating vegetables, fruit plants and nurseries is being examined based on the performance of the filter point fixed in the orchard.

12. *College Dairy*.—A total quantity of 35,664 lb. of whole milk, 179 lb. of skim milk, 31 lb. of cream, 132 lb. of butter and 74 lb. of ghee was produced. Among the four breeds of milch animals, Murrah buffalo No. 2, Ongole No. 13, Scindi No. 14, Country buffalo No. 5 recorded maximum yields of 24 lb., 21 lb., 29 lb. and 15 lb., respectively. One hundred and thirty-seven services were recorded by Ongole, Scindhi and Murrah breeding bulls.

One thousand three hundred and seventeen eggs were recorded from the two breeds of poultry—White leg-horn and Rhode island reds—maintained for teaching purposes.

13. *Buildings*.—The following buildings constructed by the Public Works Department were taken over from them during the year :—

- (1) Hostel block No. 2.
- (2) Pot culture house.
- (3) Insectary.
- (4) Dispensary.
- (5) Shed for storing chemicals and combustibles.
- (6) Shed for storing petrol.
- (7) New rooms kitchen block No. 1.

The old Sub-Registrar's office building in the college compound was converted by the Public Works Department into a rest house for the Agricultural Department and handed over. It has since been graded as a B class rest house.

The old tiled shed in front of the 'L' Block which has to be demolished has been vacated. Permission to address the Public Works Department to arrange for the demolition of the building is awaited.

14. *Civil Engineering Section*.—In addition to the teaching work the Civil Engineering Section attended to the following items of work :—

- (1) Excavating a third well in the college estate.
 - (2) Constructing a block of four latrines for hostel No. 2.
- Annual repairs to the college main building for 1951-52.

All the broken glass panes of the windows and ventilators in the building were replaced under the above estimate.

- (4) Annual repairs to hostel No. 2 for 1951-52.
- (5) Annual repairs to the gas producer house for 1951-52.
- (6) Annual repairs to old lecture hall No. 1 for 1951-52.
- (7) Annual repairs to old lecture hall No. 2 for 1951-52.
- (8) Annual repairs to the dairy buildings for 1951-52.
- (9) Graveling for the road from college front gate to the main building.
- (10) Repairs to the existing block of latrines of the hostel.
- (11) Repairs to the milking shed of the dairy.
- (12) Repairs to the well in the Botanic Gardens, in front of the college.
- (13) Graveling for the footpaths of hostel.
- (14) Graveling of the road in front of the Mechanical Engineering Stores.

- (15) Providing flooring for the former carpentry and smithy shed.

The following estimates were prepared during the year :—

- (1) Repairs to the existing block of latrines of hostel.
- (2) Excavating a 12 feet diameter well in the college farm.
- (3) Repairs to the old building in block 'C' of the college farm.
- (4) Constructing an office building for the Assistant Agricultural Engineer, Tractor Workshops.
- (5) Annual repairs to the college main building for 1951-52.
- (6) Annual repairs to the college main building for 1952-53.
- (7) Annual repairs to the gas producer house for 1951-52.
- (8) Annual repairs to the old lecture hall No. 1 for 1951-52.
- (9) Annual repairs to the old lecture hall No. 2 for 1951-52.
- (10) Repairs to the rear verandah roof of farm building in block 'A' of college farm.
- (11) Constructing masonry pillars for the pipe lines to the new gas holders.
- (12) Repairs to the roof of the verandah of the veterinary hospital.
- (13) Fencing the Meteorological observatory site at the college farm.
- (14) Constructing a parapet wall for the well north-west of 'L' block.
- (15) Metalling the front road of the orchard in the college farm.
- (16) Graveling the road in front of the mechanical stores.
- (17) Graveling the footpaths to the hostel.
- (18) Repairs to the well in the botanic gardens.
- (19) Repairs to the milking shed of the dairy.
- (20) Providing flooring to the former carpentry and smithy shed.
- (21) Graveling the road east of the college main building.
- (22) Constructing a block of latrines and urinals for the Agricultural College, Bapatla.
- (23) Constructing a fuel shed for the hostel.
- (24) Renewing the flooring of the M.B. sheds.
- (25) Rethatching the roof of in-patient and operation sheds in the Veterinary Hospital.
- (26) Annual repairs to the office of the Farm Manager, Botanical Gardens, for 1952-53.
- (27) Repairs to the gas producer house.
- (28) Repairs to the Co-operative Stores building.
- (29) Providing teakwood planks for covering the drains in the Chemistry laboratory.

15. *Mechanical Engineering Section.*—In addition to the teaching work, the Mechanical Engineering Section attended to the following items of work :—

Water supply.—Two oil-engines and two electric motors supplied the water requirements of the college and hostel. A total quantity of 15.1 lakhs of gallons was pumped during the year.

Gas supply.—2.67 lakhs of cubic feet of gas was prepared and supplied during the year.

Transport.—Four buses were in use during the year. A total of 9,000 miles was covered during the year.

Electric supply.—Nineteen thousand two hundred and two units were generated during the year and supplied to the college, hostel and Tractor Workshop. The working of the generators was not satisfactory and the unit broke down very often.

Workshop.—The following major works were done in addition to normal routine work :—

- (1) Fifty-four stools, 18 work tables, 4 lecture hall tables and 2 desks for the Biological laboratory.
- (2) Fixing sinks and giving water and drainage connexions to the laboratory was finished.
- (3) Steel covering for cobey wagon.
- (4) One double-bullock passenger cart.
- (5) Yokes for farm.
- (6) Re-roofing veranda of veterinary hospital.
- (7) Repairs to college furniture (all sections).
- (8) Foundation for electric pump and oil engine for well No. 2.
- (9) Insect frames, rollers for Entomology section.
- (10) All routine repairs.

Tractors.—Sixteen tractors ploughed an area of 5,011.81 acres and levelled for 6,046 hours during the year.

Oil engines.—Sixteen oil-engine pumping units and two petrol sets were hired to ryots during the year.

Training.—Twenty-four candidates were given training as tractor and oil-engine drivers.

Filter points.—One multiple filter point, one 2-inch filter point and one 3-inch filter point were fixed in the college.

Oscillator equipment was demonstrated to the public during the year.

16. *Research.*—In addition to the teaching work done by the various lecturers, some research work was also undertaken during the time available to them. The following is the brief summary of work done during the year :—

(i) *Plant physiology.*—The main aspects of study on paddy were water requirements, salt tolerance, phasic assimilation of nitrogen and phosphoric acid, silicophosphoric and nitrogen relationship, and viability of seeds. Physiology of Vadlapudi orange was also under investigation.

Water requirements.—Three wet and three rainfed paddy varieties were grown in pots keeping the moisture levels at 20, 25, 30 and 35 per cent on dry weights of the soil.

The damage by thrips and mealy bugs could not be controlled in spite of sprays with nicotine sulphate and fish oil rosin soap. The results which are taken as trends, showed that ADT. 22 produced the maximum dry matter with a low transpiration ratio, followed by MTU. 17 and ASD. 4.

Salt tolerance.—Two salt tolerant strains, SR. 26B and Tellathokavadlu (T. 892), and two non-salt tolerant varieties Co. 13 and MTU. 8 were studied in potculture under application of graded doses of NaCl, Na_2CO_3 and MgSO_4 . Tellathokavadlu (T. 892) was found to be better than SR26B in salt tolerance and survival value. Sodium carbonate was found to be very toxic, sodium chloride less in toxicity and magnesium sulphate almost harmless.

Nitrogen and phosphoric acid.—Experiments were conducted with MTU. 7, MTU. 9 and Co. 13 in potculture with the application of nitrogen and phosphoric acid at 30, 45 and 60 PPM, just before 2, 4 and 6 weeks after planting. Maximum yield was obtained when nitrogen or nitrogen in combination with phosphoric was applied at 4, 6 PPM or above just before or 2 weeks after planting to short and long duration varieties. The general doses of application of nitrogen was however not reflected in the assimilation values of the plants.

Silico-phosphorus nitrogen relationship in the cultivated strains.—Analysis of paddy straw sample of Maruteru and Samalkota was done for the second time and differences in assimilation of the nutrients were seen unlike the previous year's data. The strains suitable for growing on low-lying areas and having stiff straw had considerably high percentage of silica. In the inflorescence axis, the silicon content varied between 6 to 8 per cent with extremes of 2 and 16 per cent while in boot leaf, it was 16 to 22 per cent, with extremes of 10 and 29 per cent evaluated on dry basis. MTU. strains in general had the lowest silica content while AKP. varieties recorded the highest followed by SLO. CO. and ASD in boot leaf.

Seed viability of paddy.—2.3.5 Thiophenyl tetrazolium chloride as well as Bromide (Grodex) at 1 per cent, strength gave a fairly correct estimate of seed viability of paddy with 8 to 12 hours of test even in the dormant varieties. Dehusking the paddy was indispensable in conducting tests with dormant varieties.

(ii) **Botany.**—The following items of research were attended to besides teaching, outside class hours and during holidays.

Systematic collection of plants was continued with a view to equip the Herbarium with all the representative species of the State and Telugu area in particular. A large number of species from Nilgiris, Bellary and Guntur districts was collected. They were pressed, poisoned and mounted. Over 450 specimens were identified and added on to the Herbarium during the year.

Detailed morphological studies of germination in palmyra were made. Preliminary investigations showed that the pyrenes commence germination from one to two weeks after planting. During this period, conspicuous changes occur in the underground embryo. The distal end of the cotyledonary sheath elongates and pushes down into the soil carrying with it the plumule at its distal end. This plumule, as it develops, takes its nourishment from the cotyledonary sheath and by the time it is ready to emerge out of the soil, the cotyledonary sheath is reduced to a thin membranous covering. At this stage the first leaf of the plumule which is represented only by its sheath is very much thickened and edible and is popularly known as 'Tega'. A short note on it was written and sent for publication in the *Current Science*.

Four varieties of 'Gogu', viz., (1) Tella gogu (*Hibiscus cannabinus* var. *vulgaris*), (2) Yerra gogu (*Hibiscus cannabinus* var. *purpureus*), (3) Kaki gogu (*Hibiscus cannabinus* var. *purpureus forma intensica*) and (4) Pusa gogu (*Hibiscus sabdariffa* var. *altissima*) were compared under rainfed conditions for the yield of fibre.

Pusa gogu was the tallest in growth and highest in yield of fibre, recording 8 feet and 1,600 lb. per acre respectively.

Studies on the fibre development in four varieties of gogu at different stages of growth taken up during the year are in progress.

(iii) **Plant pathology (Mycology)**—(a) **Root-rot of citrus.**—Two fungi, viz., *Neocosmospora vasinfecta* and *Rhizoctonia* sp. were isolated from the diseased citrus specimens sent from Eluru. With a view to study the pathogenicity of the fungi on different citrus types, viz., Acid lime, Pummelo, Jamberi, Gajanimma and Sathugudi on Jamberi, pot experiments were started. Three months old seedlings were obtained from Kodur and planted in cement tubs. The fungal cultures were multiplied in oatmeal agar medium in the laboratory and used for inoculation purposes. When the plants had established well, they were inoculated by transferring the mass cultures to the soil. The plants were kept under constant observations. The observations recorded did not reveal the presence of the disease, on any of the citrus plants tested.

(b) **Control of damping off of tobacco in the nursery.**—The relative efficacy of perenox in different concentrations and Merfusan in comparison with 1 per cent bordeaux mixture was tested in the control of damping off disease of tobacco in the nursery. The results indicated that perenox 1 in 200 at the rate of 500 gallons per acre was found to be the best. One per cent bordeaux mixture gave the next best control. Perenox 1 in 400 was also, however, found to be effective in the control of the disease. The other treatments were not effective to any marked degree although they were all found to be better than the control.

(c) **Control of eelworms in tobacco nursery.**—An experiment was conducted to test the efficacy of a soil fumigant Dowfume W-40 in the control of eelworms in the tobacco nursery. The fumigant was applied to the soil at the rate of 20 gallons per acre. Two per cent formalin at the rate of 50 gallons per acre was included for the purpose of comparison. The seed-beds were artificially inoculated with eelworm infected tobacco root material prior to the application of fumigants. The tobacco seeds were sown one week after the fumigation treatments. The results indicated that except for stray eelworm infection in a few beds, general incidence was not appreciable for drawing conclusions about the efficacy of the fumigants.

(d) **Cross-inoculation studies of *Pythium aphanidermatum*.**—A number of pulse crops grown in pots for experimental purposes were found to be affected by damping off disease caused by *P. aphanidermatum*. The casual agent from each host was isolated and cross-inoculation studies were undertaken.

The inoculation studies were restricted to only three isolates from cowpea, greengram and sunnhemp. The pathogenicity of the different isolates on their own hosts was first established and then cross-inoculations on different hosts were conducted. The results indicated that the isolate of *L. aphanidermatum* from greengram was pathogenic on all the three hosts tried, viz., cowpea, greengram and sunnhemp while the isolates from sunnhemp and cowpea were infective only on their respective hosts.

(e) **Leaf spot on fodder grass.**—A fodder grass (*Brachiaria mutica*) popularly called as buffalo grass that was grown adjacent to a paddy crop in the college farm showed the presence of typical leaf spots caused by *Piricularia*. The fungus was isolated by single spore method and pathogenicity tests on the grass host and on some varieties of paddy were conducted. The results

indicated that the isolate of the fungus was pathogenic only on the grass host and not on the paddy varieties. It is, therefore, evident that the isolate from the fodder grass is not inoculable on paddy and hence not dangerous to paddy crop.

(f) *Leaf spot on pillipesara*.—A leaf-spot disease was observed on pillipesara (*Phaseolus trilobus*) in a fairly serious form in parts of Guntur and Krishna districts. The infected leaves on isolation have yielded a fungus which is identified as *Dendrodochium* sp. The pathogenicity of the fungus and host range were studied. The fungus was also found to be pathogenic not only on pillipesara but also on *Phaseolus radiatus*, *phaseolus mungo*, *phaseolus acontifolius*, *Amaranthus gangeticus* and *Erythrina indica*.

In the cultural studies made under different media, like host extract agar, Richards agar, Potato Dextrose agar, Oats agar and plain agar at laboratory temperature (about 30°C), the best growth was obtained in host extract agar medium.

(g) *Redgram wilt*.—Perithecial bodies were observed on the redgram plants infected by *Fusarium udum*, the casual agent for wilt disease. The fungus from perithecial bodies, was isolated by transferring a single ascospore to agar medium. The culture was then multiplied in soil maize medium (95:5) for three weeks and then transferred to pots containing sterilized soil. After mixing the inoculum thoroughly into the soil, red gram seeds were sown in the pots. The plants started wilting from third week onwards. The fungus was reisolated from the wilted plants which, on comparison with original culture and for inoculation, was found to be similar in all respects. It is, therefore, evident that the culture isolated from the perithecial bodies is pathogenic on red gram plants.

(h) *Cross-inoculation studies of colletotrichum isolates*.—The vegetable crop of cluster bean in the neighbouring fields of Bapatla was found to be affected by a fruit-rot caused by *Colletotrichum* sp. The fungus was isolated and its pathogenicity established. Then cross-inoculations were made into other isolates from agathi (*Sesbania grandiflora*), chillies and turmeric. The results indicated that the isolate from cluster beans was infective on cluster beans and agathi and not on other hosts. The cross-inoculation studies of different isolates on these hosts are in progress.

(i) *Groundnut wilt*.—The specimens of groundnut received from West Godavari through Plant Protection staff have yielded a *Rhizoctonia* sp. The fungus was isolated and when inoculated on 15 days' old groundnut plants was found to be pathogenic.

(j) *Miscellaneous investigations*.—A blight disease on tomato caused by *Stemphylium solani* has been recorded at Bapatla and in the neighbouring villages. The pathogenicity of the fungus has not been proved so far. With a view to prove its pathogenicity the fungus was isolated and brought into pure culture. The inoculations were carried out but for want of optimum conditions of temperature and humidity for infection, the experiment could not be conducted successfully. This will be pursued again when favourable conditions prevail during the proper season.

The fruit-rot of chillies is usually caused by *Colletotrichum capsici*. But in some of the collections, an *Alternaria* sp. was found associated with fruit-rot. The fungus was isolated and brought into pure culture. The pathogenicity tests conducted on fruits indicated that *Alternaria* is not pathogenic on chillie fruits. The experiment will, however, be repeated to confirm the results.

With a view to study the mode of transmission of the fungus *Neovossia horrida* which causes burnt disease of paddy, experiments were started. But further progress could not be achieved since the fungus material collected during last paddy season has lost its viability.

A rust disease in uredal stage on cowpea caused by *Uromyces* sp. was observed in the college farm. Studies relating to host range and testing of the viability of spores were undertaken. In this case also, further work could not be carried out due to the non-viability of the spores.

With a view to study the fungal flora of seed-borne diseases of paddy the seed materials from all the rice research stations in our State have been obtained and the study has been just commenced.

(iv) *Entomology*.—A study of the following pests were attempted:—

(a) *Lymantrid caterpillar pest on casuarina*.—This hairy caterpillar pest does appreciable damage to casuarina by nibbling away the leaves which results in drying up of the growing plants. The life history of the pest was followed. The apterous female moth lays about 250 spherical, glistening pale pink-coloured eggs which hatch in eight days. The caterpillar passes through seven moults and grows for 27 to 35 days attaining a length of 2 inches. Pupation occurs in between the leaves in the open. The male and female moths show dimorphism, winged males assemble towards apterous females. The life cycle occupies 40 to 48 days.

(b) *Cecidomyid fly pest of jasmine*.—Observations were made in the main flush season on the habit of this minute fly pest which in the maggot stage infests jasmine buds and causes a withering. They were found to be very delicate though active, not breeding freely in confinement. Attempts to work out the life history were not successful as the adults invariably died even within some hours when confined to cages. A chalcid parasite was found to follow this pest and control it effectively.

(c) *Oncoccephala tuberculata* (sweet potato leaf Hispid beetle).—Egg laying and larval habits were studied. This insect occurred in a pest form in 1951 summer and caused severe damage to sweet potato leaves. The adults were found to lay somewhat elongate eggs singly in small pits on the leaves from which spiny pale brown grubs hatched out. Pupation was noted to take place at the end of mines.

A single spraying with Gammexane P. 520 at 1 oz. in one gallon of water gave good control of the pest and the plants remained free from further infestation for nearly six weeks.

(d) *Brinjal epilachna* (brinjal top shoot and fruit borer).—An exploratory insecticidal trial was conducted in the farm in November 1951 and continued into January to note whether the insecticides DDT, calcium and lead arsenates generally used to control epilachna beetles had any effect in reducing borer infestation. Five treatments replicated four times were given to the plants each replication having a control. The treatments were (1) calcium arsenate spray at 1 oz. in 2 gallons of water, (2) lead arsenate at the same strength, (3) DDT (50 per cent formulation) 1 oz. in 1½ gallons of water, (4) DDT. 405—50 sulphur dust at 20 per cent per acre, (5) B.H.C. D. 025 dust 20 pounds per acre and (6) control. The treatments which were given first on 21st November 1951 were repeated after a fortnight, i.e., on 9th December 1951. Though a mild borer attack was seen on stray plants at the time of commencing the trial, within a short time the infestation became considerably reduced by an effective check on the caterpillars by a braconid parasite. The trial was given up as borer damage was not seen even in the

control plots. However, some observations were made on the effect of insecticides on epilachna. It was noted that DDT alone either as a dust or spray or in a formulation with sulphur ranked equal to, if not better than lead and calcium arsenates in controlling epilachna. An infestation of mites occurred on the leaves in the second fortnight of December. Though mites were seen in all plots, the plants treated with DDT alone showed a relatively heavy infestation while those dusted with DDT and sulphur had the lowest infestation. B.H.C. had absolutely no effect in controlling epilachna. Since mites preponderate after a DDT treatment, it should be considered safe to use lead or calcium arsenates in preference to DDT to control epilachna.

(e) *Paddy stem-borer pest.*—The first crop of paddy was found to be relatively less infested by the stem-borer than the second crop. Stray egg masses of the pest were noted only after 6 to 8 weeks after transplantation. There was not appreciable damage due to the borer on the first crop. The second crop, however, showed severe infestation even during the seedling stage. Treatments of the seedlings in the nursery and the transplanted crop with B.H.C. dust at fortnightly intervals had some effect in reducing the infestation which favoured fresh tillering and revival of the crop.

(f) *Fish culture.*—As in previous years, fish culture was taken up for demonstration of the chief operations to the students as a part of the syllabus. The pond was stocked with 272 catla fingerlings in July 1951 after the rains. In December 1951 the pond was charged with 147 more catla and five Mrigal fingerlings. The water-level began to fall from January and by March it was found necessary to harvest all the fish due to insufficiency of water for supporting the stock. The harvest yielded a total of 243½ lb. of fish which was sold for Rs. 83-11-0. The total expenditure including all the miscellaneous items came to Rs. 69-5-0 and there was a net profit of Rs. 14-6-0 under this item. The percentage of recovery worked out for Catla to 34.5 per cent and Mrigal 60 per cent. The growth of Catla was fairly satisfactory and the average length and weight at the time of harvest were 15 inches and 2 lb. 6 oz., respectively.

(g) *Bee-keeping.*—Bee-hives were maintained during the year for teaching apiculture to the students. The year was not favourable for the bees as the pasturage for nectar as well as pollen was very unsatisfactory. Only one colony was working at the beginning of the year. Two more were hived during the year out of which one deserted the hive within a short time after capture. At the end of the year two colonies were functioning. Due to lack of pasturage artificial feeding had to be resorted to many times, especially in summer. There was no gathering of honey in any of the colonies for extraction.

(h) *Sericulture.*—Rearing of mulberry silk worms was taken up as a demonstration to the students in December. Two generations were reared and the students were given young worms for rearing and recording observations. Mulberry leaf was not available in adequate quantities and as such only small-scale rearing just sufficient for demonstration was done.

Attempts were also made to rear the mulberry silk worms in summer (April) but the cocoons were small in size. The moths which emerged from them in May were dull and many of them died even on the day of emergence. Egg-laying was poor. Even the small number of eggs laid by a few female moths failed to hatch.

(i) *Ericulture.*—One generation of Eri silk worms were reared mainly for demonstration to students in February 1952. The caterpillars were distributed to students for rearing and observations.

(j) *Lac culture.*—Lac grown from the brood inoculated in October 1950, had spread well and was harvested in July 1951. The yield was 16 lb. 4½ oz. of scraped lac and was not very satisfactory for the weight of brood inoculated.

(v) *Chemistry.*—During the year 150 samples of soils, waters, manures, cane juices, etc., were received in the laboratory and registered for analysis. Of these 118 samples were analysed and reported. The remaining samples are in different stages and not yet reported. The following statement gives the different kinds of samples received :—

Soils	..	..	..	..	50	Ghee	..	..	..	2
Manures	..	..	..	..	23	Water	..	..	..	15
Cane juices	..	..	..	..	12	DDT sprayed samples	..	..	..	13
Chillies	..	..	..	..	50	Miscellaneous	..	..	..	5
										Total .. 150

(a) *Pungency in chillies.*—Preliminary study for estimating pungency in chillies and correlating it with other determinable physical and chemical factors was taken up during the year. There was an association between nitrogen content and pungency in analysis conducted with water extracts of varieties. Further work is under way.

(b) *Analysis of cotton seed samples for the amount of residue adhering to them as a result of treatment in the DDT and BHC.*—Samples of cotton seed treated with 5 per cent DDT and BHC dusts at the rate of 1 lb. per 100 lb. of material for preservation against stored product pests were analysed for the amount of residues present in them by the electrometric titration of chloride and using the technique and electrodes (both of silvercoated with silver chloride) suggested by Wade (*Analyst* 1951 : 76, 606). As the samples on analysis were found to contain amounts much in excess of the limits prescribed for the respective insecticides they were condemned as being unfit for consumption by stock and that method of preservation was also subsequently given up as not being practicable.

(vi) *Chemical Analyst.*—The Chemical Analyst of the Agricultural department for work on the analysis of fertilizers continued to be at this college. The work done by the Analyst is summarized as follows :—

One hundred and seventy-two samples (172) of manure mixtures and straight fertilizers were received and analyzed during the period under report.

	(1)	Number received and analysed. (2)
1 Manure mixtures		70
2 Straight fertilizers—		
(a) Ammonium sulphate		50
(b) Superphosphate		12
(c) Cakes		30
(d) Other miscellaneous samples		10
		Total .. 172

Of these, six samples of manure mixtures and one of a straight fertilizer were below the minimum guarantee specified by the manufacturing firms.

17. *Agricultural Extension Service*.—The Agricultural Extension work was commenced at the end of the year. In the month of June a batch of 35 students were taken to the village Buddam, five miles. A gathering of ryots was addressed and the following items of work were carried out in the ryots' fields by the students:—

(a) Planting of *Sesbania speciosa* seedlings on paddy field bunds, in an area of 5 acres; and

(b) Economic planting of paddy seedlings.

18. *Visitors*.—The College continued to be a place of attraction for visitors, many of whom were agriculturists, college students, teachers, educated ladies and gentlemen. The following are some of the important visitors:—

- 1 Sri Kala Venkat Rao, Hon'ble Minister for Health, Madras.
- 2 „ K. Chandramouli, Hon'ble Minister for Local Boards.
- 3 „ V. S. Hejmadi, Member, Board of Revenue, Madras.
- 4 „ M. Kalidas, Member of the Board of Honorary Visitors, Agricultural College, Bapatla.
- 5 Hon. Lt. P. V. Krishnaiah Chowdary, Member of the Board of Honorary Visitors, Agricultural College, Bapatla.
- 6 Sri B. Ramachandra Reddi, Member of the Board of Honorary Visitors, Agricultural College, Bapatla.
- 7 The Sub-Collector, Ongole.
- 8 Students of Hindu College, Gunfur.
- 9 A batch of students of Andhra University, Waltair.

BAPATLA,
11th August 1952.

R. BALASUBRAMANIAN,
Principal, Agricultural College.

APPENDIX.

STATEMENT OF TEMPORARY AND PERMANENT POSTS OF AGRICULTURAL COLLEGE BAPATLA, FOR 1951-52.

Name of service and post.	Number sanctioned.	
	Temporary.	Permanent.
I. Madras Agricultural Service—		
1 Principal		1
2 Senior Lecturer in Agriculture		1
3 Junior do.		1
4 Lecturer in Botany		1
5 Do. in Chemistry		1
6 Do. in Mycology	1	
7 Do. in Entomology		1
8 Do. in Mechanical Engineering		1
9 Do. in Civil Engineering		1
10 Do. in Agricultural Economics	1	
11 Gazetted Assistant in Botany	1	
12 Do. in Chemistry	1	
13 Do. in Entomology	1	
14 Plant Physiologist	1	
15 Superintendent, College Farm	1	

Name of service and post.	Number sanctioned.	
	Temporary.	Permanent.
II. Madras Agricultural Subordinate Service—		
1 Upper Subordinates—Farm Managers	7	
2 Teaching Assistants in Agriculture, Assistant in Plant Physiology and Veterinary Assistant	25	
3 Fieldmen	5	
4 Mechanic	1	
5 Artists	4	
III. Madras General Subordinate Service—		
1 Librarian	1	
2 Assistant Librarian	1	
3 Veterinary Compounder	1	
4 Laboratory attenders	17	
5 Library attenders	2	
6 Store-keepers	2	2
IV. Madras Ministerial Service—		
1 Accountants and Upper Division clerks	1	4
2 Lower Division clerks	3	4
3 Typists		2
V. Madras Inferior Service—		
1 Peons	6	14
VI. Agricultural Engineering Section—		
1 Engineering Supervisors	3	
2 Senior Tractor Drivers	3	
3 Junior do.	13	
4 Lorry drivers	2	
Ministerial—		
1 Lower division clerk	1	
Inferior—		
1 Peon	1	
2 Tractor cleaners	16	
VII. Electrical Section—		
1 Supervisor	1	
2 Power house operator	1	
3 Electrician	1	
4 Lineman	2	
5 Store-keeper	1	
VIII. Transport Section—		
1 Bus drivers	4	
2 Do. cleaners	2	

FINANCIAL STATEMENT.

EXPENDITURE STATEMENT FOR 1951-52.

I. Agricultural College—40.E. Agriculture—Agricultural Education—B. Post-war Reconstruction—Agricultural College, Bapatla—

	RS.	A.	P.
(a) Pay of officers—Establishment including travelling and other allowances	1,98,740	7	0
(b) Wages to coolies	22,297	14	0
(c) Dearness allowance to menials	23,075	7	0
(d) Other charges	2,00,514	14	3
Liabilities	4,452	9	6
	2,04,967	7	9
(f) Petty construction and repairs	6,306	14	6

II. 40. G. Agriculture—Agricultural Experiments and Research A. Research Institute—

(a) Pay of Officers, establishment, including travelling allowance and other allowances.	3,142	4	0
(b) Contingencies	8,149	9	6

III. 40. D. Agriculture—Agricultural demonstration and propaganda including public exhibitions and fairs—I. Ordinary Areas—Excluding Post-war Reconstruction Schemes—Scheme for the effective control and test of manure mixtures and straight fertilisers—

(a) Pay of Officers, establishment, including travelling allowance, etc.	4,471	8	0
(b) Contingencies	6,108	14	3

Receipts under XXIX. Agriculture—Agricultural Receipts—P.W.R.—Agricultural College, Bapatla.

Receipts	49,379	10	5
Recoveries of over payments	14	15	6
XLV. Stationery and Printing	58	4	6
XIII. Other Taxes and Duties	248	11	9

ADMINISTRATION REPORT OF THE PRINCIPAL, AGRICULTURAL COLLEGE AND RESEARCH INSTITUTE, COIMBATORE, FOR THE FASLI YEAR ENDING 30TH JUNE 1952.

1. I submit my report for the year 1951-52.

2. *Charge*.—I continued to be in charge of the post of the Principal throughout the year under report. The Principal continued to be in administrative control of the Central Farm, Dairy, Animal Hygiene, Agricultural Economics, Civil and Mechanical Engineering, Artists, Plant Physiologist and Cytogeneticists sections as in the previous year, in addition to his being in general charge of teaching in the College, Students, Hostel and the General services.

3. *Staff*—(a) *Vice-Principal*.—Sri G. V. Narayana, Oil-Seeds Specialist, was Vice-Principal till 28th February 1952. He went on leave for four months from March 1952. During this period Sri P. Krishna Rao, Millet Specialist, acted as Vice-Principal.

(b) *Lecturer in Agricultural Economics*.—Sri S. V. Duraiswami Ayyar continued to be Lecturer in Agricultural Economics during the year.

(c) *Assistant Agricultural Engineer (Civil)*.—Sri B. K. Sadasiva Rao continued to be the Assistant Agricultural Engineer (Civil) excepting for a period of one month and 20 days from 1st June to 20th July 1952 when he went on leave on average pay.

(d) *Assistant Agricultural Engineer (Mechanical)*.—Sri J. P. Walter Devasahayam continued to be in charge of the post until 20th December 1951 when he was transferred as Assistant Agricultural Engineer (Research) and was in additional charge of this post till 27th December 1951. Sri P. K. Radhakanth assumed charge from 28th December 1951 and is in charge of the work.

(e) *Plant Physiologist, Cytogeneticists, Bapatla and Coimbatore and Lecturer in Animal Hygiene*.—There was no change in the personnel of the four posts during the year under review. Dr. Francis Joseph continued to hold charge of the post of Lecturer in Animal Hygiene and Dr. N. Krishnaswami and Sri S. Sampath, Cytogeneticists, Coimbatore and Bapatla, respectively. Sri T. R. Narayanan continued to be Plant Physiologist during the year.

4. *Tours*.—I attended the usual meetings of the Board of Studies of the Madras University as well as that of the Madras and Andhra Universities and conference of the representatives of the managements of the affiliated colleges of the Madras University.

I was on tour to Nagpur in connexion with the inspection of work on Soil Science and Agricultural Chemistry of the Madhya Pradesh Department of Agriculture. I attended the meetings of the Educational Council and Crops and Soils Wing meeting of the Indian Council of Agricultural Research at Indore, and the meeting of the first All-India Agricultural Educational Council convened by the Hon'ble Sri K. M. Munshi, Minister for Food and Agriculture at Hyderabad.

I was deputed to attend the meeting of the working party of fertilizers and third session of the International Rice Commission at Bandung, Indonesia. Besides the above, I was on tour to Ootacamund in connexion with the catering arrangements for the International School of Soil Fertility Course and to Bangalore to discuss various aspects and arrangements connected with the above course with Dr. K. Ramaiah, the Rice Consultant of the F.A.O. I accompanied Sri N. T. Gulrajani, Under-Secretary to the Government of India, Food and Agricultural Department, to Ootacamund to inspect the catering arrangements agreed upon with the Delight Manufacturing Co., for the Soil Fertility Course.

5. Agricultural Education—(a) Agricultural College, Coimbatore—(i) Admissions.—The College reopened for 1951-52 academic year on 15th June 1951 for the second and final year B.Sc. (Ag.) classes. The first year students assembled on 22nd August 1951. The number of students in each of the three classes at the end of the academic year was—

First year B.Sc. (Ag.)	73
Second year B.Sc. (Ag.)	53
Final year B.Sc. (Ag.)	78

The number of admissions to the first year B.Sc. (Ag.) for the year 1951-52 was ordered to be maintained at 80 as in the previous years. Of these, two seats were reserved for Coorg and two for the United State of Travancore and Cochin, the candidates to be nominated by the respective Governments.

The selection of students of the Agricultural Colleges, Coimbatore and Bapatla, was made by a Committee consisting of two non-official members, viz., Lt.-Col. Dr. S. G. Manavalaramanujam, M.A., Ph.D. (London), D.I.C., F.Z.S., Vice-Chancellor of Annamalai University, and Sri C. Ramaswami Naidu, M.A. (Cantab), retired Secretary, Indian Central Tobacco Committee. The total number of students admitted into the Agricultural College, Coimbatore, during the year 1951-52 was 83, as detailed below:—

Fresh admissions—	
Candidates from Madras State	70
Candidates from Coorg	2
Candidates from Travancore and Cochin	2
Detained students of the previous year	9
Total	83

The students who were admitted in 1949-50 in the first year class appeared for the final B.Sc. (Ag.) degree examination in April 1952. Out of 83 students who appeared, 75 completed the course by passing the examination.

The table below gives the detailed information of students (including private) who appeared for the examination and the result thereof:—

Class.	Number appeared.	Number passed.	Percentage of pass.
(1)	(2)	(3)	(4)
I B.Sc. (Agriculture)	73	64	88
II Do.	59	48	81
Final Do.	83	75	90

Short course.—Regular short courses in agriculture and other allied subjects could not be undertaken during the year due to the continuance of increased admissions to this College and want of accommodation and other facilities.

(ii) **Vocational Training in Dairy Husbandry.**—The Government sanctioned the continuance of training cultivators in Dairy Husbandry at the Agricultural College for the year under review. Twelve candidates were selected to undergo training from nominations of District Agricultural Officers. Only five candidates joined the course and they were given the training in Dairy Husbandry for a period of one month from 7th May to 6th June 1952. They were taught all branches of Dairy Husbandry pertaining to breeding of cattle, feeding and housing of livestock, milking and manufacture of all milk products. An examination was held at the end of the course at which all came out successful. The candidates were paid a stipend of Rs. 50 per mensem during their period of training.

(iii) **Students' tours.**—In addition to lectures and practical classes on various subjects, the students were taken on study tours to important places to study local agriculture and to get acquainted with practices adopted in the several tracts. The second year students were taken on tour to Hospet, Bellary (Agricultural Research Station, Siruguppa), Vijayavada, Maruteru, Bapatla, Kodur and Ranipet and the final year students were taken to Hosur, Mysore and Bangalore on educational tours. Various short tours to neighbouring villages around the College were also undertaken for studying local practices and gathering information on rural conditions.

(iv) **Scholarships.**—Details of various scholarships granted to the students during the year are furnished as hereunder:—

State Scholarship.—Four students of the first year B.Sc. (Ag.) belonging to backward communities were granted State scholarships during the year.

Two merit scholarships were granted to the two best students of the academic year 1950-51 judged from the total aggregate marks obtained by them in the first year class.

Scholarships by the Harijan Welfare Department.—Original scholarships were granted to four students of the first year B.Sc. (Ag.) at the rate of Rs. 375 per annum and scholarships were renewed for eight students of other classes at the rate of Rs. 375 per annum.

Non-residential scholarships were also granted to three of the students (one fresh and two renewals) at the rate of Rs. 60 per annum.

Government of India Scholarships.—The Scheduled Castes, Scheduled Tribes and Backward Classes Board of the Government of India sanctioned Scholarships to two students of the B.Sc. (Ag.) at the rate of Rs. 375 and Rs. 360 per annum. Besides the above, two students were sanctioned maintenance allowance and exemption from payment of tuition fees. Two students deputed by the Government of Coorg were also granted scholarships by that Government at the rate of Rs. 25 per mensem each for a period of ten months. Dr. Rangachari's Technical Scholarship and Lord Pentland Scholarships were also awarded to two deserving students.

(v) **Examinations.**—Two terminal examinations for all the three classes were held as usual in September and December 1951. Eight students of the first year B.Sc. (Ag.) class, five students of the second year and one student of the final year class were not sent up for the University Examination by

the College Board due to their poor performance in class and terminal examinations. The University examinations (written and practical) were held in the month of April 1952. The number of candidates appeared for the University Examination are as follows :—

First Year B.Sc. (Ag.)	...	...	...	...	...	73
Second Year B.Sc. (Ag.)	...	...	...	...	...	53
Final Year B.Sc. (Ag.)	...	...	...	...	...	82

(vi) *The College Board.*—The Board met four times during the year to discuss matters connected with the College and students such as revision of time-table, discipline and examinations.

(vii) *The College Hostel.*—The Hostel remained under the supervision of the Principal as Warden (Ex-Officio) assisted by a Gazetted Officer as Senior Deputy Warden and another non-gazetted officer as Junior Deputy Warden. During the year under report, Sri M. Sundaram, Assistant Agricultural Chemist, and Sri K. Meenakshisundaram, Teaching Assistant in Economics, were in charge of the Hostel as Senior Deputy Warden and Junior Deputy Warden, respectively. The average strength of Hostel during the year was 180. Twenty-nine students of the three classes were permitted of the inmates remained satisfactory. The management of the three messes of the inmates remained satisfactory. The management of the three messes run for the convenience of the students continued to be in charge of the students themselves. The average daily rate for the different messes was as below :—

	RS.	A.	P.
Non-vegetarian Mess (A and B) ...	...	...	...
Vegetarian Mess ...	...	...	...

The annual Hostel Day was celebrated on 2nd March 1952 with sports, socials and entertainment.

(viii) *Students' Club.*—The literary and athletic activities of the club were continued as in previous years. The students took interest in all the field games and sports activities. The 42nd Students' club day and sports were held on 23rd March 1952 under the presidentship of Mr. A. B. Harvey, District Superintendent of Police. The celebrations concluded with enactment of dramas by the students.

Under the auspices of the Students' Club the following lectures, debates and elocution competitions were held :—

(1) *Twelve* lectures and addresses were arranged during the year 1951-52. Of these, two were by Europeans—Major Tainsh and Miss Helen R. Sexton, one by Dr. K. Ramiah of the F.A.O. and another by Dr. R. L. Sethi.

(2) The literary competitions held during the year were (a) elocution contest, (b) essay competition, (c) inter-ward debating contest, (d) contest for the best article in Tatler and (e) contest for the best work of art, for Tatler.

The students also participated in (1) Inter-collegiate debates conducted by the Madras University in which a student of this College ranked second on individual merit in English debate; (2) Inter-college debate sponsored by the Government College of Technology, and in the inter-collegiate dramatic competition conducted at Coimbatore.

Sports activities centred round the College Day Sports, Club Day, Hostel Day and open sports. During the year, 13 matches in Hockey, 11 in Football and 12 in Cricket were played, besides a number of tournaments and friendly matches played in tennis, volley ball, basket ball, badminton and table tennis.

Two shields were won and College colours were awarded to the best players for the year in cricket, hockey, football and tennis.

(ix) *College Day and Conference.*—The Thirty-fourth College Day and Conference of the Madras Agricultural Students Union was celebrated on 30th and 31st July 1951 following the All-India Rice and Wheat Research Workers' Conference from 27th to 20th July 1951. The Conference was inaugurated by Sri K. M. Munshi, Minister for Food and Agriculture, Government of India. Sri Ramlal Sethi, I.A.S., Agricultural Commissioner to the Government of India, presided over the symposium on Manuring of Crops. An agricultural exhibition showing the activities of the different research sections was put up for the delegates and visitors. The Conference was attended by a large number of distinguished visitors, among whom mention may be made of Sri A. B. Shetty, Minister for Agriculture, Madras, Sri R. M. Sundaram, Secretary, Food and Agriculture Department, Sri N. Murugesu Mudaliar, Deputy Secretary, Food and Agriculture Department, Sri M. S. Sivaraman, I.C.S., Director of Agriculture, Madras, and Dr. Amir Ali, Hyderabad. Twenty-two papers were submitted for the symposium. Very keen interest was evinced in the subject and the discussions were ably guided by the Chairman.

The Departmental Officers' Conference was held under the presidentship of the Director of Agriculture and was attended by all Deputy Directors, District Agricultural Officers, Heads of Sections, Superintendents of Research Stations and other Gazetted Officers of the Agricultural College and Research Institute.

The joint meeting of the Board of Research and Extension of Indian Council of Agricultural Research was also held on 30th and 31st July under the presidentship of Sri K. M. Munshi.

The first Research Workers' Conference of the Madras Agricultural Department was held on 2nd August 1951 and Sri Ramlal Sethi presided. All the departmental research workers attended the meeting. The prizes for 1951 were distributed to the students for merit in their studies.

The State prize for the crop competition won by Sri Vellai Gounder of Krishnagiri taluk, Salem district, was awarded by Sri Munshi during this conference.

On the afternoon of the second day, there was the usual College Day tainment by enacting four dramas.

On the afternoon of the second day, there was the usual College Day Sports. Sri V. N. Lakshmanan was Champion for the year.

(x) Some of the important and distinguished foreign scientists who visited the Agricultural College and Research Institute were—

1. Dr. Oppenheimer from Israel, Member of the F.A.O.
2. Mr. M. Norris E. Wood, Director-General of the F.A.O.
3. Mr. Cummings, Director of South-East Asia, F.A.O.
4. Professor, Mangelsdorf of Rockefeller Foundation, New York.

gas producers, retorts and main supply lines was attended to. The gas tank and other units of the system were cleaned and painted to keep them in condition. Experiments are in progress for turning over to coal in place of firewood for producing gas.

(ii) *Water-supply* on the Estate was satisfactory. There were a few breakdowns due to old age of the pipes, these having been laid about 25 years ago. A proposal was, therefore, submitted for the renewal of the entire pipe line at a cost of Rs. 53,000 which was ordered to be deferred till September 1952. The purchase of a higher capacity pump to increase the supply of water is under correspondence. Repairs and minor breakdowns were promptly attended to. The daily average consumption of the water on the Estate was in June 1952 to the extent of 72,960 gallons as against 51,830 gallons during May 1951.

Proposals were submitted early in April 1952 for provision of an independent water-supply by providing an overhead tank to the Students' hostel as the present system does not suit the demands of the students and Government orders are awaited for the same.

(iii) *Electricity*.—The entire system of electricity comprising transformers, street lights and other installations on the Agricultural College and Research Institute and the estate were periodically tested and maintained in good order. The transformer oils, when tested, that of the transformer at the malt factory was found to be poor. The Superintending Engineer, Pykara Electricity System, has been addressed for supplying standard grades of oil.

The power factor at the Malt Factory was improved by installation of a condenser. The resistance unit in this condenser was replaced as it was found to be on open circuit which resulted in a poor power factor. By the renewal of the resistance unit, the normal power factor was obtained.

Proposals have been submitted for extending the electric supply to cotton and millet breeding stations departmentally. Extension of three-phase lines from Tractor Workshop was connected to the existing three-phase lines to the distribution supplying Research Engineer's Workshops. The following additional electrical installations were carried out during the year :—

- (1) Yard lighting in the Central Farm.
- (2) Seed Development office.
- (3) Students' Hostel.
- (4) Bull and pig sheds of the College Dairy.

Temporary connexions were also extended during the College Day and Hostel Day celebrations. The motor generator set was run alternately according to the load. The total consumption of electrical energy during the year was 169,142 units with a maximum demand of 61 K.W. The restriction bus service has been found to be more useful in carrying school children more than bullock carts.

(iv) *Transport passenger service*.—The two motor buses transferred from the Agricultural College, Bapatla, to the Assistant Agricultural Engineer (Research) in 1950 for conveyance of school-going children from the Estate was transferred to the control of the Principal from 1st October 1951. The bus service has been found to be useful in carrying school children at a quicker time and more accommodative than bullock carts.

(v) *Fire-drill*.—Classes were regularly conducted on all Wednesdays when the peons of the Institute were taught to handle the various equipments connected with fire-fighting, to be of use in cases of emergency.

The Tower clock is being maintained in good working order and it keeps regular time.

(vi) *Sanitation*.—The sanitation of the Estate was satisfactory, though the permanent Sanitary Inspector was on leave for a major portion of the year and the work was in additional charge of the Civil Supervisor. Cresol and Lysol were sprayed on stagnant waters to prevent breeding of mosquitoes and other disease-carrying germs. There were stray cases of smallpox in the Estate. Curative and prophylactic measures were taken in time. Vaccination camps were conducted in the Estate with the kind co-operation of the District Health Officer, Coimbatore. During these camps, 887 vaccinations were done including 13 primary vaccinations.

There were 20 births and nine deaths during the year.

The general health of the Estate remained satisfactory.

10. *Civil Engineering Section*.—The Civil Engineering Section engaged in teaching B.Sc. (Ag.) students and maintenance of departmental buildings continued to be under the control of the Principal.

As per Government Order, the work of maintenance of residential buildings on the Estate was transferred from the Public Works Department to the Principal from 1st April 1952. A Supervisor, an Upper Division Clerk and a peon sanctioned for the work was added on to the strength of the staff.

The Civil Engineer's section conducted the following classes during the year :—

	First year.		Second year.	
	Number.	Hours.	Number.	Hours.
(1)	(2)	(3)	(4)	(5)
Theory	17	17	11	11
Practical	52	156	36	108

The works undertaken by the section in the year are appended in Appendices A and B.

11. *The Agricultural Economics Section* continued to be under the control of the Principal. Sri S. V. Duraiswami Ayyar continued to be Lecturer in Agricultural Economics. The two assistants continued to handle the practical classes in Agricultural Economics for the Final Year B.Sc. (Ag.) class. Fifty-one lectures were delivered in the year. Fifty-six classes of 168 hours were devoted to the practical classes. The students were taken on tour to eight villages for rural enquiries. A report on the survey of economic conditions of the seven selected villages in Coimbatore district was submitted to the Director of Agriculture. The services of the two Assistants were also utilized for rural economic studies in Vadavalli and Goundanpalayam villages. A report on this will be submitted separately. The two assistants, besides the teaching work, also helped the Lecturer in arranging the tours of students, correction of records of observations and enquiries of students and guided them in their economic surveys of villages.

The following two papers were contributed by the section :—

(1) Note on economic aspects of manuring of crops to the College Day and Conference in July 1951.

(2) India's foreign trade—Agricultural commodities—to the Conference of the Indian Society of Agricultural Economics in November 1951.

12. Animal Husbandry Section.—The staff of one Lecturer, two Assistant Lecturers and a compounder continued to be under the Principal. During the year, Dr. Francis Joseph, the Lecturer in Animal Hygiene, was on leave on average pay for two months from 1st November 1951 when Sri S. N. Vaidyanathan, one of the Assistant Lecturers, held full additional charge of the post.

The following classes were dealt with by the section during the year:—

	Theory.	Practical.
(1)	(2)	(3)
B.Sc. (Agriculture), class I	53	94
Do. II	27	96
Total	80	190

Besides the teaching work detailed above, the following works were attended to in the Veterinary hospital attached to the College:—

In-patients to the hospital	904
Out-patients to the hospital	2,488

The average daily attendance was 50.36.

Seven hundred and eighty-five castrations were performed against 641 during the last year.

Operations—major	264	} 340
Do. —minor	76	

Microscopical specimens examined, 442.

Foot-and-mouth disease broke out in Paddy Breeding Station and Cotton Breeding Station. All affected animals were duly treated and necessary prophylactic measures were observed in time.

The health of the animals in Central Farm, Dairy and Breeding stations was good and satisfactory. Seventy-two cows were served by breeding bulls during the year. One hundred and four animals belonging to Central Farm and Research Stations were actually immunized against rinderpest by S.S. inoculation. Thirteen calves were also protected against rinderpest by serum alone method.

Two hundred and ten fowls of the College Dairy and 171 birds of the Estate residents were protected against Ranikhet disease. Ninety-eight birds of the Dairy and 68 birds of the Estate residents were vaccinated against fowl-pox. Monthly inspections of the private animals at the Paddy Breeding Station, Millet Breeding Station and on the College Estate were done. Twenty calves born to the Government bulls were also inspected during the year.

The general health of the livestock was satisfactory.

Sri K. Mehra, Director of Veterinary Services, Madhya Bharat, and Sri D. Pattabiraman, Deputy Director of Animal Husbandry (Livestock), Madras, visited the Institute during the year.

13. Artists' Section.—Comprising six artists and an artist-photographer, continued under the Principal. The balance of posters of the scheme, that could not be finished in the previous year was completed.

In addition to the above work, the artists undertook the work for the various sections of the Institute in the preparation of posters, labels, etc.

The Photographic section undertook the following works during the year:—

Photographic specimens	566
Prints	3,190
Developing roll films	10
Black and white diagrams	10
Copying, charts, models and posters, re-touching negatives	347
Enlarging	1,256
Micro-photographs	38
Total	5,417

Extension Service.—An extension service was started this year with the officers and students of this College on a purely voluntary basis. The idea of the service is for the volunteers to take up a farm nearby the institute and carry to it all improved methods of Agriculture by actual demonstration and conduct of the improved methods. There was considerable enthusiasm evinced in the service.

Central Farm—Land.—No land was added to the farm area this year. Out of 210 acres owned by the Central Farm, the specialists had 60 acres. The area proposed for acquisition was not secured during the year. A good deal of difficulty was experienced for dry land cultivation.

Season.—The rains were inadequate this year also and as a result the water-table in all wells went down considerably, making summer cultivation very difficult. The wetlands were kept going only with the help of the two wells in that area, as the channel water was received only three times and proved to be wholly inadequate.

In spite of the chronic water shortage, however, all the various experiments of the various specialists were carried out without fail. Green fodder for dairy animals was also grown and supplied as per schedule.

Well-boring.—With a view to relieve the acute water problem, power-boring was carried out in F. Nos. 42 and 57 while hand-boring was done in wells in F. Nos. 77, 68, 76 and 40. The cleaning of the existing bores was also carried out and all ways were tried of increasing the supply of water in the farm.

Livestock.—The year started with 41 pairs. Nine pairs were sold off as unserviceable. Three pairs were purchased. The strength at the end of the year is 36½ pairs.

A Farmers' Day was celebrated in December 1951 and a good show was put up. A number of ryots from adjacent villages attended.

College dairy.—The dairy attached to the Central Farm as well as the poultry are purely for educational purposes. The strength of the herd was 67 at the beginning of the year and the closing balance was 42. Four goats are also kept. The opening strength of the poultry was 111 birds and after disposals, transfers and casualties, the closing balance stood at 79 birds.

Practical classes to demonstrate butter making, ghee preparation and manufacture of "koa" were conducted for the benefit of the students. Practical classes were also run for a month during the holidays in connexion with the Dairy Husbandry course conducted for selected ryots of the State.

There is a very urgent need to improve the water-supply on the Central Farm, if the farm is to continue its useful purpose as a model for other farms and farmers, and also serve as a testing station for the various experiments of the different specialists at the Research Institute.

Cytogeneticist (Coimbatore).—The work of this section continued to be fundamental studies on millets, fruits and horticultural crops. In millets, special attention was paid to the auto-tetraploid *Pennisetum typhoides* and back-crosses of the allo-tetraploid of the *Pennisetum* inter-specific hybrid.

Hybridization between cultivated grain sorghums and *Sorghum halepense* (Johnson grass) was attempted. Trials with colchicine to induce polyploidy in grain sorghum Co. 5 was done.

In *Setaria* (Italian millet) hybridization of the diploid *S. italica* with *S. verticillata* (diploid) and with other tetraploid species of *Setaria* like *S. intermedia*, *S. pallidifusca* was also attempted.

Post-graduates.—Three post-graduate students were working in this section. Two completed their work and submitted theses for M.Sc. of the Madras University and qualified for the degree. The third student is continuing his work.

Cytogeneticist (Bapatla).—The research work was concentrated on rice, the main items of work being (1) study of wild species, with a view to utilize them for breeding, (2) study of geographical races of rice, hybridization between varieties and selection of economic types and (3) induction of genetic and chromosomal variations. A new line of work started this year was the study of the inheritance of economic characters.

Yield trials are being conducted with an acenaphthene-induced mutation in Co. 13. A natural mutant was picked out in a South American variety and is being multiplied.

A scheme to study transgressive segregation was started by crossing two saline-resistant varieties S.R. 26-BX, T.T. Vadlu and two non-lodging varieties of rice and the F_2 s are being grown.

Piricularia resistance was tested in the progenies of inter-variety crosses between varieties from different countries.

Plant Physiologist.—Studies were continued on the effect of pre-soaking seeds of different crops plants in phosphate solutions on their subsequent growth and yields.

A new scheme was sanctioned during the year for investigating the possibilities of pre-soaking in nutrient salts as a method of improving crop yields.

Viability—Studies.—Studies were conducted with the chemical 2, 3, 5 triphenyl tetrazolium chloride, to assess the viability of various seeds, in a shorter period than is possible by the normal direct germination tests. Fourteen varieties in paddy, nine in millets, four in pulses, six in oil-seeds and four varieties in cotton were tested. It was found that the use of the chemical is helpful in assessing seed viability more expeditiously than by ordinary germination tests.

The results of these studies were published in the *Madras Agricultural Journal* and summarized as a short note for the guidance of the seed development staff of the department.

General.—In pursuance of the final decision taken in the conference of the International Rice Commission held at Bandung, Indonesia, in May 1952 to implement the recommendations of the Working Party on fertilizers during the International Rice Commission at Bogor in 1951, it was decided to run a

training centre for research workers engaged in soil fertility investigations in Indonesia, India or Thailand under the expanded technical assistance programme of the F.A.O.

The training course is decidedly a short-term project and the purpose of the course is to bring to those attending it up to date concepts in experimentation with fertilizers, manures and soil amendments and to give them an opportunity of learning the latest procedure for determining the fertilizer requirements of rice on different soil types. It is designed for those who are professionally engaged in work on soil fertility problems with special reference to rice. In accordance with this decision of the conference the Member Governments and International Rice Commission have deputed trainees to participate in the training. Dr. K. Ramiah, the Rice Consultant, F.A.O., recommended the Agricultural College and Research Institute, Coimbatore, as a suitable place for running the course. The training centre was proposed to be inaugurated on 15th July 1952.

Certain alterations, fittings and laying of pipe-lines, provision of flush-outs, etc., together with other equipment were found necessary in the hostel premises to accommodate the trainees of the Soil Fertility course and these were carried out satisfactorily.

LIST OF VISITORS DURING THE YEAR.

1. Hon'ble Sri K. M. Munshi, Union Minister for Food and Agriculture.
2. Hon'ble Sri A. B. Shetty, Minister for Agriculture, Madras.
3. Sri Vishnu Sahay, Secretary, Food and Agriculture Department, Government of India.
4. Sri Bakshi, Personal Assistant to Hon'ble Minister, Government of India.
5. Sri R. M. Sundaram, Secretary to Government, Development Department.
6. „ N. Murugesu Mudaliar, Deputy Secretary to Government.
7. „ M. S. Sivaraman, I.C.S., Director of Agriculture, Madras.
8. „ B. M. Lakshminpathy, Joint Director of Agriculture, Madras.
9. „ Ram Lal Sethi, Agricultural Commissioner with the Government of India.
10. Sardar Datar Singh, Vice-Chairman, Indian Council of Agricultural Research.
11. Dr. Amir Ali, Dean of the Faculty of Agriculture, Osmania University, Hyderabad.
12. Sri P. A. Gopalakrishnan, Joint Secretary, Food and Agriculture Department, Government of India.
13. Hon'ble Sri B. Gopala Reddy, Minister for Finance, Government of Madras.
14. Mr. R. R. Keithan, Rural Welfare Worker, Gandhigram.
15. Sri K. Venkatasamy Nayudu.
16. Deputy Registrar of Co-operative Societies, Coimbatore.
17. District Veterinary Officer,
18. Sri E. P. Royappa, District Collector, Coimbatore.
19. „ G. R. Govindarajulu.
20. „ R. K. Kandasamy.
21. „ T. N. Palanisamy Gounder.

Members
of the Board
of Honorary
Visitors.

- 22 Sri K. Ramiah, Rice Consultant, F.A.O. for Asia and Far Eastern Countries.
- 23 Sri S. K. Mehra, Director of Animal Husbandry Services, Madhya Bharat Union.
- 24 Sri V. N. Amble, Statistician (Agricultural), Indian Council of Agricultural Research.
- 25 Sri Maule, Director of Bureau of Animal Breeding and Genetics to Livestock in India.
- 26 Professor Mundgil, Head of the Department of Mechanical Engineering, Roorkee.
- 27 Mr. Sassoon of Messrs. Parry & Co.
- 28 Sri B. G. Oka, Professor of Animal Husbandry and Dairying, Poona.
- 29 „ K. Venkataraman, Director, Educational Cinematographic Institute, Madras.
- 30 Dr. S. Krishnamurthy, Professor of Agriculture, Annamalai University.
- 31 Sri P. V. Acharya, Regional Director, F.A.O., New Delhi.
- 32 „ S. P. Srinivasan, I.A.S., Assistant Collector, under training.
- 33 Jewar Singh Pruthi, M.Sc. (Ag.), Bio-Chemist, Central Food Technological Institute, Mysore.
- 34 Dr. G. S. Batia, M.Sc., Ph.D. (Lond.), Second Economic Botanist to Government of Madhya Pradesh, Nagpur.
- 35 Sri D. Viswanatha Reddy, M.Sc., Compost Development Officer.
- 36 Dr. Nagan Gowda, Hon'ble Minister for Agriculture.
- 37 Director of Industries and Commerce.
- 38 Dr. T. M. Vithal Rao, B.Sc. (Hons.), Ph.D. (U.S.A.), Agricultural Chemist, Osmania University.
- 39 Sri A. P. A. Brito Muthunayagam, B.Sc. (Madras), M.Sc. (Cornell), F.C.S., Agricultural Chemist, Travancore State.
- 40 Sri M. Subbiah Pillai, Special Officer, Central Rice Research Institute, Cuttack.
- 41 Sri N. T. Gulrajani, Under Secretary to Government of India, Food and Agriculture Department, Government of India.
- 42 Chief Minister of Hyderabad.
- 43 Commissioner, Famine Relief.
- 44 Delegates of Rice and Wheat Research Workers' Conference.
- 45 Sri S. R. Maini, I.A.S., Secretary, Indian Council of Agricultural Research.
- 45A Sri K. R. Damle, I.C.S., Joint Vice-President of the Council.
- 46 „ B. P. Pal, Director, Indian Agricultural Research Institute.
- 47 „ Bhatnagar, Joint Secretary, Finance Department to the Government of India.
- 48 Sri V. M. Chavan, Deputy Director of Agriculture, Crop Research, Bombay.
- 49 Sri T. Srinivasamurthi, Senior Assistant Botanist, Paddy Research Station, Mysore.
- 50 Sri N. A. Patil, Assistant Plant Pathologist, Wheat Rust, Poona.

- 51 Sri S. C. Roy, Director of Intensive Cultivation, Ministry of Food, New Delhi.
- 52 Sri P. L. Patel, Director, Institute of Agriculture, Anand.
- 53 „ P. K. De, Agricultural Chemist, Government of West Bengal.
- 54 „ S. M. Wakankar, Economic Botanist, Agricultural Research Institute, Gwalior.
- 55 Sri M. S. Pawar, Rice Specialist to the Government of Hyderabad, Himaja Sagar.
- 56 Sri P. M. Ganguli, Economic Botanist, Assam.
- 57 „ S. B. Chattopadhyaya, Assistant Mycologist, Calcutta.
- 58 „ R. L. M. Ghose, Central Rice Research Institute, Cuttack.
- 59 „ M. V. Vachani, Agronomist, Central Rice Research Institute, Cuttack.
- 60 Sri Clarence A. Gideon, Assistant Economic Botanist, Main Farm, Parbhani.
- 61 Sri Sham Singh, Assistant Agricultural Commissioner to the Government of India.
- 62 Sri P. B. Ekbote, Wheat Specialist, Madhya Pradesh.
- 63 „ Varadarajan, Agricultural Officer, Coorg.
- 64 Janab Majid, Director of Agriculture, Assam, Shillong.
- 65 Sri Damodar Misra, In-charge of Extension Work, Cuttack.
- 66 „ Manavar, Additional Director of Agriculture, Uttar Pradesh.
- 67 „ H. E. Nandi, Director of Agriculture, West Bengal.
- 68 Dr. Vaidya, Madhya Pradesh, Nagpur.
- 69 Sri N. Parthasarathy, Economic Botanist, Indian Agricultural Research Institute.
- 70 Sri Lakshmi Shahi, Director of Animal Husbandry, Bombay.
- 71 „ M. P. Appajappa, Director of Agriculture, Mysore.
- 72 „ Rudramurthi, Assistant Director of Agriculture, Mysore.
- 73 Dr. Datta, Director, Izatnagar.
- 74 Sri Gurumani.
- 75 Dr. Vasudeva, Head of the Department of Mycology, Indian Agricultural Institute, Delhi.
- 76 Sri B. H. Marley, Principal, College of Technology, Coimbatore.
- 77 „ G. R. Damodaran, Principal, P.S.G. College, Coimbatore.
- 78 „ V. N. Rajan, Collector of Coimbatore.
- 79 „ N. D. Krishna Rao, District and Sessions Judge.
- 80 „ Lobo, Additional District and Sessions Judge.
- 81 „ C. R. Narayanaswamy Ayyar, Superintending Engineer.
- 82 „ T. A. Ramalingam Chettiar.
- 83 „ C. Subramaniam.
- 84 „ V. C. Palanisamy Gounder.

P. D. KARUNAKAR,

Principal, Agricultural College and Research Institute.

LAWLEY ROAD, P.O., COIMBATORE, 2nd August 1952.

STATEMENT OF TEMPORARY AND PERMANENT POSTS OF THE OFFICE OF THE
PRINCIPAL, AGRICULTURAL COLLEGE, COIMBATORE.

Name of service and post.	Number of posts Sanctioned.	
	Permanent.	Temporary.
I. Madras Agricultural Service—		
1 Principal	1	..
2 Plant Physiologist	1	..
3 Cytogeneticist (Coimbatore)	1	..
4 Do. (Bapatla)	1	..
5 Assistant Agricultural Engineer (Civil)	1	..
6 Assistant Agricultural Engineer (Mechanical)	1	..
7 Lecturer in Agricultural Economics	1	..
8 Lecturer in Animal Hygiene	1	..
II. Madras Agricultural Subordinate Service—		
1 Assistant to the Lecturer in Agricultural Economics.	..	2
2 Assistant to Cytogeneticist (Coimbatore)	..	1
3 Do. (Bapatla)	..	1
4 Assistant to Plant Physiologist	..	2
5 Fieldman	1	..
6 Museum Curator	1	..
7 Draughtsman	1	..
8 Artists	7	..
9 Sanitary Inspector	1	..
III. Madras General Subordinate Service—		
1 Librarian	1	..
2 Assistant Librarian	1	..
3 Veterinary Compounder	1	..
4 Laboratory attenders	3	..
5 Office and library attenders.	2	..
IV. Madras Ministerial Service—		
1 Head clerk	..	1
2 Upper Division Clerks	3	2
3 Lower Division Clerks	5	..
4 Steno-typists	..	2
5 Telephone operator	..	1
V. Madras Inferior Service—		
1 Peons	15	1
VI. Agricultural Engineering Section—		
1 Teaching Assistant (Mechanic)	..	1
2 Bus drivers	..	2
Inferior—		
3 Cleaner	..	1
VII. Madras Engineering Subordinate Service—		
1 Electrical Supervisor	1	..
2 Civil Supervisors	..	2
VIII. Madras Veterinary Subordinate Service—		
1 Additional Lecturer in Animal Hygiene	1	1

FINANCIAL STATEMENT FROM 1ST JULY 1951 TO 30TH JUNE 1952.

Expenditure.

(a) 40. Agriculture—E. Agricultural Education—A. Agricultural College—	RS.	AS.	PS.
1 Pay of officers, establishment including travelling allowance and other allowances.	52,203	8	0
2 Wages to coolies	2,375	15	0
3 Dearness allowance to coolies	1,472	7	0
4 Books and periodicals	3,916	0	0
5 Batta to students	3,773	10	9
6 Other contingencies	8,489	0	9
7 Scholarships	6,692	0	0
(b) 40. Agriculture—E. Agricultural Education—C. Central Farm and College Estate—			
1 Pay of officers, establishment including travelling allowance and other allowances.	11,042	15	0
2 Petty construction and repairs	10,029	5	6
3 Repairs and upkeep	7,754	12	0
4 Miscellaneous	36,624	5	9
5 Dearness allowance to menials	5,045	4	0
(c) 40. Agriculture—G. Experiments and Research—A. Research Institute—			
1 Pay officers, establishment including travelling allowance and other allowances.	41,851	14	0
2 Apparatus and materials	15,095	15	9
3 Other contingencies	712	4	9
4 Dearness allowance to menials	408	3	0
(d) 40. Agriculture—F. Agricultural Engineering—H. Lorries—			
1 Pay of establishment including travelling allowance and other allowances.	1,602	2	0
2 Other charges	3,292	3	6
(e) 40. Agriculture—Works	8,136	8	0
(f) 57. K. Miscellaneous and unforeseen charges in connection with the visit of high personages.	856	0	3

Statement of receipts under XXIX. Agriculture—Agricultural receipts.

(a) Agricultural College and Research Institute	35,799	4	0
(b) Miscellaneous	20,785	5	4
(c) Agricultural engineering and other receipts	31	8	0
(d) XLV. B. Stationery and printing	68	8	0

APPENDIX A.

LIST OF ESTIMATES PREPARED.

1 Annual repairs to Lawley Road Dispensary (providing teakwood leading for glass panes etc.)	19	8	0
2 Providing teakwood hat and coatstand at Principal's room.	30	0	0
3 Special repairs to gas and powerhouse buildings	1,000	0	0
4 Annual repairs to Veterinary Hospital	300	0	0
5 Annual repairs to elementary school	90	0	0
6 Repairs to office furniture	300	0	0

	RS.	AS.	PS.
7 Annual repairs to Chemistry and Entomological Laboratory	74	0	0
8 Annual repairs to yard well and engine shed	90	0	0
9 Annual repairs to roads (suppl.)	490	0	0
10 Repairs to septic tank at the officers, lavatory in Research Institute building.	74	0	0
11 Repairs to the floor of the Museum in the Freeman building.	42	0	0
12 Providing expanded metal in the courtyard of Ladies' Hostel.	220	0	0
13 Painting the furniture in the Veterinary Hospital ..	75	0	0
14 Distempering Freeman hall in the Freeman buildings ..	337	0	0
15 Providing racks in the Rest-house	70	0	0
16 Providing flush-out in staff latrine in Freeman buildings.	900	0	0
17 Extension of Telephone booth for providing Telephone Exchange.	75	0	0
18 Improvements to the Rest-house	1,200	0	0
	(approximate)		
19 Constructing one block of 8 quarters for Sanitary Mazdoors	22,000	0	0
	(approximate)		
20 Providing a water tank in the Students' Hostel ..	4,000	0	0
	(approximate)		
21 Constructing a compound wall around the Veterinary Hospital of the Agricultural College.	4,980	0	0
22 Construction of combined waiting and dressing shed at Veterinary Hospital in the Agricultural College.	3,400	0	0
23 Providing a glazed door in the Government Entomologist's room in the Research Institute.	160	0	0
24 Annual repairs to Government Malt Factory	90	0	0
25 Special repairs to Government Malt Factory	410	0	0
26 Estimate for providing barbed-wire fencing on the tank bund at Central Farm.	4,700	0	0
27 Providing revetment to the well at Botanical Garden ..	3,700	0	0
28 Concreting road near water trough at Cotton Breeding Station.	120	0	0
29 Annual repairs to road (providing a new gate with pillars and widening the approach to Cotton Breeding Station).	500	0	0
30 Revised estimate for constructing an office building for the Cotton Specialist.	20,000	0	0
31 Annual repairs to Insectory Buildings			
32 Alteration in the old insectory building			
33 Repairs and rethatching of apiary shed near Government Agricultural Chemist's bungalow.			
34 Annual repairs to Implement shed in the Orchard ..			
35 Annual repairs to office building in Orchard			
36 Repairs to pump set house for Government Lecturing and Systematic Botanist.			
37 Special repairs to Farm house roofing for Government Lecturing and Systematic Botanist.			

	RS.	AS.	PS.
38 Raising the roof of the Government Malt Factory machine building.	1,000	0	0
39 Constructing a cycle-shed in the Cotton Specialist office building.			
40 Converting the animal nutrition shed into Chemistry Laboratory in the Agricultural College Estate.			
41 Constructing a pump house in the College Orchard.			
42 Annual repairs to Central Farm Building for 1951-52.			
43 Annual repairs to Dairy building for 1951-52.			
44 Widening the A Block well.			
45 Annual repairs to Government Agricultural Chemist's room.			

APPENDIX B.

LIST OF WORK EXECUTED.

1. Providing and fixing soil pipes for urinals and wash basins in Students' Lavatory.
2. Repairing caution boards.
3. Fixing glass panes in Freeman hall.
4. Fixing screw catches for ventilators in library record room in Freeman building.
5. Annual repairs to Travellers' bungalow (providing tower bolts, etc.).
6. Replacing broken glass panes in Laboratory in the Research Institute, building.
7. Annual repairs to Students' Pavilion.
8. Annual repairs to Playground.
9. Annual repairs to Lawley Road Dispensary.
10. Providing a door in the Animal Nutrition shed for the Seed Development Office.
11. Annual repairs to Freeman building.
12. Special repairs to Students' Lavatory in the Freeman building.
13. Providing teakwood hat and coatstand in Principal's office room.
14. Annual repairs to Cotton Laboratory in the Research Institute buildings.
15. Annual repairs to Officers' Mess.
16. Annual repairs to yard well and pump house.
17. Annual repairs to elementary school building.
18. Annual repairs to Veterinary Hospital.
19. Annual repairs to Chemistry Laboratory.
20. Annual repairs to roads in the College Estate.
21. Construction of a pot culture house for the Plant Physiologist.
22. Repairs to office furniture of the college.
23. Annual repairs to Research Institute buildings.
24. Special repairs to gas and power house.
25. Providing expanded metal in the courtyard of Ladies' Hostel.
26. Painting furniture in the Veterinary hospital.
27. Extending telephone booth in the Research Institute building.
28. Providing racks in the Rest-house.

29. Distemping Freeman hall in the Freeman building.
 30. Special repairs to lean to roof in the Dry earth cattle-shed in the Central.
 31. Special repairs to the milking shed.
 32. Deepening the M. Block well in Central Farm.
 33. Annual repairs to Government Malt Factory for 1951-52.
 34. Special repairs to Government Malt Factory buildings for 1951-52.
 35. Making rat-proof to the office building in the Botanical Garden.
 36. Constructing a latrine in the Botanical Garden.
 37. Constructing an office building for the Cotton Specialist—Estimate Rs. 20,000.
 38. Extending lean-to roof in the Central Farm office building.
 39. Providing benches in the implement shed in the Central Farm.
 40. Special repairs to pump house in the Botanical Garden.
 41. Constructing a room in the College orchard well for housing the motor pump set.
 42. Annual repairs to the implement shed in the Orchard.
 43. Annual repairs to Central Farm buildings.
 44. Annual repairs to Government Agricultural Chemist's building.

STATEMENT SHOWING THE OUTPUT AND DISPOSAL OF DAIRY PRODUCE.

	Opening balance.	Receipts.	Total.	Cash sales.	Credit sales.	Fed to stock.	Separation.	Demons- tration.	Rejected and Total Difference.	Balance.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Whole milk	..	Rs. A. 43,271 8	Rs. A. 43,271 8	Rs. A. 498 8	Rs. A. 35,809 12	Rs. A. 59 12	Rs. A. 47 0	Rs. A. 273 0	Rs. A. 43,504 12	Rs. A. 234 4
Skim milk	..	Rs. A. 6,026 12	Rs. A. 1,830 12	Rs. A. 1,830 12	Rs. A. 1,169 0	Rs. A. 1,841 0	Rs. A. 198 0	Rs. A. 721 0	Rs. A. 6,026 12	Rs. A. 1 0
Cream	..	Rs. A. 1 15	Rs. A. 675 1	Rs. A. 677 0	Rs. A. 13 6	Rs. A. 642 3	Rs. A. 72 1	Rs. A. 21 7	Rs. A. 677 0	Rs. A. Nil
Butter	..	Rs. A. 0 11	Rs. A. 350 15	Rs. A. 351 10	Rs. A. 163 10	Rs. A. 110 12	Rs. A. 72 1	Rs. A. 5 3	Rs. A. 351 10	Rs. A. 10
Ghee	..	Rs. A. 0 11	Rs. A. 63 12	Rs. A. 63 12	Rs. A. 63 2	Rs. A. 24 6	Rs. A. 38 12	Rs. A. 63 2	Rs. A. 63 2	Rs. A. 10
Eggs (in Nos.)	..	Rs. A. 50	Rs. A. 4,675	Rs. A. 2,619	Rs. A. 9,460 0	Rs. A. 1,463 0	Rs. A. 3,038 0	Rs. A. 1,875 0	Rs. A. 9,460 0	Rs. A. 10
Curd	..	Rs. A. 0	Rs. A. 721 0	Rs. A. 721 0	Rs. A. 163 0	Rs. A. 163 0	Rs. A. 57 0	Rs. A. 57 0	Rs. A. 721 0	Rs. A. 10

Pure line work on the stations.—Selection work in certain varieties in which strains are in demand was continued at all the research stations. At Coimbatore, work on Barigavadlu of Anantapur, was continued. Nucleus seed of cultures in four Wynad varieties were maintained.

At Pattambi a total of 33 cultures in Elapappuchamban, Chornali Valia Chamban, Velutharikayama, Chuvanna, Vellakoli were under yield trials and twelve promising cultures were carried forward for further work.

Two cultures in Pedda Atragada were multiplied for large-scale trial in the Krishna delta.

Further work at Rice Research Station, Tirurkuppam, on Swarnavari which serves a lakh of acres, resulted in better yielding cultures than the strain TKM. 3 which is now under cultivation. Yield trials of 79 cultures in six varieties of the Chingleput, North Arcot and South Arcot districts were rendered inconclusive due to the very severe drought that the tract experienced. One hundred and ninety-two selections in five varieties were under studies and in spite of the drought, certain cultures which showed promise were marked for further trials.

At the Paddy Breeding Station, Mangalore, 29 cultures in the four important first-crop varieties and nine cultures in Athikraya which cover 80 per cent of the area between themselves were under yield trials and nineteen cultures were found promising.

At Ambasamudram work on Pulidipiratti, (a dry rice) Sembulli and Maikuruvai was continued and 206 selections were found promising.

At Buchireddipalem 106 selections in Pishanam, Sannavadlu, Masipishanam (a drilled rice) and Iswarakora were under various stages of study. Though the season was very adverse, most of the cultures recorded higher yields than the standard.

At Aduthurai selection work in the vigorous growing short duration red rice variety of Mattakuruvai was continued. Eighteen cultures in the three varieties common in the sandy coast were under yield trials. The best of them will be sent next year for district trials.

Hybridisation.—Intensive hybridisation work was undertaken at Coimbatore on the following lines for economic ends:—

(i) *Evolution of blast resistant strains.*—The blast resistant Co. 25 Sirumani continues to be very popular in the Tanjore delta and would have covered nearly two lakhs of acres. It is also finding favour with the cultivators in Madurai and Tirunelveli. For improving its quality, further crosses were made between Co. 25 and other strains and the progenies are in F_3 stage. In the evolution of short duration strains to replace the popular Co. 13 and Co. 10 which are blast susceptible, intensive studies resulted in the isolation of two cultures which are multiplied for large scale trials next season. Similarly crosses were effected for evolution of medium duration strains to replace GEB. 24, Co. 2 and Co. 8, which are not resistant to blast to the degree one would wish. In all about 3,000 progenies at various generations were studied and the season was favourable for incidence of blast which helped the studies very much.

(ii) *Drought resistance.*—From the study of crosses made between cultivated rices and the wild rices to evolve drought resistant strains of superior quality, 150 progenies were studied under controlled irrigated conditions at Coimbatore and also at Tirurkuppam sub-station. Certain progenies had given 100 per cent yield over the non-resistant popular strains. Three hundred selections were made for further studies.

(iii) For evolution of dormant short-duration strains which are useful during wet harvest, twelve sets of crosses were made and the F_1 s were studied. Some F_2 were raised in the Navarai season also and promising selections were made. It looked as though it is possible to combine yield and dormancy.

(iv) On the principle that crossing geographical races *indica* and *japonica* groups, may release certain valuable combinations of genes residing in each of them, seventeen sets of crosses were made and studied. Sterility is a great barrier which has yet to be overcome for successful results. This work will be pursued in the coming year using the latest methods to restore fertility.

Deep-water rices.—With a view to evolve suitable strains for the submersible areas which cover an area of at least two lakhs of acres in the State, where at present paddy raising during the monsoon season is a problem, a large number of progenies of crosses between the local strains and Burma were studied at the newly opened Rice Research Station at Pulla. The first year's study which was carried out under exhaustive rigours was very promising. Certain Siamese types gave 1,150 lb. of paddy, while the crops in the submerged area completely perished. Certain cross-progenies had very good tillering, desirable heading characters besides withstanding submersion. These have again been under trial for the second time.

Saline resistance.—For want of a suitable station in the typical saline areas, the progenies of crosses which were undertaken between the reputed saline resistant strains, SR. 26 B and Tellathokavadlu on the one hand and the popular strains of different duration on the other, were kept going. Some of the material was tested on the ryots' fields in typical areas with the collaboration of the District Officers. Still it is a hit or miss method and substantial progress may not be possible until a station is opened in a typically saline area. Proposals to open a station are pending with the Government awaiting sanction. Besides, breeding for a bunched type similar to GEB. 24, high quality Jada Molagolukulu and evolution of cosmopolitan strains was continued.

In addition to the evolution of high yielding strains in the local varieties, certain hybridisation work was also taken up at the sub-stations with definite objects. At the Agricultural Research Station, Aduthurai, a culture (1560) was fixed which is blast resistant, resembling White Sirumani, both in size of grain and quality of rice. At Maruter 531 cross progenies were studied to evolve a better quality Akkullu, a higher yielding GEB. 24 and shorter duration high yielding strains than MTU. 9 and MTU. 15 and desirable progenies were carried forward for further test and trial.

Twelve cross-progenies were studied at Pattambi during the first-crop season to evolve a uniform ripening PTB. 9. Out of the 466 selections under study during the second crop for producing high yielding medium duration strains, 47 were found promising. One culture was found to be as good as Co. 3 and it did not deteriorate during storage through monsoon.

Two short duration cross-progenies 5059 and 5056 were found to be useful in the Swarnavari and Navarai season at Tirurkuppam besides possessing good quality of rice. Selections with stiff straw gave better yield than the lodging strain of Co. 18 during the Navarai season.

At Mangalore, work on the evolution of a non-deteriorating Co. 3 resulted in two cultures, which are promising. Crosses were effected

between suitable South Kanara strains and non-lodging strains for other places by combining non-deteriorating strains during first-crop season which results in a large amount of waste during wet harvests.

At Ambasamudram, culture 5108, a cross progeny between GEB. 24 and Kavuinginpoothala was found to do well in the studies over a series of years. This was fixed up for trial in the district. Certain cultures were found to do better than ASD. 6 in yield and standing power, and the studies would be continued.

Studies for evolution of short duration Co. 25, short duration saline resistant strains and dormant strains were reinforced at Aduthurai also. In all 350 progenies were studied.

Induction of mutations.—Treatment of germinating seeds with certain chemicals such as ceresan, acenaphthene and benzene resulted in a few mutants, which are slightly later in duration but high yielding. The trials were continued and the 'mutants' maintained their superiority in their characters. District trials are proposed next season.

Introductions—Types.—One hundred more pure lines were added to the existing collection which now totals 2,400. Ten species of *Oryza* and a dozen forms of *O. sativa* var *spontanea* were maintained. It is found that certain Chinese types are useful during the second-crop season and these were sent to the sub-stations for trial in these areas. A co-ordinate set of trials of some Chinese types received from the Director, Central Rice Research Institute, Cuttack, were planted in this first-crop season. SR. 26 B introduced from Orissa was doing well in many places where the land is moderately saline. Kasipichodi, a fine grained type from Hyderabad is popular under well irrigated conditions and high-level second-crop areas.

Manurial experiments.—Nightsoil compost was found to be better in the Samba season than farmyard manure and equal to it in the Swarnavari season at 60 lb. nitrogen and both were better than no manure at Rice Research Station, Tirurkuppam, and Agricultural Research Station, Maruter. Fused phosphate was found to be as efficacious as super at all stations of trial. Super applied to green manure crops increased the yield of green matter up to 50 per cent in the West Coast and Aduturai and the results show that the trend that indirect application of phosphate through green manure is more efficacious than directly applying it to rice. Bonemeal was found to be efficacious at Mangalore than super in the first year of the trial. There was no interaction between graded doses of P_2O_5 application with varying levels of green matter as basal dressing.

It was found that at higher doses of nitrogen, the crop had a tendency to stand erect by placing the ammonium sulphate 2 inches below the surface in the form of pellets mixed with earth.

Cultural trials.—Spraying dicotox, a patent weed killer, 1 in 50 or 1 in 100 was somewhat useful to kill weed growth in the modan area but could not control the subsequent weed growth.

Other crops.—It has been demonstrated whenever some irrigations are possible that cotton and groundnuts are useful in the rice fallows securing a substantial profit. M.U. 1 cotton sown at 8 feet apart in lines with dry rice was very paying in the dry areas at Tirurkuppam station. By closely planting sesbania seedlings with the paddy along the margins of paddy field bunds up to 6,000 lb. of green leaf could be secured depending upon the climatic conditions.

A scheme for improvement of sweet potato and tapioca was run at three sub-stations. The results show that certain American and Chinese sweet potato types give very delicious vegetable as well as high yield. Nitrogen did not increase sweet potato tuber production in the rich soils of Coimbatore while it was very efficacious in the laterite soils of West Coast. Studies on ginger continued at Pattambi on various aspects and it was generally found that cattle-manure is the most efficacious of all the different types of nitrogenous manures. Leaving a portion of the crop with proper mulching was found the best way of preserving seed material of ginger.

Trials on Sea Island cotton were continued at Mangalore and Pattambi. All odd corners with facilities were used for growing some crop or the other, either to serve as food, fodder or green manure. The year recorded an increase of revenue at Maruter and Pattambi over the previous season.

Tours.—I was on tour for 101 days in the districts in connexion with inspection of the stations where rice work was being carried on. The stations Samalkota and Palur were put under my technical control. Enquiries from private landlords of the State and requests for seed from abroad were suitably dealt with.

Post-graduate training.—Of the four officers who have registered for M.Sc., two have finished their work and are submitting their theses this August.

Publications.—A popular bulletin on rice in Madras was issued this year. A large number of papers for the College Day and First Scientific Officers' Conference, News Letters and notes for the Grow More Food journals were contributed from the Section.

Visitors.—Notable amongst the visitors were—

(1) The Rajpramukh of Mysore, (2) Dr. E. Norris Dodd, Director-General of the F.A.O., (3) Hon'ble Mr. Munshi, the Food and Agricultural Minister, Government of India, (4) Hon'ble Dr. Nagan Gowda, Minister for Agriculture, (5) The Commissioner of Civil Supplies, Madras, (6) Sri R. L. Sethi, Agricultural Commissioner, (7) P. C. Mangelsdorff, Esq., of Rockefeller Foundation, (8) Sir Datar Singh (Government of India), Vice-Chairman, Indian Council of Agricultural Research, and (9) Sri B. Ramakrishna Rao, Chief Minister of Hyderabad (Deccan).

Farmers' Days were regularly held each quarter on all the Research Stations which were successful, with good attendance and exhibits.

COIMBATORE,
2nd August 1952.

M. B. V. NARASINGA RAO,
Paddy Specialist.

APPENDIX I.

STATEMENT I.

Staff on Station where both the technical and administrative controls are with the Paddy Specialist.

Name of service and post.	Number of sanctioned posts.	
	Permanent.	Temporary.
I. Madras Agricultural Service—		
Paddy Specialist	1	..
Assistant Paddy Specialist	2	..
Agricultural Meteorologist	..	1
Superintendents	2	1

Name of service and post.	Number of sanctioned posts	
	Permanent.	Temporary.
II. Madras Agricultural Subordinate Service—		
Upper subordinates	22	10
Fieldmen	24	10
III. Madras Ministerial Service—		
Lower division clerks	8	3
Clerk-cum-Typist	..	1
Typists	..	2
Computer—Upper division clerk	..	1
IV. Madras General Subordinate Service—		
Laboratory attenders	2	..
Demonstration maistries	..	3
V. Madras Inferior Service—		
Peons	7	10

STATEMENT II.

Seed materials distributed by stations under complete control of Paddy Specialist.

	LB.	NOB.
Vegetable seeds of different sorts	432	..
Vegetable seedlings	..	1,950
Sesbania speciosa seeds	4,521	..
Gliricidia seeds	140	..
Sesbania seedlings	..	2,00,000
Gliricidia seedlings	..	34,890
Groundnut	2,144	..
Gingelly	770	..
Fruit plants (lemon, banana, etc.)	..	3,012
Grass slips	..	16,300
Tapioca stems	..	38,000
Kapok	25	..
Sweet potato	..	35,000

APPENDIX II.

SUMMARY OF THE RESULTS ACHIEVED BY THE PADDY SECTION DURING 1951-52.

Evolution of high-yielding strains from the local varieties in which strains are in demand continued to be the important line of work of the section. Hybridization for special aims was taken up and the materials were at different stages of study. The following is the summary of the results achieved.

Paddy Breeding Station, Coimbatore.

Strains released.—Two strains from Paddy Breeding Station, Coimbatore, Co. 27 Puddupatti Samba and Co. 28 Bangarutheegalu of Kurnool Wynad 1, Palthondi, Wynad 2, Marathondi for the hill regions of Malabar. Selected work was in progress in Barigavadlu of Anantapur.

Nucleus seed was distributed to the districts for multiplication and distribution in the coming years. These strains will have a potential spread of a lakh of acres.

Hybridization.—Evolution of short and medium duration blast resistant high yielding strains resembling the susceptible popular ones is one of the important activities. Two cultures amongst the short duration and one culture in the medium duration (GEB. 24) was selected up for trials in the district. Crosses made for improving the quality of rice of the highly resistant and very popular

Co. 25 sirumani are at different stages of study. Co. 25 and Co. 26 have covered nearly two lakhs of acres in the southern districts of Tanjore, Madurai and Tirunelveli and they were very popular.

Four hundred progenies of crosses made between drought resistant wild rice forms *Oryza sativa spontanea* and cultivated strains of different duration were studied under restricted water supplies and promising material was secured for further work on the station and in the districts.

Fundamental work.—Induction of mutations, production of economic polyploids are being taken up in collaboration with the Cytogeneticist. The crossing of geographic races, japonica, indica and certain South American and Belgian Congo types was put on hand for combining the rare genes in these groups. A live collection of 2,400 types (including 10 species of *Oryza* and a number of wild rice forms) was being maintained for utilizing them in hybridisation work.

Agronomy.—The problem of making the paddy ryot self-sufficient with regard to green manuring which is found to be the most efficacious and economical was being demonstrated by utilizing the field margins for raising *Sesbania*, planting of wide bunds with quick leaf producing shrubs like *Gliricidia* and raising *Sesbania* during the fallow period where one or two irrigations are possible.

Cotton and groundnuts were grown in the rice fallows with success. Three exotic varieties of sweet potato B. 219, V. 1 and V. 12 and two seedling types were found promising.

APPENDIX III.

PROGRAMMES OF WORK FOR 1952-53 OF PADDY SECTION.

Paddy Breeding Station, Coimbatore.

I. **Pure line selection.**—(i) District trials of promising cultures in six Ramnad varieties—tank fed.

(ii) Maintenance of purity of stocks of strains by replicated progeny row.

(iii) Study of single plant selections made in Barigavadlu (Anantapur) and Tiruchengode samba (Erode).

(iv) Evolution of strains suitable for tank-fed areas—work to be done at Puramakudi Farm.

II. **Hybridisation.**—(a) **Blast resistance.**—(i) Study of back crosses in the F_2 stage. (Co. 25 $\times$ Co. 4 $\times$ Co. 25); (Co. 4 $\times$ Co. 9) $\times$ (Co. 9); (Co. 13 $\times$ Co. 4) $\times$ (Co. 13).

(ii) Study of progenies of medium and short duration strains with Co. 4 in the F_3 and F_4 stage.

(iii) Study of F_2 of crosses made between the popular strains, BAM. 3, PLR. 1, BAM. 6, SLO. 17 with Co. 4.

Studies will be also carried out at Aduturai and Buchireddipalem.

(b) Study of crosses made for special purposes—

(i) GEB. 24 $\times$ Kolamba (for combining tillering of GEB. 24 with heading characters of Kolamba).

(ii) Co. 15 $\times$ Komban samba (for improving quality of Co. 15).

(iii) Kavunginpoothala $\times$ GEB. 24 (for combining the panicle characters of Kavunginpoothala with tillering of GEB. 24).

(c) **Flood resistance.**—The material is studied at Pulla Deep Water Rice Station. (The nucleus seed is maintained at the Paddy Breeding Station, Coimbatore.)

(d) Study of progenies of crosses made for alkaline resistance in the districts and maintenance of material at the Paddy Breeding Station, Coimbatore.

(e) Study of progenies of crosses between cultivated × wild rices made for drought resistance under controlled conditions of water supplies. The studies will be reinforced at Tirurkuppam and Pattambi.

(f) Study of F_2 s of crosses made for introducing 'dormancy' in short duration strains.

(g) Study of crosses made for evolution of short and medium duration strains with stiff straw.

(h) Study of F_2 s of crosses made between 'Japonica' × 'Indica' types.

III. (a) Maintenance of 2,400 types and study of any further accessions.

(b) Selection of types for trial in different seasons in the several zones of the Madras State.

(c) Comparison of promising exotic types in the navarai season for yield at Coimbatore and Tirurkuppam.

IV. Manurial trials.—(i) Studies on the efficacy of applying phosphate direct to rice and through the green manure crops.

(ii) Continuation of the experiment on graded doses of P_2O_5 and leaf.

(iii) Study of placement of ammonium sulphate × local method of application.

(iv) Studies in the methods of application of P_2O_5 to transplanted paddy crop.

(v) N and P_2O_5 levels at 0, 30, 45 and 60 lb. alone and in combination.

(vi) Laying out a permanent Manurial Experiment involving nitrogen from different sources, two levels of K_2O , two levels of P_2O_5 and two levels of lime.

(vii) Studies on the manurial requirements of organic matter to rice soils.

V. Cultural trials.—(i) Adoption of methods of making paddy farmer self-sufficient with regard to green leaf requirements.

(ii) Growing of cotton and groundnut in the rice fallows.

(iii) Continuation of studies on improvement of tuber crops, sweet potato and tapioca (Indian Council of Agricultural Research Scheme).

VI. Fundamental studies.—(i) Induction of mutations by various methods and study of polyploids (in collaboration with Cytogeneticist).

(ii) Studies on the anatomy of stem of deep water rices × ordinary rices.

ADMINISTRATION REPORT OF THE AGRICULTURAL METEOROLOGY SECTION, COIMBATORE.

I. Sri C. Balasubramanian, Agricultural Meteorologist, continued to be in direct charge of the section under my technical and administrative control, throughout the period under report.

II. Formation of the section.—The Agricultural Meteorology Section was formed on 14th February 1948 as per the resolution of the crops and soils wing of the Board of Agriculture and Animal Husbandry in India at its meeting held in February 1942. The object of the formation of the section was to collect data on the influence of climatic factors on crop growth, yield and incidence of pests and diseases. It was also felt necessary that suitable data should be collected for a series of years and the data collected should be analysed and interpreted both in respect of the incidence of pests and diseases and of meteorological conditions, if prediction of the outbreak of pests and diseases of crops is to be attempted with success.

III. Main lines of research pursued in this section.—(1) Collection of daily meteorological and microclimatic data, the latter being 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 as detailed below:—

(a) Coimbatore—Paddy, cotton and cholam.

(b) Aduthurai—Paddy.

(c) Pattambi—Paddy.

(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) The section is taking necessary action to erect an observatory at Agricultural College, Bapatla, on the same lines as the one located at the Agricultural Meteorological Observatory, Coimbatore.

(4) 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 influences 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 rainfall data received from the District Collectors were posted in the concerned register.

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

(i) The compilation of soil temperature data recorded at 5, 10, 20 and 30 cms. depth was taken up.

(j) The data of daily evaporation from the two soil evaporimeters were compiled for the period of record, viz., one year.

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

(l) The reports received from the District Agricultural Officers with reference to the "season and crops" were compiled and a short note comprising the whole State was submitted to Director of Agriculture, Madras.

(m) The yield of GEB. 24 (paddy) for a period of 35 years was statistically studied for its relative dependence on the meteorological factors. A paper was written on the findings for presenting in the ensuing scientific conference.

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

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

(p) The growth rates of cotton K_2 and K_3 varieties during 1950-51 were compiled and a polynomial growth curve for K_1 was fitted up.

(q) Microclimatic data collected in cotton in 1948-49 and 1949-50 were analysed.

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

(s) The data collected at Hagari, Anakapalle, Tindivanam, Koilpatti and Guntur for 10 years on the rainfall yield correlation experiments were analysed.

(t) The data sent by the Fruit Specialist and the Cytogeneticist were analysed.

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

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

(w) A ready reckoner for the vapour pressure and humidity for the corresponding dry and wet bulb readings is being prepared.

(5) *Collaboration with the Government Entomologist in the prediction of outbreak of pests.*—(a) In collaboration with the Government Entomologist microclimatic 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.

(b) The reports received from the crop specialists with regard to the incidence of pests and diseases were compiled in a separate register.

(c) A detailed line of work on the collection of meteorological data on the incidence of sugarcane borer was submitted to Director of Agriculture in consultation with the Government Entomologist.

(d) Data of incidence of pests and diseases were collected as far as available from the annual station reports.

(e) The records maintained on the stem-borer attack on paddy at Agricultural Research Station, Maruteru, were examined.

(6) The experiments on the drought resistance of crop plants and the study of the weather forecasts issued in the local almanacs were discontinued as per the orders of the Director of Agriculture, Madras.

IV. *Publications.*—(i) Monthly weather reviews were published regularly in the *Madras Agricultural Journal*.

(ii) Twelve papers on Agricultural Meteorology and allied subjects were released for publication.

V. *Miscellaneous.*—(a) *Teaching.*—The Agricultural Meteorologist delivered special lectures to the first year students in the colleges of Agriculture at Coimbatore and at Bapatla.

(b) The weather data and technical advice were supplied to the officers of both the central and State Governments and also University and quasi-Government bodies.

(c) Daily comparative weather statements were maintained and submitted regularly every month to the Director of Agricultural Meteorology, Poona.

(d) Agricultural Meteorologist collected folk-lore during all his tours.

(e) The Agricultural Meteorology section had been taking part in all the departmental conferences and exhibitions.

(f) The various weather reports, crop reports and progress reports were submitted to the Director of Agriculture, Madras, Director, Agricultural Meteorology, Poona, and the Secretary, Research Council, Coimbatore, on the due dates. The Honourable Minister for Finance, Madras, and Inspector-General of Police, Madras, were supplied with reports on "Season in 1951-52 and its effects on crops."

(g) To assess the influence of the meteorological factors on the physiological shedding of pepper spikes, a scheme of work was drawn up in consultation with the Oil Seed Specialist and the Pepper Specialist as per the orders of the Director of Agriculture.

(b) The Agricultural Meteorologist delivered a special lecture on "Agricultural Meteorology in Madras State" under the auspices of the Madras University under the Extension Lecture Scheme.

(i) Indexing of literature pertaining to Agricultural Meteorology and allied subjects was attended to.

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

COIMBATORE,
28th July 1952.

M. B. V. NARASINGA RAO,
Paddy Specialist.

APPENDIX.

SEASONAL CONDITIONS DURING 1951-52 (FASLI YEAR) AND THEIR EFFECTS ON CROPS.

South-west monsoon period.—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 damage to the just transplanted paddy crop over extensive areas, but 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. 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. Tetrad and army worm infested paddy crop and Red hairy caterpillar prevailed over Groundnut crop in South Arcot and parts of Tiruchirappalli in August-September. In South Kanara 'Hispa' attack on paddy was rather in a severe form particularly in Mangalore and Udipi 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.—The commencement of the north-east monsoon also was very much discouraging as rains were far below normal throughout the State, thus augmenting the drought in the several districts where already south-west monsoon had disappointed. The Carnatic zone comprising of Nellore, Chingleput and South Arcot received only below 25 per cent of its normal October rainfall, thus affecting water-supply in all the tanks and making future prospects gloomy. In the month of November, South Arcot got heavy rains while Chingleput and Nellore maintained status quo. Due to want of rains and consequently lack of water for irrigation, paddy nurseries were abandoned in Chittoor and semi-dry paddy was allowed for grazing in Chingleput district. Rainfall in December also was 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 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 an utter failure in this State for the fifth year in succession causing anxiety and distress in most places.

Dry weather period.—Dry weather prevailed generally over the State in January except for scattered light showers here and there. Harvests were in full swing utilizing 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 saving many 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. Sooty 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 potato was in full swing in March.

Scarcity for even 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 thunder showers occurred, mainly in the Circars, hills and in the southern districts favouring the Masulipattam cotton. Dry weather continued for the first 20 days of May and thereafter widespread, 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 reported that area under Swarnavari paddy will increase to 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 some hardship to potato crop.

The starting of the south-west monsoon in June 1952 is again disappointing. The rainfall was slightly above normal only in South Kanara while in all other places it was below normal. The main reservoirs were at a low ebb during the month with the result that planting of first crop paddy in Tanjore will be delayed to the detriment of yield. In the Nilgiris also the potato main crop is suffering due to drought. This is further augmented by the infestation of the crop by cut worm and cock chafers. The early sown dry crops are suffering throughout the State.

ADMINISTRATION REPORT OF THE COTTON SPECIALIST FOR THE YEAR 1951-52.

I. Charge.—Sri C. Jagannatha Rao continued to be in charge of the section as Cotton Specialist till the forenoon of the 14th April 1952 when Sri S. M. Kalyanaraman took over charge and continued to act as Cotton Specialist till the end of the year.

Early during the year, the scheme for the certification of CO. 4 cotton (Uganda) was sanctioned in G.O. No. 3464, Development, dated 26th July 1951, and continued to work successfully throughout the year, certifying the summer crop of 1951, the winter crop of 1951-52 and registration and inspection of the summer crop of 1952.

During the year there were a number of changes in the personnel of the posts of Assistant Cotton Specialists, primarily due to the sanction of the certification scheme. Sri T. V. Rangaswamy continued to hold the post of Assistant Cotton Specialist at headquarters. Sri P. N. Krishnaswami Rao was posted as Certification Officer and was relieved of his duties as Assistant Cotton Specialist, Srivilliputhur, on the afternoon of 15th August 1951 and he took over charge as Certification Officer on 16th August 1951 forenoon. Sri C. K. Ramachandran, who was Assistant Cotton Extension Officer at Koilpatti, was posted as Assistant Cotton Specialist, Srivilliputhur, and he took charge from Sri P. N. Krishnaswamy Rao on the afternoon of 15th August, 1951. Sri A. Raghavan continued to be Assistant Cotton Specialist at Siruguppa in charge of the scheme for the breeding of Cambodia cotton suited to the black soils of the Ceded districts, till he went on leave on 17th June 1952, forenoon when the Assistant Cotton Specialist, Bellary, relieved him holding additional charge. Sri K. Satyanarayanamurthy, Assistant Cotton Specialist, Mungari and Westerns Schemes, continued to be in charge of the schemes throughout the year and in addition he held additional charge of the post of Assistant Cotton Specialist, Siruguppa, from the forenoon of 17th June 1952 vice Sri A. Raghavan granted earned leave for 46 days. Sri G. Seshadri Ayyangar and Sri V. Ramaswamy Mudaliar, Assistant Cotton Specialists, continued to be in charge of the Cocanadas and Winter Cambodia Schemes respectively at Narasaraopet and Coimbatore while Sri M. Venkoba Rao and Sri L. Neelakanta Ayyar, Assistant Cotton Specialists, continued to hold charge of Northern Schemes and Chille Scheme, respectively, at Nandyal and Lam. In addition, the latter two officers were also in charge of the Agricultural Research Stations at Nandyal and Lam, respectively. Sri S. Mayandi Pillai was in charge of the scheme for the multiplication of K. 2 and CO. 4 cotton throughout the year. He was in additional charge of the post of Assistant Cotton Specialist, Karunganni Scheme, from the afternoon of 12th April 1952 when Sri S. Kalyanarama Ayyar, Assistant Cotton Specialist, Karunganni and unirrigated Cambodia Schemes, was relieved on his transfer to Coimbatore as Cotton Specialist.

During the year under report, Sri K. Kannian, the Senior Cotton Assistant at the Cotton Breeding Station, was promoted as Assistant Cotton Extension Officer, Guntur, and he was relieved of his duties as Senior Assistant at the Cotton Breeding Station on 9th June 1952 afternoon. Sri M. Bhagavandas

has been posted in his place and he joined duty on the forenoon of 18th June 1952. Sri V. Santanam, another Senior Assistant at the Cotton Breeding Station, resigned his post to take up the appointment under the Indian Tobacco Committee as Agronomy Assistant and was relieved at the Cotton Breeding Station on the afternoon of 10th May 1952. Sri S. R. Thyagarajan has been posted in his place and the latter joined duty on the forenoon of 20th May 1952. The rest of the Upper Subordinates at the Cotton Breeding Station continued throughout the year. It may be mentioned that at present all the Upper Subordinates working at the Cotton Breeding Station, excepting the Farm Manager, are all either probationers or emergency candidates waiting to be regularized, their period of service varying from a few months to less than two years. Under these conditions, it has been found extremely difficult to maintain the standard of efficiency and progress in the programme of work of the Cotton Section.

Besides the above changes in the personnel of the Upper Subordinates, five of the senior fieldmen who had ample experience in cotton and were very useful to the section have been promoted as Certification Inspectors in the CO. 4 Certification Scheme, Rajapalayam and consequently they have been relieved of their duties as fieldmen at the Cotton Breeding Station. Their places have been filled up by emergency candidates. This has also added to the difficulty of carrying out the programme of work of the section.

II. Season.—The year under report may be declared to have been agriculturally unfavourable on account of the droughty conditions that prevailed for the fifth year in succession. At Coimbatore, the rainfall received during the year was short of the average by over 7 inches and in addition, the distribution of the deficient rainfall was also very unfavourable for normal crop growth. Though the sowings were done at proper time and initial crop growth was encouraging, on account of the favourable rains early in the year, the continuous drought that prevailed from December onwards has been responsible for the reduction in acre yields in both irrigated and unirrigated cottons. To add to this, supply of water in the wells at the Cotton Breeding Station consistently got reduced thereby restricting the frequency and quantity of irrigations given to the cotton crop. Besides these unfavourable conditions, the incidence of blackarm was very severe in the early sown cottons due to the prevalence of continuous wet weather in November. In the southern districts the onset of north-east monsoon was late and weak resulting in delayed sowings of Karunganni in the extreme south and reduction of area under irrigated cotton in the Central and Southern districts in spite of the impetus given by the high prices for cotton obtained during the previous season, manifesting itself in a desire shown by the agriculturists to increase the area under irrigated cottons particularly Madras Uganda 1. In the Westerns area also, the conditions were unfavourable on account of the ill-distributed rainfall received during the year. The yields recorded were generally below normal. In the Mungari tract the total rainfall was not in deficit. But its distribution was very unfavourable to cotton resulting in greatly reduced yields. In the Northern area, though the total rainfall was in excess of the normal, it was ill-distributed, there being heavy unprecedented rains in the month of May 1952, towards the close of the hot weather period. Early rains were poor resulting in late sowings. This condition of insufficient moisture in the soil, continued during crop growth, due to which there was a general crop failure in this tract. Under these conditions, normal breeding work for crop improvement received a set back. In the Tungabhadra Project area the total precipitation and distribution were both generally defective and has been responsible

for reduced yields in cotton. In Guntur, season was extremely adverse to chillie crop owing to the prolonged drought that obtained after the transplanting of the crop and the heavy incidence of thrip. In the Cocanadas area also the droughty conditions that prevailed, adversely affected the yields in cotton. Thus, the season during the year under report should be declared generally very unfavourable for both American and *Desi* cottons.

III. Research.—Research relating to cotton improvement in Madras is very comprehensive including in its scope problems of yield improvement, improvement in quality, building up resistance to pests, diseases and drought in all the commercial varieties grown in this State. In addition, it caters to the needs of new project areas like the Tungabhadra Project and Lower Bhavani Project, to off-seasonal fallows on rice lands in deltaic areas, to the Coastal districts of Malabar and South Kanara and in fact to all vacant spaces including backyards and bunds. Another feature of the work, of no mean importance, is the maintenance, multiplication and distribution of seeds of improved cotton varieties which have considerably spread in the districts and augmented the income to the cultivators. Another very important item of work newly added to the section this year is the certification of the improved variety of cotton, namely, Madras Uganda 1 which ensures that the growers of this cotton get a better price for their produce than they would otherwise derive. The benefit to the growers by the certification of Uganda cotton is approximately estimated to be of the order of 1.75 crores of rupees each year. Most of the items of research mentioned above are being carried out under the auspices of special schemes, financed mostly by the Indian Central Cotton Committee at the several Agricultural Research Stations and Cotton Research Centres of the State and are detailed below:—

(a) Cotton Breeding Station (State Financed) where improvement of irrigated Cambodia, unirrigated Karunganni, Nadam, Wild cottons, Perennial cottons and cottons suited to rice fallows and fundamental studies are the chief items of work.

(b) Winter Cambodia and Sea Island Cotton Scheme, Coimbatore, with sub-stations at Avanashi (Coimbatore district), Tiruchengode (Salem district), and Srivilliputhur (Ramanathapuram district), Agricultural Research Stations, Pattambi (Malabar district), Nileshwar and Mangalore (South Kanara district), is devoting its attention for the improvement of winter sown Cambodia and introduction and acclimatization of Sea Island cotton.

(c) The Cambodia breeding scheme at Siruguppa (Bellary district) with sub-stations at Hagari and Nandyal, is engaged in evolving suitable American types of cotton for the irrigated and unirrigated black soils of Ceded districts.

(d) The Long Staple Cotton Breeding Scheme, Srivilliputhur, with its sub-station at Palur (South Arcot district), is devoting its attention for the production of superior quality cottons suited for the summer cultivation in the Central and Southern districts of Madras.

(e) The Cocanadas Cotton Improvement Scheme at Narasaraopet (Guntur district) with sub-station at the Agricultural Research Station, Lam (Guntur district), is intended to improve the yield, quality and colour of the Cocanadas cotton. In addition, it is also to improve the quality of the short staple *Chinnapathi* and *Buradapathi*.

(f) The Mungari Cotton Improvement Scheme at Adoni (Bellary district) is intended for the improvement of quality in the short staple Mungari cotton grown in the districts of Bellary, Kurnool and Anantapur.

(g) The Westerns Cotton Improvement Scheme, Hagari, is engaged in the improvement of the Westerns Cotton both in quality and yield.

(h) The Scheme for the Improvement of Tinnevelles and Karunganni cotton at Koilpatti with sub-station at Coimbatore, is for the production of superior quality of Karunganni strains suited to the entire unirrigated soils of the Central and Southern districts of Madras, growing *Desi* cottons.

(i) The Northern Cotton Improvement Scheme at Nandyal is intended to improve the adaptability and yield of Northern cotton.

(j) The unirrigated Cambodia Scheme at Periakulam is engaged in the evolution of American type of cotton suited to the rainfed tracts of the Central and Southern districts of Madras.

(k) The Scheme for the distribution of CO. 2 and K. 5 cottons at Tiruppur is for the large-scale production of pure seeds of these two improved strains to cater to the needs of the cultivators in the Coimbatore, Salem and Tiruchirappalli districts and in addition to meet the demands from other districts growing these cottons. Recently the variety CO. 2 has been replaced by M.U. 1 and it is proposed to multiply and distribute this variety in the future.

(l) The Scheme for the multiplication and distribution of K. 2 and Madras Uganda 1 seeds at Koilpatti with sub-station at Srivilliputhur is devoted to the production and distribution of these two important strains of cotton, M.U. 1 and Karunganni 2.

(m) The Scheme for the distribution of Westerns 1 at Guntakal which is in charge of the District Agricultural Officer, Bellary, is for the production and distribution of pure seeds of the improved strain W. 1.

(n) The Scheme for the multiplication and distribution of Cocanadas, 1 at Guntur in charge of the District Agricultural Officer, Guntur, is intended to multiply and distribute seeds of the improved strains Cocanadas, 1 and 2.

(o) The Seed Nucleus Schemes for CO. 2, Madras Uganda 1 and Karunganni, 5 at Coimbatore, for K. 2, M.U. 1 and 7682 (M.U. 2) at Koilpatti, for W. 1 at Hagari, for N. 14 at Nandyal, and C. 1 at Guntur, are intended for the maintenance of the purity of the different strains in the nucleus stage.

(p) The Chillie Improvement Scheme at Guntur financed by the Indian Council of Agricultural Research is engaged in the improvement of yield and resistance to thrips in chillies.

(q) In addition to the above, the work on the improvement of Coriander is being done at Guntur and Koilpatti under State auspices.

(r) The Scheme for the certification of CO. 4 cotton at Rajapalayam is intended to inspect the crops and produce of Uganda cotton and issue certificates of purity which will help the cultivators to obtain better prices for their cotton in the market. The Scheme is being worked under State auspices.

The Cotton Specialist guided the technical work of all the above items of research during the period under report, while the administrative control of most of the schemes was also vested with him. Proposals for the extension of the seed multiplication schemes at Tiruppur and Koilpatti have been submitted to the Director of Agriculture for recommendation to the Government. Similarly proposals for the extension of the scheme for the multiplication of W. 1 strain at Guntakal prepared by the District Agricultural Officer, Bellary, was scrutinized and submitted to the Director of Agriculture for forwardal to Government. The revised scheme for the expansion and continuance of the cotton certification scheme was also prepared and submitted to the Director of Agriculture.

IV. Seed supply.—The schemes for the production of nucleus seeds of strains CO. 2, Madras Uganda 1 and K. 5 at the Cotton Breeding Station,

Coimbatore, of strains Madras Uganda 1, Madras Uganda 2 (7682) and K. 2 at the Agricultural Research Station, Koilpatti, of strain W. 1 at Agricultural Research Station, Hagari, of strain N. 14 at the Agricultural Research Station, Nandyal, and of strain C. 1 at the Agricultural Research Station, Lam, continued to function during the year under report. A combined scheme for the multiplication and distribution of pure seeds of CO. 2 and K. 5 at Tiruppur and K. 2 and Madras Uganda 1 at Koilpatti continued to usefully function under the charge of Gazetted Assistant Cotton Specialists at Tiruppur and Koilpatti, respectively. During the year 120 seed samples of breeding material and 143 samples of perennial cottons were supplied to various parties.

V. *Miscellaneous*.—The Cotton Specialist continued to be a Member of Cotton Purchase Committee, Central Jail, Coimbatore, Secretary of the State Cotton Committee, Madras, and Member of the Research Council and Estate Committee of the Agricultural College and Research Institute, Coimbatore. During the year under report, five meetings of the Jail Committee were attended to, three State Cotton Committee Meetings were attended to and reported on and one Meeting of the Indian Central Cotton Committee was attended to by Sri C. Jagannatha Rao as Cotton Specialist.

VI. *Legislation*.—The provisions of the Madras Agricultural Pest and Diseases Act, 1919 (Madras Act III of 1919) were extended for a further period up to 31st March 1953 in G.O. Ms. No. 868, Food and Agriculture, dated 28th May 1952. A notification to the Cotton Ginning and Pressing Factories (Madras) Amendment Act, 1948, was issued in G.O. Ms. No. 2342, Development, dated 31st March 1952, directing that varieties Cambodia 2, Uganda 1, Karunganni 5 and Karunganni 2 should not be mixed with any other variety or with one another and shall not be ginned or pressed in Cotton Ginning and Pressing Factories in the districts of Coimbatore, Tiruchirappalli, Madurai, Ramnathapuram and Tirunelveli excepting in pure forms. Provisions of the Madras Cotton Control Act, 1942, were extended for a further period of one year from 1st January 1952 in G.O. Ms. No. 2456, Food and Agriculture, dated 27th December 1951. Cotton Cambodia Co. 4 production and Certification Order, 1951, under section III of the Essential Supplies (Temporary Powers) Act, 1946 (Central Act XXIV of 1946), read with notification of the Government of India, Ministry of Commerce and Industry S.R.O. No. 405, dated 24th March 1951, and Cotton Cambodia CO. 4 Ginning and Pressing Rules, 1951, under section 13 of the Cotton Ginning and Pressing Factories Act, 1928 (Central Act XII of 1925), as subsequently amended by the Cotton Ginning and Pressing Factories—Madras Amendment Act, 1948 (Madras Act XXV of 1948) were issued in G.O. Ms. No. 3464, Development, dated 26th July 1951.

VII. *Publication*.—Besides the revision of the papers that were written up and submitted for presentation at the last College Day and Conference, seven other papers were written and submitted for publication in the News Letter, Mezhlhelvam, Grow More Food Journal and Madras Agricultural Journal. In addition, five other papers have been prepared and submitted for presentation at the ensuing College Day and Conference.

VIII. *Petty construction and repairs*.—The following items of work and repairs were undertaken and completed during the year :—

Serial number and description of work executed.	Amount spent,		
	RS.	A.	P.
1 Construction of office building for Winter Cambodia Scheme	19,989	0	0
2 Fencing of the northern side field No. 37 (1,175 feet) ...	816	4	9

Serial number and description of work executed.	Amount spent.		
	RS.	A.	P.
3. Repairs to channels and layout, new cement channels.	541	0	0
4. Concreting road in front of water-tub	95	0	0
5. Extension to Farm Manager's office and stores ...	2,990	6	0
6. Extension of implement shed in Lab III	1,104	0	0
7. Annual repairs to non-residential buildings	322	0	0

The statement showing the strength of the staff as on 30th June 1952 is enclosed as Appendix I to this report. The progress of research achieved during the year under different items of research are embodied in Appendix II submitted with this report. In addition, the summary of results achieved during 1951-52 together with the programme of work for 1952-53 is also separately enclosed.

LAWLEY ROAD, COIMBATORE,
31st July 1952.

S. M. KALYANARAMAN,
Cotton Specialist.

APPENDIX I.

STATEMENT SHOWING THE STRENGTH OF THE STAFF AS ON 30TH JUNE 1952.

Particulars.	Cotton Breeding Station, Coimbatore.		Long Staple Cotton Scheme.		Cocanadas Scheme.		Mungari Scheme.																																	
	P	T	P	T	P	T	P	T																																
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)																																
(1)																																								
Madras Agricultural Service.																																								
(i) Cotton Specialist..	1	..	..	1	1	..	..	1																																
(ii) Assistant Cotton Specialists.	1	..	..	..	..	..	..	..																																
Madras Agricultural Subordinate Service.																																								
(i) Upper Subordinates.	8	..	..	2	..	1	..	1																																
(ii) Fieldmen	12	2	..	3	..	3	..	3																																
(iii) Maistries	..	2	..	..	..	..	..	..																																
Madras Ministerial Service—Clerks.																																								
(i) Upper division clerks.	..	..	..	1	..	..	..	..																																
(ii) Lower division clerks.	2	..	..	1	..	1	..	..																																
(iii) Typists	..	1	..	..	..	..	..	..																																
(iv) Steno-typists ..	..	1	..	..	..	..	..	..																																
(v) Attenders	1	..	..	..	..	..	..	..																																
<table><tr><th rowspan="2"></th><th colspan="2">Winter Cambodia Scheme.</th><th colspan="2">Karunganni Scheme.</th><th colspan="2">Dry Cambodia Scheme.</th><th colspan="2">Westerns Scheme.</th><th colspan="2">Certification Scheme.</th></tr><tr><th>P</th><th>T</th><th>P</th><th>T</th><th>P</th><th>T</th><th>P</th><th>T</th><th>P</th><th>T</th></tr><tr><th>(10)</th><th>(11)</th><th>(12)</th><th>(13)</th><th>(14)</th><th>(15)</th><th>(16)</th><th>(17)</th><th>(18)</th><th>(19)</th><th>(20)</th></tr></table>										Winter Cambodia Scheme.		Karunganni Scheme.		Dry Cambodia Scheme.		Westerns Scheme.		Certification Scheme.		P	T	P	T	P	T	P	T	P	T	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
	Winter Cambodia Scheme.		Karunganni Scheme.		Dry Cambodia Scheme.		Westerns Scheme.			Certification Scheme.																														
	P	T	P	T	P	T	P	T	P	T																														
(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)																														
Madras Agricultural Service—cont.																																								
(i) Cotton Specialist.	..	..	..	..	..	..	..	..	1	..																														
(ii) Assistant Cotton Specialists.	..	1	..	1	..	..	..	..	(Certification Officer).	..																														
Madras Agricultural Subordinate Service—cont.																																								
(i) Upper Subordinates	..	7	..	3	..	1	..	3	..	5 (Inspectors)																														
(ii) Fieldmen	..	9	..	6	..	1	..	6	..	10																														
(iii) Maistries	..	..	..	..	..	..	..	..	..	10																														
Mahras Ministerial Service—Clerk—cont.																																								
(i) Upper division clerks.	..	1	..	..	..	1	..	..	..	1																														
(ii) Lower division clerks.	..	..	..	..	..	..	..	1	..	1																														
(iii) Typists	..	1	..	1	..	..	..	..	..	..																														
(iv) Steno-typists ..	..	..	..	..	..	..	..	..	..	..																														
(v) Attenders	..	1	..	..	..	..	..	..	..	..																														

APPENDIX II.

SUMMARY OF RESULTS ACHIEVED DURING 1951-52 AND THE PROGRAMME OF WORK FOR 1952-53.

Cotton Breeding Station, Coimbatore.

Among the several items of work that were in progress at the Cotton Breeding Station during the year 1951-52 the more important ones were those directed towards improvement of irrigated Cambodia and unirrigated Karunganni and nadam cottons to cater to the needs of the central and southern districts of the State. In the case of the irrigated Cambodia the objective was the evolution of a long-stapled American type of cotton with a minimum staple of 1-1/16 inches and a ginning percentage of 38 and also adaptable to the entire winter sown Cambodia tract. The improvement work on Karunganni cotton aims at the isolation of a Karunganni type which will be better than Karunganni 5 in staple, fineness and ginning. The progress under the above items during the year briefly is as follows. In the trials for determining the suitability of promising Cambodia types to Coimbatore and Tiruchirappalli districts, it was found that M.U. 1 was the one that was around suitable and at the same time possessed desirable yield and quality. The trials further indicated the possibility of utilising this cotton for raising both during season and summer. In the co-ordinated yield trials with promising long staple cultures conducted at Coimbatore, Avanashi and Tiruchengode it was clear that three of the 18 cultures that were tested were improvements over M.U. 1. These three, i.e., 0734, 9995 and 9030 are proposed to be tested in the districts. Of these three 0734 has been found to be adaptive to rainfed conditions also while 9030 had recorded significantly better halo length and ginning percentage than M.U. 1. In the trials with early Karunganni cultures in advanced stages on the red soil, B. 32-48/51 once again showed its superiority over K.5 for earliness, yield and ginning percentage. This culture is proposed to be tested in the nadam tract for its adaptability and suitability to replace perennial nadam. On the black soil, among the promising Karunganni selections that were under yield trials special mention may be made of 5341 which excelled the control in yield, halo length and ginning percentage. Besides this, cultures B-32/48/51 and interracial early culture which was tested for the first time on the black soils was observed to be early. Among the comparatively late cultures 7112 B.7 and 7036 would appear to deserve further trials.

In addition to the main items of research described above, work on perennial cottons, wild cotton hybrids, and fundamental studies on effect of stored seed on yield, method and effect of pretreating seeds in chemical nutrients, varietal variability for blackarm resistance, determination of the effect of spacing on yield, inheritance of lint quantity and quality in Asiatic cottons and the response of varietal, time of sowing and manurial treatments to cotton on rice fallows engaged our attention during the year. The chief findings on these several items during the year are summarised below. Among the perennial cottons, Moco continued to be the best adapted for all conditions in the southern districts and therefore its purification and multiplication of seeds was attended to. Thirty pounds of seeds were supplied to the Secretary, Indian Central Cotton Committee in addition to its distribution within the State in all the districts. Among the recent collections Caramura cotton appeared to be promising and has therefore been arranged to be planted in the different Agricultural Research Stations for the comparison of performance with Moco cotton. In the study of selections from crosses in the fifth and seventh generations involving wild types like Darwinii, Taitense and Raimondii, it was revealed that only one culture was significantly better than M.U. 1 in yield and ginning percentage while four others recorded better yields alone. Another observation made in this study was that improvement in halo length was achieved generally in crosses involving M.U. 2 as a parent. With the object of determining if the use of old seed for sowing would in any way affect the yield and quality, co-ordinated trials were conducted during the year with four desi varieties and three American types, the former under rainfed and the latter under irrigated conditions, at Coimbatore, Koilpatti,

Nandyal, Hagari, Guntur and Srivilliputhur. The results obtained clearly disproved the standing prejudice amongst cultivators, i.e., that use of old seeds will result in low yields and poor quality. The data showed that there was no significant difference in yield, halo length, ginning percentage, seed weight or lint weight between crops raised from old and new seeds. This finding is expected to prove very useful for recommending to seed distribution schemes, the use of unsold stocks of seeds in any year, during the next season. The report from Indore claimed that treatment of cotton seeds in nutrient solutions prior to sowing increased the yield of seed cotton. To verify this observation under Madras conditions a co-ordinated trial was laid out during 1951-52 simultaneously at Coimbatore and all cotton sub-stations. The study of the effect of such pretreatment of seeds was conducted using molar, half molar and quarter molar concentrations of Ammonium sulphate and monopotassium phosphate, compared against untreated seeds and seeds soaked in water on five desi varieties and two American cottons. The results did not reveal any effect of seed treatment on yield, halo length, or ginning percentage though there were indications that treatment of seeds in higher concentrations of the chemicals was likely to affect viability of seeds. The studies on blackarm resistance during the year confirmed the previous findings that culture 2196 an interspecific hybrid involving hirsutum and herbaceum cottons was the most resistant of all the varieties tested so far. In addition two central American collections, i.e., R.A. 818 and R.A. 23 were highly resistant to the disease. These resistant types have been utilised in hybridisation work. The derivatives of such crosses would be tested for resistance during the coming year and suitable selections made. The trial on the effect of spacing cotton in lines, 3 inches and 9 inches apart, on yield confirmed the previous findings that the yield, halo length and ginning percentage were not influenced by the treatments. The studies on the inheritance of lint quantity and quality indicated that the lintless type carries a gene for fibre maturity which finds expression when brought into association with a gene for lint. The progeny of the hybrid, short length $\times$ immature lint segregated giving a dihybrid ratio to confirm which, back crosses between F.1s and respective parents have been effected. New crosses have been effected to study the inheritance of fibre fineness and 38 crossed bolls have been obtained for study in the next year. The studies intended to find suitable varieties, time of sowing, response to manuring and residual effect of growing cotton on the succeeding crops in rice fallows were simultaneously undertaken in 13 Agricultural Research Stations. The indications obtained from the study are that early duration American types can be economically cultivated in a few of the stations while in others the possibility appears to be rather remote on account of low temperatures obtained during the initial stages of crop growth and high temperatures prevalent during the flowering phase of the crop. It is proposed to pursue the studies in an intensive manner at a few of the stations only with the object of evolving varieties suited to the different rice fallow areas in the State. A special scheme as per instructions of the Director of Agriculture for this purpose is being submitted for sanction.

Programme of work for 1952-53.—The research work during 1952-53 will cover the items of work that are unfinished and require to be pursued with the objective of evolving cosmopolitan type of American and desi cottons excelling the standard strains M.U. 1, K.5 and K.2 in quality and if possible yield also. The study relating to the acclimatisation of Sea Island in West Coast will be continued. The fundamental cottons and wild cotton hybrids will be continued for the selection of suitable types for multiplication and propagation. The study on the suitability of varieties to rice fallows would be continued in an intensive manner. The fundamental studies on the genetics of mutant types, lint quality and lint quantity will be pursued. In addition, the new item of work that would be undertaken during the year will be the study of the behaviour of Sea Island Cambodia first generation crosses with particular reference to the utility of heterosis and possibility for grafting useful F.1s on perennial cottons, the object being to maintain the F.1 in a vegetative manner.

ADMINISTRATION REPORT OF THE MILLET SPECIALIST FOR THE YEAR ENDING JUNE 1952 (FASLI 1361).

I submit the Administration Report of the Millet Specialist for the year ending 1952 (fasli 1361).

SECTION I—INTRODUCTION.

1. *Charge.*—Sri P. Krishna Rao, Millet Specialist, continued to be in charge of the Millet Section throughout the period.

The Millet Specialist was appointed as Vice-Principal and Secretary, Research Council from 3rd March 1952 and was in charge of the post till 30th June 1952 in the leave vacancy of Sri G. V. Narayana, Oil Seeds Specialist. The Millet Specialist also attended to the duties of the Principal from 28th April 1952 to 19th May 1952 when the latter was away to Siam to attend the Rice Conference.

2. *Staff.*—Sri U. Achyutha Wariar, Assistant Millet Specialist in charge of the Regional Millet Stations Scheme was appointed as Seed Development Officer, Coimbatore and was relieved on 21st July 1951 by Sri V. Krishnaswamy, Assistant Paddy Specialist who was appointed in this vacancy as Assistant Millet Specialist from 21st July 1951. Sri V. Krishnaswamy was also appointed subsequently to act on probation as Assistant Paddy Specialist from 3rd April 1951 in G.O. No. 397, Food and Agriculture, dated 14th March 1952. Sri G. Ramabhadran, Assistant in charge, Regional Millet Station, Tiruppattur, was promoted as Seed Development Officer, Bellary, and relieved from Tiruppattur on 20th September 1951. Sri B. L. Narasimhamurthy, Assistant in charge, Regional Millet Station, Narasapatnam was promoted as Assistant Millet Specialist, Hybrid Cumbu Scheme and was in charge of the post from 8th December 1951 to 31st March 1952 in the leave vacancy of Sri A. Kunhikoran Nambiar, Assistant Millet Specialist. Sri B. L. Narasimhamurthy was also promoted later as Superintendent, Agricultural Research Station, Anakapalle and was relieved on 26th June 1952 to take up this post.

There have been considerable changes in the subordinate staff, and many Assistants, Fieldmen and Clerks were posted for short periods temporarily and later relieved by candidates allotted by the Services Commission.

3. *Schemes.*—There are three Schemes, under the administrative and technical control of the Millet Specialist. They are the following:—

(i) *Scheme for the Production of Hybrid Cumbu seeds.*—This Scheme was sanctioned in G.O. No. 4030, Development, dated 16th October 1945 for three years from 20th March 1946 to 19th March 1949 and later in G.O. No. 5223, Development, dated 21st October 1948 for one year from 20th March 1949 to 19th March 1950. Further sanction for extension of two years from 20th March 1950 to 19th March 1952 was accorded in G.O. No. 1377, Food and Agriculture, dated 18th July 1950, and the present extension is sanctioned for five years from 20th March 1952 to 19th March 1957 in G.O. No. 539, Food and Agriculture, dated 28th March 1952. This Scheme is partly financed by the Indian Council of Agricultural Research.

(ii) *Scheme for the Production of Improved Strains of Millets in Regional Millet Stations.*—This Scheme is in operation at the Regional Millet Stations, Ariyalur, Tiruppattur, Ongole and Narasapatnam. It was sanctioned in G.O. No. 1565, Development, dated 24th March 1949 for five years from 1st April 1949 to 31st March 1954. This is completely financed by the State Government.

(iii) *Scheme for the Control of Striga.*—The Scheme for the Control of Striga which is a parasite on Sorghum was sanctioned in G.O. No. 824, Food and Agriculture, dated 26th August 1949 for three years from 21st September 1949 to 20th September 1952 and further extension was sanctioned in G.O. No. 2432, Food and Agriculture, dated 29th December 1950 for one year from 21st September 1952 to 20th September 1953. Another extension has been sanctioned in G.O. No. 1323, Food and Agriculture, dated 28th June 1952 for one year from 21st September 1953 to 20th September 1954. This Scheme is partly financed by the Indian Council of Agricultural Research. Work on this Scheme is being carried on at Nandyal, Guntur, Hagari and Coimbatore and the Assistant Millet Specialist in charge of the Scheme is stationed at Agricultural Research Station, Nandyal.

Reports relating to these Schemes are presented in separate sections in this report.

4. *Tours.*—The Millet Specialist was on tour for 66 days during the year to attend to the inspection of Millet work at the out-stations and in the districts, and also to discuss the work connected with the Seed Development Schemes, Mewani irrigation experimental work, etc. The members of the staff stationed at Coimbatore and other centres of Millet work were on tour for a period of 238 days attending to the sowings and harvests of trial plots of millet strains, collection of seed materials, and arranging and conducting the "Park Fair Exhibition" held at Madras from 24th December 1951 to 21st January 1952. The Assistant Millet Specialist, Cumbu Scheme, was on tour for 44 days to arrange for and inspect the Hybrid Cumbu Seed Farms, to procure seeds and to inspect trial plots in the districts. The Assistant Millet Specialist, Regional Millet Stations was on tour for 16 days to inspect the work at the Regional Millet Stations, Ariyalur, Tiruppattur, Ongole and Narasapatnam and to purchase work animals for the Millet Breeding Station.

5. *Examinations.*—On request by the Madras Public Services Commission, Sri P. Krishna Rao, the Millet Specialist conducted the Telugu Language Examination on 18th March 1952 and Sri A. Kunhikoran Nambiar, Assistant Millet Specialist conducted the Malayalam examination at Coimbatore in March 1952.

6. *Visitors.*—Several prominent scientists and other persons interested in agriculture visited the section. The following are the most important of them:—

1. Hon'ble Sri A. B. Shetty and Hon'ble Dr. Nagan Gowd, Ministers for Agriculture.
2. Mr. R. L. Sethi, Agricultural Commissioner, Government of India.
3. Sri R. Gopalakrishnan, I.C.S., Joint Secretary, Food Department, Government of India.
4. Dr. J. G. Dod Geus, Agronomist, Hague, Holland.
5. Mr. Tandeyr, Soil Scientist, Belgian Congo.
6. Sri Dhanalal, Agricultural College, Nagpur.

7. Mr. Kaithan, Gandhi Ashram, Dindigul.
8. Mr. Bahadur Singh, Kathiawar.
9. Dr. Mody, Gujarat.
10. Director of Agriculture, Madras.
11. Sir T. Vijayaragavachariar, ex-Vice-Chairman, Indian Council of Agricultural Research.
12. H. K. Mehara, Director, Animal Husbandry Department, Nagpur.
13. Mr. Amble, Statistician, Indian Council of Agricultural Research.
14. Sri V. V. Subramanian, I.C.S., Director of Controlled Commodities.
15. Professor Mangles Dorf of the Howard University.
16. Dr. Norris Dodd, Director-General, F.A.O.
17. Sri A. K. Gupta, } Agricultural Officers, Bombay.
18. Sri P. R. Shendge, }
19. Mr. W. A. Cummings, Regional Representative, F.A.O., Bangkok.
20. Sardar Dattar Singh, Vice-Chairman, I.C.A.R.
21. Sri P. A. Srinivasan, I.A.S. (Officer under training).
22. Sri G. R. Govindarajulu } Honorary visitors.
23. Sri R. K. Kandaswamy }

Several parties of students of universities and other educational institutions also visited the Section and the farm at the Millet Breeding Station. The work done in the Section and the results achieved were explained to the visitors.

7. *Exhibition*.—The section participated in the "Park Fair Exhibition" held at Madras from 24th December 1951 to 21st January 1952. An exhibition was put up at the laboratory in the Research Institute during the College Day and Conference in July 1951, and Scientific Conference and Departmental Officers' Conference in August 1951. Exhibits of Millets were also sent to the District Officers for exhibition on the occasions of important festivals in the districts. Quarterly exhibitions were arranged in the Regional Millet Stations.

8. *Meetings*.—The Millet Specialist attended the monthly meetings of the Research Council and Estate Committee including the special meetings to scrutinize the programmes of work, the annual reports and other scientific reports and schemes received from the Research Officers during the year under report. The Millet Specialist also attended the Sub-Committee meetings, Study Group meetings and special meetings connected with the Mewani Irrigation Experiments of the Lower Bhavani Project.

9. *College Day and Conference—College Day*.—The 34th College Day and Conference was celebrated on the 30th and 31st July 1951. It was inaugurated by Hon. Sri K. M. Munshi, Minister for Food and Agriculture, Government of India and presided over by Sri R. L. Sethi, Agricultural Commissioner, Government of India, New Delhi. A paper on "Manuring of Millets" in Madras was presented at the Conference by Sri P. Krishna Rao, Millet Specialist and Sri A. Kunhikoran Nambiar, Assistant Millet Specialist.

Departmental Officers' Conference.—The Millet Specialist and the two Assistant Millet Specialists attended the Conference of Departmental Officers arranged at Coimbatore on 1st and 2nd August 1951. It was presided over by the Honourable Sri A. B. Shetty, Minister for Agriculture, Government of Madras.

Scientific Conference.—The Millet Specialist also attended the Conference held on 24th August 1951 which was presided over by Mr. R. L. Sethi, Agricultural Commissioner, Government of India and took part in the discussion of papers. Eight papers on Millets were contributed by the section and among these two, viz., (1) "The Evolution of Short Duration Hybrids in Cumbu" and (2) "The Improvement of Grain Size in Talairichan Cholam in Madras State"—were presented and discussed at the Conference.

10. *Education*.—The Assistant Millet Specialist (Cumbu) took special classes on Breeding of Millets for the final year students of the Agricultural College, Coimbatore on the 24th and 25th January 1952. The Millet Specialist gave special lectures to the students of the Agricultural College, Bapatla on 25th and 26th February 1952, on "The Important Problems now under investigation in Millets" and the botanical characters of the millets, their inheritance and application to breeding were explained in the practical classes.

11. *Miscellaneous—Elections*.—Most of the members of the staff attended to the duties of General Elections conducted in January 1952 and many of them performed the duties on more than one occasion to the fullest satisfaction of the authorities without any complaint either from the Returning Officers or the public.

Vanamahotsavam.—This week was celebrated at the Millet Breeding Station. Four hundred plants of tamarind, Gliricidia and neem were planted at the station. Large numbers of seedlings were raised and supplied to District Officers for distribution to the public.

SECTION II—MILLET BREEDING STATION, COIMBATORE.

A. Season and rainfall.

12. During the year 1951-52, a total quantity of 16.38 inches of rain was received in 36 rainy days. The normal annual rainfall for the station is 24.19 inches in 58.8 rainy days. It was noticed that the rainfall was defective to an extent of 7.81 inches, the deficiency being in the north-east monsoon and hot weather period. The cumulative effect of the continued deficient rainfall for the past five years has left its effect upon the water supply in the wells of the Millet Breeding Station. The west well which used to have above 15 feet of water and was having about two feet of water last year, completely dried up. The bore well continued to work satisfactorily with an average discharge of about 60 gallons of water per minute. The total irrigated area has dwindled down to about five acres during the period.

The dry land cholam crop was sown during the last week of July with the receipt of 0.62 inches of rain and continued up to the end of the month. The failure of subsequent rains in August and the first half of September 1951, adversely affected the growth of the crop to such an extent, that it was feared that the whole crop may dry up. But the rains received during the second week of September were a welcome relief to the dry land cholam crop, as well as, Minor Millets. The cumbu and tenai crops were sown in proper season in September and the subsequent rains helped growth. But the grain

yield was not satisfactory in the case of the cumbu crop owing to heavy rains at flowering time, during the latter half of the north-east monsoon. Owing to the hot weather rains being much in deficit of the normal, the area under the summer crops was limited to the extent that could be commanded by the bore well. The season as a whole was a partial failure as reflected in the comparatively poor yield of crops and poor supply of water in the wells.

B. Cholan (Sorghum species).

13. During the year under report Sorghum (Cholan or Jonna) was grown on an area of 23.31 acres in the monsoon season as a rainfed crop and on 3.84 acres under irrigation as garden crop in the summer season at the Millet Breeding Station. A total of 858 cultures were grown and studied during the year. The season was a failure for the rainfed Cholan crop owing to inadequate rainfall and also uneven distribution of rains. The rainfed crop was almost a total failure and the yields obtained were very low with the result that conclusive results could not be obtained from yield studies in many experiments. But the summer crop was quite satisfactory as there was adequate supply of water for irrigation for the area sown which was also supplemented by summer showers.

All the Sorghum strains, both rainfed and irrigated so far evolved at the Millet Breeding Station, continue to spread in tracts for which they have been evolved. As usual, the demand for Cholan seeds was heavy during the year under report. Since the area available for the multiplication of nucleus seeds is very limited, only a part of the demand for seed could be met. During the year under report, 37,235 lb. of seeds of Cholan strains and promising high yielding selections were supplied to farmers through Departmental Officers and also by direct sale at the Millet Breeding Station. The bulk of this was intended for sowing seed farms.

There are numerous Sorghum varieties and sub-varieties under cultivation in the Madras State, which are highly local in their behaviour and distribution. Therefore the 16 strains so far released from the Millet Breeding Station, Coimbatore, have not been found to be adequate to cater to the needs of the different tracts. Hence selection work for the areas for which suitable strains were not released is being continued. While the main object was to increase the yield, improvement of the quality of grain and straw of the major varieties also was taken up to evolve suitable strains for distribution to the cultivators. A brief account of the work done and the results achieved at the Millet Breeding Station, Coimbatore, is given under each item.

14. *Rainfed Cholams*—(1) *Periamanjil Cholan*—(a) *Evolution of high yielding strains having juicy stalks and reddish purple straw*.—*Periamanjil Cholan* is the best dryland variety of Cholan grown in the Coimbatore district. Cholan Co. 1 is a strain of *Periamanjil Cholan*. It matures in 135 to 140 days and has yellow grain and blackish purple straw. In *Periamanjil Cholan*, there are two distinct varieties, which can be distinguished by their straw colour, one being blackish purple and the other reddish purple. Straw of reddish purple colour has better market value. Strain Co. 1 has blackish purple straw. Hence selection work in the direction of evolving a strain of *Periamanjil Cholan* with reddish purple straw was taken up. Since the selections that came out of this process were pithy, juiciness was introduced in *Periamanjil Cholan* by hybridising it with juicy stalked varieties. As a result of hybridization and selection, four selections A.S. 8001 and A.S. 8002 (reddish purple and pithy), A.S. 8110 (reddish purple and juicy) and

A.S. 8112 (blackish purple and juicy) were isolated. All the four selections were in yield trials from 1948 onwards. In 1951 monsoon season, three selections A.S. 8001, A.S. 8002 and A.S. 8112 were compared with Co. 1 as standard in yield trial plots. A.S. 8110 being a poor yielder was rejected. Due to adverse season, the plots were gappy and seed setting was poor and the differences in yield were not significant. To combine the good qualities of both reddish purple straw and juiciness, A.S. 8002, a high yielding selection with reddish purple straw, was crossed with a similar economic type A.S. 8112 having juicy stalked blackish purple straw, in 1951 monsoon season. The progeny will be studied during the coming seasons to isolate high yielding types of *Periamanjil Cholan* having juicy stalk and reddish purple straw.

(b) *Improvement of grain size in Periamanjil Cholan*.—With a view to improve the grain size of *Periamanjil Cholan*, it was crossed with A.S. 3596, a bold grain type and 21 selections from these crosses were put in preliminary yield trials in 1950 monsoon season. Out of these, 11 selections which were good yielders of grain and straw and which have bold grains were further tested in preliminary yield trial plots with Co. 1 as standard in 1951 monsoon season. Owing to adverse season, the trials failed and no conclusions could be drawn. The trial will be continued.

(c) *Investigations on the effect of early drought on the development of Periamanjil Cholan by means of morphological and histological studies*.—This is a new problem taken up during the year and preliminary investigations were started in the main season crop of 1951. Two strips of *Periamanjil Cholan* crop were sown one completely rainfed and the other given three irrigations during a period of 52 days of severe drought which followed the sowing of the crop. Sixty-five plants in each lot were picked out at random for the study of the various characters. Observations indicate that the primordium of the earhead gets differentiated earlier in the partially irrigated crop while the rainfed crop flowers a week later. It is interesting to note in this connection that the differentiation of the floral primordium commences in the plant during the period of early drought and this explains why drought in the early stages of the crop has a permanent adverse effect on the crop yield, even though later rains follow the drought. Detailed investigations on these various aspects of the problem will be continued.

15. (2) *Talaivirichan Cholan*—(a) *Evolution of strains yielding higher than Co. 2 (Chalky) and Co. 3 (Pearly)*.—This variety is largely grown in the hilly tracts of Srikakulam, Visakhapatnam and East Godavari districts and in the districts of Chittoor, North Arcot, South Arcot, parts of Salem and Tiruchirappalli and to a small extent in Coimbatore district. It has very loose panicle and the smallest grain among cultivated Sorghums. The grain of *Talaivirichan Cholan* is either chalky or pearly white, and the two strains Co. 2 and Co. 3, already released, represent the chalky and pearly groups respectively. Further selection work has resulted in the isolation of high yielding pearly grained selection A.S. 8008. It was in yield trial with Co. 2 and Co. 3 as standards for the fourth year in 1951 monsoon season to confirm its previous performances. Owing to severe drought in the early stages, the plots were very uneven and as such the yield data were not taken for analysis. It is proposed to repeat the trial in the coming monsoon season.

A collection of 103 fresh samples was made in 1950 from the districts of Coimbatore, Visakhapatnam and North Arcot. They were sown and studied during 1951 monsoon season and 47 cultures which were pure and economic were carried forward for tests in preliminary yield trial plots.

(b) *Evolution of a white chalky strain of Talaivirichan Cholan for Chittoor district*.—There is a preference for chalky types in the Chittoor

tract. Though strain Co. 2 is chalky grained, it was not found suitable to Chittoor district. None of the cultures from the previous collections also was found to be economic in tests conducted in 1950. Fresh samples of *Talaivirichan Cholam* having white chalky grain were collected from Chittoor and the adjoining tracts of North Arcot district. Those received from North Arcot were sown in 1951 monsoon season and 55 types were advanced for trials. The collections from the Chittoor district await study.

(c) *Improvement of grain size in Talaivirichan Cholam.*—*Talaivirichan Cholam* has got the smallest grain size among the cultivated *Sorghum* varieties, as already mentioned previously. To evolve bold grained selections four types of *Talaivirichan Cholam* were crossed with five bold grained types of *Sorghum conspicuum* from Africa. From the progeny of the above crosses, two selections were significantly superior to Co. 3 the standard both in grain size and yield in 1950. These two selections, along with three others which were in preliminary yield trials, were advanced to yield trial and sown in the monsoon season of 1951. Owing to early drought and adverse season, the growth was patchy and stunted and as such the yield data were not taken for analysis. The trial is proposed to be repeated in main 1952 season.

(d) *Improvement of fodder quality in Talaivirichan Cholam.*—The straw of *Talaivirichan Cholam* is coarse and pithy and grows very thick. It is not relished by cattle because of the above defects. In certain places where it is grown, this straw is used for thatching and fuel purposes. To improve the quality of straw of this variety, it was crossed with an extracted juicy type A.S. 5945. Among the progenies studied, one selection, A.S. 7657 was promising and it was advanced to yield trial in 1950 monsoon season. It gave significantly higher yield of grain than Co. 3, but the yield differences were not significant in the case of straw. The trial was repeated in 1951 but due to drought and adverse seasonal conditions, the yield data were not taken for analysis. It will be repeated in the coming main season.

Juice was extracted from the Cholam stalks of Co. 2, Co. 3 and A.S. 7657 and analysed for glucose and sucrose. A.S. 7657 recorded almost double the quantity of total sugars yielded by the other two on analysis at the stage when the heads were about to emerge (boot stage) as indicated in the table below :—

Selection number.	Extraction percentage.	Total sugars for 100 pounds of stalks in lb.
(1)	(2)	(3)
A.S. 7657	25	1.2525
Co. 2	10	0.587
Co. 3	13	0.754

When the dry fodder was analysed chemically for food value, A.S. 7657 was found to be the best as per data given below :—

Particulars.	Co. 3.	Co. 2.	A.S. 7657.
(1)	(2)	(3)	(4)
Moisture	7.88	7.39	10.47
Ash	2.93	4.12	6.56
Crude protein	2.37	2.74	3.30
Ether extractive	30.83	22.89	24.22
Crude fibre	55.99	62.86	55.45
Carbohydrates by difference			
Total	100.0	100.0	100.0

Particulars.	Co. 3	Co. 2	A.S. 7657
(1)	(2)	(3)	(4)
Lime (CaO)	0.16	0.28	0.10
Phosphoric acid (P. 2 O 5)	0.28	0.66	0.62
Nutritive ratio	20.96	16.78	9.61

NOTE.—Over dry basis—Remarks of the Government Agricultural Chemist—From the point of view of superiority of Cholam straw for feeding, selection A. S. No. 7657 is the best of the lot followed by CO-2 and CO-3 in descending order of merit.

16. (3) *Irungu Cholam*—Improvement of grain size, grain colour, and yield of grain and straw in *Irungu Cholam*.—This variety is cultivated in the southern districts particularly Ramanathapuram, Tirunelveli and parts of Madurai and Tiruchirappalli. It is mostly grown as a fodder crop in the districts of Ramanathapuram and Tirunelveli and the grain of this variety is brown in colour and almost completely enclosed by the glumes and the stalk is thin. In the districts of Madurai and Tiruchirappalli, it is grown both for its grain and fodder and the grains are slightly exposed in this case and are mostly white in colour. To improve this variety in the direction of a good fodder-cum-grain variety, a number of *Irungu* types were crossed with high yielding selections of *Peria Vellai Cholam* from Coimbatore district in which the grains are white in colour, large and well exposed. The progenies from crosses and a few selections from the previous trials were put in preliminary yield trial plots and compact family blocks during 1951 monsoon season. Fifty-five selections in 11 families were in compact family blocks with K. 1 *Irungu Cholam* strain of Koilpatti and A.S. 7081, an extracted *Irungu* type as standards. Owing to adverse season, the stand was not uniform and yield data when analysed did not give significant differences. In the preliminary yield trials, out of 14 selections tested in two groups with K. 1 and A.S. 7081 as standards, none was found to be superior to the standard A.S. 7081.

Seventy-two cultures from the above crosses in F. 4, F. 5 and F. 6 generations were grown for purification in 1951. Twenty cultures of the F. 6 generation were pure for their characters and promising economically and they are proposed to be advanced to preliminary yield trials for sowing in 1952 main season.

17. (4) *Kaki Jonna*—Evolution of a juicy stalked high yielding *Kaki Jonna* strain for fodder.—This is mainly a fodder cholam variety grown generally in parts of Chittoor, North Arcot, South Arcot and Salem districts and it is of minor importance for grain. In these tracts, the grain Cholam is *Talaivirichan Cholam* whose fodder is of poor quality. *Kaki Jonna* is often cut as green fodder. Its grains are brown in colour and are not very much relished as food. An attempt was previously made to build up a sweet and juicy stalked *Kaki Jonna* type by crossing this variety with "Sorgo" a sweet *Sorghum* type from America. But none of the progenies was found to be good after testing them in preliminary yield trials. To build up a high yielding strain, samples of *Kaki Jonna* were collected and studied, in the monsoon season in 1951 in two row plots to fix their characters and select for further economic work.

18. (5) *Strains for late sowings (September) in dry lands of Coimbatore district.*—In the Coimbatore district, the main Cholam sowings will generally take place in July-August. But due to frequent failure of early monsoon, there is a need for short duration varieties that can be sown late in September or early in October, and harvested along with the main crop. To build up varieties which come up well when sown in September-October, collections

of *Patcha jonna* and *Tella jonna* samples were made from the districts of Nellore, Cuddapah, Anantapur and South Arcot and sown at the Millet Breeding Station in 1949 and 1950 monsoon seasons. The samples, however, were not suitable to this tract. Fifty samples of Cholan collected from the late sowing tract of Dharapuram, Erode and Bhavani were sown late in October 1950. Owing to adverse season and severe *Calocoris* attack, most of the collections failed to set seed. A fresh collection of 70 types of yellow, five of red and 19 of white grain were made from the taluks of Bhavani, Erode, Dharapuram, Avanashi, Palladam and Udumalpet, were sown in September 1951, studied, and 50 promising selections from these consisting of 38 yellows and 12 whites were advanced for trial during the coming main season.

19. *Irrigated Sorghums*.—Most of the irrigated varieties of Cholan grown in South India whether they are white, yellow or red grained come under the species, *S. subglabrescens*. The area under irrigated Cholan is only about five lakhs of acres, and it is chiefly concentrated in the districts of Coimbatore, Madurai, Tiruchirappalli and Salem. To a small extent, irrigated Cholams are grown in the other districts also. The varieties and sub-varieties are very numerous in the irrigated Cholams. As a result of selection work so far, the following 11 strains of irrigated Cholan have been evolved at the Millet Breeding Station, Coimbatore. They are Co. 4 (*Sen cholam*), Co. 5 (*Chinnamanjal cholam*), Co. 6 (*Chitral Vellai cholam*), Co. 7 (*Kokkivellai cholam*), Co. 8 (*Ennai Vellai cholam*), Co. 9 (*Kesari cholam*), Co. 12 (*Mottai Vellai and Uppam cholam*), Co. 13 (*Ennai Vellai cholam*), Co. 14 and Co. 15 (*Vellai cholam*), and Co. 16 (*Salangai Vellai cholam*). Selection work for the other tracts for which the strains already released have not been found suitable is in progress. Improvement over the existing strains to meet the needs of the cultivators in the direction of grain colour and size and palatability of fodder, is also continued at the Millet Breeding Station. The progress made and the results achieved under each important variety are presented below.

20. (1) *Sen cholam* (red grains).—(a) *Evolution of a Sen Cholam strain with bolder grains than Co. 4*.—Irrigated *Sen Cholam* is generally grown in the Salem and Tiruchirappalli districts and to a small extent in the Coimbatore district. Co. 4 is the existing strain of the variety and it has spread in the tract. This is a good yielder but has small grains while the cultivators have a tendency to prefer bolder grains in Sorghum. One selection, A.S. 7589, with bolder grain and good yield, obtained from direct selection was given out for trials in Salem district and it is reported to be promising. Cholan Co. 4 was crossed with A.S. 3790 a very bold grained type from Africa, to improve the size of grain. But the progenies did not have the desired colour of Co. 4 and hence they had to be rejected. The different types met with in the *Sen Cholam* varieties are being studied for their grain sizes to pick out and test bolder grain types than Co. 4 for evolving suitable strains.

(b) *Evolution of a juicy stalked strain of Sen Cholam*.—As the *Sen Cholam* occupies a considerable area giving a large quantity of fodder in addition to its heavy grain yield, improvement of the quality of its fodder through the introduction of juiciness became necessary. Co. 4 was therefore crossed with A.S. 6509, a juicy stalked mutant of *Sen Cholam* and the progenies were purified and one selection, A.S. 8206, was put in yield trials in 1950 summer season. But owing to scarcity of irrigation water, the trial was a failure. In 1951 summer season, the trial was repeated with three more selections, one from the same cross from which A.S. 8206 is derived, and two pink grain selections, which are progenies of the crosses between Co. 9

and A.S. 6509, with Co. 4 as standard. In the yield of grain, though the differences were significant, none of the selections compared was better than the standard. Only one selection, A.S. 8345, was on par with the standard Co. 4 in grain yield. In straw yield, all the four selections were significantly superior to the standard Co. 4 giving increased yields ranging from 65.9 per cent to 84.5 per cent over it. When the straw of the four selections and that of the standard Co. 4 was analysed chemically for finding out their nutritive value, all the four selections were found to be better than the standard and A.S. 8345 was the best of the lot. The selections A.S. 8206 and A.S. 8345 are once again put in yield trial for confirmation of their performances in summer 1952, and the data will be ready for the next report.

21. (2) *Chinnamanjal Cholam*.—(a) *Improvement of grain size in Co. 5 (Chinnamanjal Cholam strain)*.—*Chinnamanjal Cholam* is an extremely localized variety of irrigated Sorghum and is confined to Coimbatore taluk. It has medium loose panicles with pure yellow grains and matures in about 105 days. Co. 5 is the strain of this variety and it has medium-sized grains. As bold grains are preferred, improvement in that direction was sought by crossing two selections of this variety with A.S. 3790 which has large grains. Twenty-two selections after purification for their morphological characters were sown, one head per row in 1951 summer season for estimating the purity of grain size. When the data were analysed for grain size five selections A.S. 8335/4, A.S. 8337/2, A.S. 8337/3, A.S. 8337/4 and A.S. 8348/2 were found to be pure for grain size. Three heads in each of these selections were sown separately in 1952 summer season to confirm whether they are pure for grain size. The grains of these five selections are 55 to 78 per cent larger in size than those of standard Co. 5.

(b) *Evolution of a juicy stalked strain of Chinnamanjal Cholam*.—To evolve a juicy stalked strain of *Chinnamanjal Cholam*, Co. 5 was crossed with Co. 11, the fodder Cholan strain, to introduce juiciness into it and to improve the quality of fodder. From the progenies of the crosses, four promising selections with desirable characters of Co. 5 and with juiciness were put in yield trial plots in summer 1951 using Co. 5 and Co. 11 as standards. But the differences in grain yield were not significant. In straw yield, three selections A.S. 8338/7, A.S. 8339/8 and A.S. 8338/8, were significantly superior to the standard Co. 5 giving increased yields ranging from 48.6 to 53.9 per cent over the standard.

Chemical analysis of the straw showed that A.S. 8338/4 is the most nutritious of all the selections.

For confirmation of the results of 1951 summer season, the three selections A.S. 8338/4, A.S. 8338/7 and A.S. 8338/8 were put in yield trial with Co. 5 and Co. 11 as standards in summer 1952. The data are not ready for this report, the crop having just been harvested.

22. (3) *Vellai Cholam*.—*Vellai cholams* constitute the biggest group among the irrigated cholams and consist of innumerable types differing mainly in duration, panicle shape, grain size and glume colour. The range in duration varies from 85 to 120 days and the selection of a particular variety depends upon the irrigation facilities available in the particular tract. Nine *Vellai cholam* strains representative of the different irrigation groups have so far been released from the Millet Breeding Station. But to cater to the specific needs of certain tracts, work is being continued at present. Improvement of the strains already released by improving the colour of grain, etc., is also in progress. The progress of work under the different items of *Vellai cholam* is presented below.

(a) *Evolution of a strain yielding higher than Co. 7.*—Co. 7 is the strain of *Kokki Vellai cholam*. It has a duration of 110 to 115 days and is confined mostly to Coimbatore district. To build up a strain with the same duration as Co. 7 and with better yield, collections were made from Gobichettipalayam, Satyamangalam and Avanashi taluks, studied and put in two rows in 1948 summer season. After purification, they were put in row yields in summer 1950 and eight selections which were superior to Co. 7 in grain yield were advanced to preliminary yield trials in summer 1951 and sown with Co. 7 as standard. When the yield data were statistically analysed, four selections all from Gobichettipalayam, were found to be significantly superior to Co. 7 in grain yield. But these selections have grains with slight red wash over them, and also their duration is shorter by 10 to 15 days. As they are contemporary to Co. 9 (*Kesari cholam strain*), they are proposed to be transferred to Co. 9 group. In straw yield, none of the selections was better than the standard Co. 7. It is proposed to collect fresh samples from the area to continue this item of work.

(b) *Evolution of a strain yielding higher than Co. 9 (Kesari Cholam) with juicy stalk.*—The *Kesari cholam* strain Co. 9 is the most popular of all the *Vellai cholam* strains in the southern districts. It gives a very high yield of grain and fodder. But as the straw is pithy, it has a low fodder value. It is a cosmopolitan strain. It has done very well as a mungari crop in the Siruguppa area. To improve the fodder quality, the strain Co. 9 was crossed with a juicy type A.S. 3834 (*Agni Kodai cholam*) from Madurai. One of the selections A.S. 8159 which has come out of the above cross and which has got the desirable characters of Co. 9 and the juiciness of stalk was in yield trials from 1948 onwards. It gave significantly higher yield of grain than Co. 9 in 1949; but the yield differences were not significant in 1950 and 1951. This selection was in district trials from 1950 onwards and it has given encouraging results in many of the southern districts. The trials with A.S. 8159 are being continued.

(c) *Evolution of a strain yielding higher than Co. 9 and without red wash.*—The strain Co. 9 (*Kesari cholam*) has a red wash over its white grain as the name indicates. The cultivators prefer pure white grains. The object of this work is therefore, to evolve a *Vellai cholam* strain free from red wash in grain and also having same duration and if possible giving higher yield than Co. 9. The problem was attempted to be tackled by pure line selection by making collections from Tirunelveli, Madurai and Coimbatore districts, but this line of work did not succeed. Co. 9 was therefore crossed with the strain Co. 7 (having pure white grains). The selections obtained from this cross though having no red wash, did not prove to be good yielders.

In 1951 summer season, other crosses were effected between A.S. 8159 (having juicy stalk and red tinted grain) and Co. 12 (*Mottai Vellai cholam*) strain with pure white grains. Out of seven crosses made, three along with their reciprocals were sown in 1952 summer season, and selections taken for further work. By crossing A.S. 8159 with Co. 12, it is expected that a high yielding type with pure white grain and juicy stalk can be evolved.

(d) *Evolution of a juicy stalked Mottai Vellai Cholam strain yielding higher than Co. 12.*—Co. 12 is the *Mottai Vellai cholam* strain. Next to Co. 9, it is the most popular of the irrigated strains and its importance lies in the fact that it has got the shortest duration among the irrigated Sorghums in that it matures in about 85 days. This strain is a high yielder of both

grain and straw, the grain being white chalky, and the stalk pithy. To introduce juiciness into this variety and thereby improve its fodder, Co. 12 was crossed with A.S. 8159 as described under (c) and the progenies are under study.

(e) *Evolution of a strain better than Co. 12 and shorter in duration.*—As already recorded, Co. 12 has got the shortest duration among the irrigated Sorghums. But as the water-supply is failing year after year, it is always covetable to have strains as short in duration as possible. So with the object of building up shorter duration strains than Co. 12, without sacrificing yield, samples were collected from Gobichettipalayam and Satyamangalam in 1949 and sown in the summer season of the same year for study. Fourteen promising selections from these were tried in row yield plots in 1950 summer season with K. 2 and Co. 12 as standards, and 12 were significantly superior to the standard Co. 12 in grain yield. These 12 selections were put in two groups of preliminary yield trials in 1951 summer season with Co. 12 and K. 2 as standards, and two selections were significantly superior to the standard Co. 12 in grain yield and one of them superior to it in straw yield also. These two selections A.S. 8388 and A.S. 8393 were advanced to yield trials and sown in 1952 summer with Co. 12 and K. 2 as standards. The yield data are not ready for this report.

23. *Trials of strains in the districts.*—Trials of improved strains and selections in the fields of the cultivators in the various districts to test their suitability to the tracts in co-operation with the District Staff continued to be carried out. This item of work is probably the most important for a plant breeder since the real worth of the improved selections that are produced at the breeding stations, can be found out only by comparing them with the local crops in the fields of the cultivators in the districts. Seeds of all the 16 cholam strains and those of promising selections were given for trials at a large number of places throughout the districts during the year under report. From the reports received during the year, A.S. 7081 (the extracted type from a cross between *Irungu* and *Periamanjai cholam*) gave 65.6 per cent more grain yield and 26.2 per cent more straw yield than the local *Irungu*. A high seed rate of 80 lb. per acre sown at Kollpatti yielded a very high tonnage of fodder. Trials with the *Talaivirichan cholam* selection A.S. 8008 in the districts of Salem and Tiruchirappalli were not conclusive because of adverse seasonal conditions. The extracted juicy stalked *Periamanjai cholam* type A.S. 8112 was sent to five places for trial in Tiruchirappalli district. The results have not been received so far. The irrigated *Vellai cholam* selections A.S. 8155 and A.S. 8159, the latter being juicy stalked, were given to a number of places in the districts of Madurai and Ramanathapuram in 1951 summer season for trial. From the reports received during the summer season 1951, the two selections are found to have given 20 per cent more yield than the local at Sattur, and 15 per cent more at Srivilliputhur, Mudukulathur and Aruppukkottai. Seeds of the different strains were issued for conducting fresh trials during the summer season 1952. A.S. 7589 a high yielding selection of *Sen cholam* was given for trials in the districts of Salem and Tiruchirappalli. The *Kittan cholam* selections A.S. 7441 and A.S. 7442 were given for trial in the taluks of Pollachi and Udumalpet, and *Karurettu Vellai* selections A.S. 7561 and A.S. 7562 to Palladam and Dharampuram. The *Vellai cholam* selections A.S. 8155 and A.S. 8159 were given for trial at a number of places in the districts of Coimbatore, Madurai and Ramanathapuram along with Co. 9 for comparison against the local types. The *Uppam cholam* selection A.S. 7934 was given for trial in Coimbatore district. Seeds of the new strains Co. 14 (*Vellai cholam*), Co. 15 (*Vellai*

cholam) and Co. 16 (*Salangai Vellai cholam*) were sent to Madurai district for raising seed farms. The most popular of all the *cholam* strains, Co. 4 (*Kesari cholam*), Co. 11 (*Fodder cholam type of Patcha jonna*) and the *Mottai Vellai cholam* Co. 12 continue to be very popular. Seeds of the different strains were also supplied for sowing seed farms.

24. *Fundamental work*.—(1) *Studies in the genetics of Sorghum*.—(a) & (b) *Linkage relationship, axil and sheath; and axil and juiciness*.—To study the linkage relationship between axil and sheath; and axil and juiciness in *Sorghum*, 28 crosses were made between suitable parents in the summer of 1951. The crossed heads were taken at the time of harvest and the setting in all of them was quite good. These could not be sown in 1952 summer season for want of irrigated area and it is proposed to raise the F. 1s in 1953 summer season.

(2) *Studies in the nature and quality of Sorghum starch and its baking qualities and the uses to which it can be put*.—The object of the work is to find out to what use *Sorghum* starch can be best put to. It has already been reported by previous workers that *Sorghum* starches can be used for processing textiles. There are no previous data, as to whether there are differences in size, shape and nature in starch grains between different species. There is also no information with regard to the gluten content of the different *Sorghum* species and also no attempt has yet been made to find out whether this kind of study could supplement the systematic classification of *Sorghum*. This item of work is taken with the object of solving the above problem as far as possible.

Nine *Sorghum* samples representing the major *cholam* varieties of the Madras State have been taken and chemically pure starch has been prepared from all of them. The starch grains were also measured, and drawings made and these measurements were statistically analysed as a preliminary step. Work on the baking qualities and the gluten content of the different varieties is being taken up.

25. *Programme of work for 1952-53*.—*Rainfed cholams*.—(1) *Periamanjai cholam*.—(a) Evolution of high yielding strains with juicy stalked, reddish purple straw.

(b) The study of the effect of early drought on the development of *Periamanjai cholam* by means of morphological and histological studies.

(2) *Talaivirichan cholam*.—(a) Evolution of strains yielding higher than Co. 2 (Chalky) and Co. 3 (Pearly) the *Talaivirichan cholam* strains.

(b) Evolution of a white chalky grained *Talaivirichan cholam* strain for the Chittoor district.

(c) Improvement of grain size in *Talaivirichan cholam*.

(d) Improvement of fodder quality in *Talaivirichan cholam*.

(e) Evolution of high yielding bold grained juicy stalked *Talaivirichan cholam* strains.

(3) *Irungu cholam*.—Evolution of high yielding grain-cum-fodder varieties of *Irungu cholam* with better exposure of grain suitable for the *Irungu* tract.

(4) *Kaki jonna*.—Evolution of a high yielding *Kaki jonna* strain for fodder.

(5) Evolution of strains for late sowings (September) in Coimbatore district.

Irrigated cholams.—(1) *Sen cholam*.—(a) Improvement of grain size in the *Sen cholam* strain Co. 4.

(b) Evolution of a juicy stalked high yielding *Sen cholam* strain.

(2) *Chinnamanjal cholam*.—(a) Improvement of grain size of Co. 5 (*Chinnamanjal*).

(b) Evolution of a juicy stalked *Chinnamanjal cholam* strain.

(3) *Vellai cholam*.—(a) Evolution of a strain yielding higher than Co. 9 (*Kesari cholam*) with juicy stalk.

(b) Evolution of a strain yielding higher than Co. 9 and without red wash.

(c) Evolution of a strain yielding higher than Co. 9 without red wash of grain and with juicy stalks.

(d) Evolution of a juicy stalked *Mottai Vellai cholam* strain yielding higher than Co. 12 the present strain.

(e) Evolution of a strain yielding higher than Co. 12 or giving at least the same yield, but with shorter duration

District trials.—Trials of improved strains and selections in the cultivators' fields in the various districts to test their suitability to the tracts in co-operation with the District Staff.

Fundamental Work.—(1) *Studies in genetics of Sorghum*.—

(a) Linkage relationship axil and sheath.

(b) Linkage relationship axil and juiciness.

(2) *Studies in the nature and quality of Sorghum starches and its baking qualities and the uses to which they can be put to*.

(3) The study of the inheritance of earhead shapes in *Sorghum* in crosses between *Talaivirichan cholam* and strain H. 1 (*Tella jonna* of Bellary).

C. *Ragi* (*Eleusine coracana*, Gaertn).

26. *Ragi* is the next important millet in acreage. Owing to uncertain monsoon, work at Millet Breeding Station was limited to irrigated types. Two crops, namely, the summer and the main season ones were grown. Three hundred and thirty-three cultures were raised and studied in 2.43 acres.

Improved strains.—The improved strains of *ragi* Co. 1, Co. 2, Co. 3 and Co. 4 continued to be popular in places where they are grown. *Ragi* Co. 1 is a medium duration strain of 120 days, that can be grown as an irrigated and a dry crop. It is a cosmopolitan strain having a wide range of adaptability. *Ragi* Co. 2 and Co. 3 are short duration strains of 110 days duration grown mainly under irrigation. *Ragi* Co. 4 is an irrigated variety of long duration that requires 140 days for maturing. Due to the continued failure of monsoon, the short duration strains, especially *ragi* Co. 2 is in great demand. Strains Co. 3 and Co. 4 are grown in limited areas and in particular localities where such types are preferred. The improved strains were in good demand but the supply had to be restricted for want of sufficient seed owing to the limited facilities for seed multiplication. From the Millet Breeding Station 12,591 lb. of improved seeds of *ragi* were distributed. The bulk of it was intended for raising seed farms in the districts to cover the target area fixed for this millet as per the Grow More Food Scheme.

27. *Yield trials*.—In order to evolve high yielding selections, three sets of yield trials were conducted. In the first series, five promising short duration cultures were compared with *ragi* Co. 2 to isolate a selection of *ragi*

better than Co. 2. E.C. 4601 is earlier by 11 days and gave an increased yield of 15.5 per cent grain and 10.6 per cent straw over Co. 2; though the difference was not statistically significant. The shorter duration by eleven days gives it a decided advantage as one or two irrigations can be saved. The early Anakapalle varieties mature 17 days in advance of Co. 2 but are very poor yielders of both grain and straw at Coimbatore.

The second set was designed to isolate high yielding *Karumsuruttai* (pigmented) ragi and to test the yield of E.C. 4310, a promising white grain selection. Three *Karumsuruttai* selections and E.C. 4310 were compared with ragi Co. 1. The two *Karumsuruttai* selections E.C. 4573 and 4576 were significantly superior to Co. 1, yielding 58.4 per cent and 54.6 per cent more grain. E.C. 4310 yielded as much as Co. 1. The performance of these being consistent over a number of years, E.C. 4573 and E.C. 4310 are advanced for district trials. It is expected that these will serve to meet the growing demand for high yielding selections of white and *Karumsuruttai* varieties of ragi.

In the third series, eight cultures were put under replicated row yield trial. Four short duration cultures were significantly outstanding out of which the first three were advanced to yield trials.

Thirty-seven single plant cultures were grown in observation plots and 16 promising ones advanced for further tests. Hundred and seventy-one fresh samples collected from districts were studied and 234 single plant selections were carried forward. Single plant selections of strains to isolate cultures true to type and small bulk plots of the same to produce nucleus seed were grown.

28. *Disease resistance studies*.—This is a very important investigation aimed at evolving strains of ragi resistant to *Piricularia* infection. When seasonal factors are favourable for the disease, it often occurs in an epidemic form considerably reducing the yield. All the cultures that were under study were affected to a greater or lesser extent due to the artificial inoculation. Seven selections that were comparatively resistant were put to severe tests. The disease was induced by the spraying of spore suspension. The results were separately analysed for yield and infection and correlation between disease infection and yield was also worked out. The correlation though positive, was not significant. The results indicate that high yielding types are susceptible to infection. High yielding types E.C. 4600, AKP. 3, K. 1 and Co. 1 show a higher percentage of infection than E.C. 1008 and E.C. 151 which are very poor yielders. The experiment will be pursued with a larger number of varieties for further confirmation.

29. *Study of Reniform grains*.—Investigations of "Reniform" grain shape in ragi is an item of fundamental research. "Reniform" grains were observed in a sample of ragi received from East Africa. Unlike the globular grains, these are slightly flat and cylindrical with a constriction towards the micropyle. They are slightly longer transversely and almost kidney-shaped. Hence the new shape is designated "Reniform" and this grain shape is a new character observed in ragi. Progenies of 33 single plants collected from the original seed sample were grown and 66 selections were taken for isolating lines pure to the character. It is intended to isolate pure lines by selection and pursue the inheritance of this new trait.

30. *Trial of strains in the districts*.—The trial of the strains in the districts was not very satisfactory due to unfavourable monsoon. In many

centres no sowing was taken up or the crops dried up for want of rain. The ragi strain H. 1 of Hagari has given encouraging results in Payyanur, North Malabar. An increased yield of 30 per cent over local varieties was reported. In the coming season, extensive trials will be conducted with the Hagari strain of ragi in North Malabar. Ragi strains Co. 1, and Co. 2 of Coimbatore, H. 1 of Hagari, K. 1 of Koilpatti and P. 1 of Palur were sent for exploratory trial in Nilgiris district. These high yielding strains of the plains are unsuitable to the hills. They are stunted in growth and require 30 to 45 days more than local varieties. Local varieties were collected for isolating types suited to the tract. Local samples from Malabar and South Kanara, 108 in number, were grown under observation. Their general growth was very poor. Sixty-seven single-plant selections were taken for further study.

31. *Publication*.—A research note reporting the occurrence of "Reniform" grain in ragi was prepared and sent up for publication in the Madras Agricultural Journal.

A research note on "Earless—a new mutant in ragi" was also released for publication in "Current Science".

32. *Programme of work for 1952-53*.—A. *Evolution of improved strains*.—
(2) Short duration ragi.
(2) *Karumsuruttai* ragi.

B. *Disease resistance studies*.—Evolution of strains resistant to *Piricularia* infection.

C. *Fundamental research*.—Study of Reniform grain shape in ragi.

D. Trial and spread of improved strains.

D. *Tenai (Setaria italica, Beauv)*.

33. *Tenai* (Korra) is one of the four major millets dealt with at the Millet Breeding Station. It comes fourth in the order of importance and occupies an area of 1.5 million acres in the Madras State. During the year under report, two crops of tenai were raised, one under rainfed conditions during the north-east monsoon season and the other under irrigated conditions during the same period. A total number of 260 cultures was studied in an area of 12.04 acres. These cultures were mainly grown for testing yield and study of resistance to tenai rust. The details regarding these studies are given in the following paragraphs.

34. *Improved strains*.—Three strains in tenai have been evolved at the Millet Breeding Station of which tenai Co. 1 and Co. 3 are dryland strains, and tenai Co. 2 is an irrigated strain. Tenai Co. 1 is the most popular of the three strains and it can be raised under irrigation also. A quantity of 2,403 lb. of seed of tenai Co. 1 was distributed from the Millet Breeding Station, Coimbatore, for seed farms and trials in the districts. As an irrigated strain tenai Co. 2 has been very popular in parts of the southern districts. As only a limited quantity of seed could be produced at the Millet Breeding Station, the demand for the seeds from the districts could not be met in full. However, 555 lb. of seeds of tenai Co. 2 were distributed during the year to serve as nucleus seed for future spread of the strain. Tenai Co. 3 is a dryland variety which yields higher than Co. 1. A quantity of 888 lb. of tenai Co. 3 seed was distributed for seed farms and for conducting trials.

35. (a) *Evolution of high yielding strains*—(i) *Short-duration strains less than 85 bags*.—To evolve short duration and high yielding tenai types by hybridization, suitable parents were chosen and crosses were made in the summer season of 1945. Four hundred and thirty-five single plants were isolated from the progenies of these crosses. From further generations, five selections which were found promising were carried forward for yield trial with a short duration high yielding Salem selection as control in 1950 main season. All the selections gave higher yields of grain than the control and in the case of three selections, the increases were statistically significant. The trial was repeated in the main season of 1951. One selection S.I. 4894 has given the highest grain yield of 17.3 per cent over the control S.I. 3497 the short-duration economic selection, the increase being statistically significant. In straw yield, two selections S.I. 4919 and S.I. 4894 are superior to the control. The trial will be repeated during next year for confirmation of results.

(ii) *Evolution of an irrigated strain for the Tiruchirappalli district*.—From the districts of Nellore, Salem and Tiruchirappalli, tenai samples were collected and tested, and ten selections were compared in a preliminary yield trial with tenai Co. 2 the irrigated strain as control during 1949 main season. None of the selections yielded more than the standard though five selections were on a par with Co. 2. These five selections were tried in an yield trial with the local variety from Tiruchirappalli as control. Three selections were superior to the Tiruchirappalli local. The trial was repeated in main 1951 season. Three selections S.I. 4946, S.I. 4945 and S.I. 4957 are significantly superior to the local in grain yield and S.I. 4946 is significantly superior to the rest. In straw yield, none of the selections are significantly superior to the local though S.I. 4957 stands on a par with it. In money value, S.I. 4946 is significantly superior to the rest and S.I. 4957 stands on a par with the local.

(iii) *Evolution of dryland strains for Salem district*.—Six single plant selections were chosen from a promising Salem local variety and they were compared with the local bulk as control in a preliminary yield trial randomized and replicated five times. The results for both grain and straw yields are not significant, but two selections have given higher yield of grain than the control.

(iv) *Evolution of dry land strains for Cuddapah district*.—Four Cuddapah selections were compared in a 4×5 randomized block in a preliminary yield trial with the general mean as control. One selection has given a higher yield of grain than the general mean and it is significantly superior to the other three selections.

(v) *Evolution of strains for other major districts on zonal basis (rain-fed)*.—Dryland tenai samples were collected from the districts of Visakhapatnam, Anantapur, Nellore, Kurnool, Salem and Coimbatore and ten promising cultures were tried in a preliminary yield trial with the general mean as the standard in a 10×5 randomized block. The results of both grain and straw yields are significant. In grain yield, five selections have given higher yield than the general mean and out of these only one selection is significantly superior to the rest. In straw yield, six selections have given higher yield than the general mean.

(vi) *Evolution of strains for other major districts on zonal basis (irrigated)*.—Irrigated tenai samples were collected from the districts of Cuddapah and Coimbatore and five promising cultures were tried in a preliminary

yield trial with the general mean as the control in a 5×5 randomized block in 1951 main season. Two selections have given higher yields of grain and straw than the general mean and they are significantly superior to the others.

36. (b) *Rust resistance studies*.—Rust (*Uromyces Setariae italicae*) is a disease which attacks the tenai crop. It appears sometimes in a severe form when the plants suffer badly and the yield is considerably reduced. To evolve a suitable type that is resistant to this disease work was in progress from 1944. In the 1948 monsoon season, three selections showed less infection than the others and out of these three selections, S.I. 3756, was the least infected. Twenty-three fresh samples collected from an infected field at Coimbatore were studied in 1949 main season and 18 single plants were isolated. Four of them were found to have less than 25 per cent field infection. These were studied with Co. 1 strain, S.I. 3560 the susceptible variety and S.I. 3756 the resistant variety at the Millet Breeding Station in 1951 main season. Ten new selections were also added to these. Out of the 14 selections tested for rust resistance in main 1951 season, only one selection S.I. 5017 showed the same infection 30 per cent as S.I. 3756 the rust resistant variety. One selection S.I. 4975 which was sown for yield studies was observed to be tolerant to rust. These two selections will be further tested with S.I. 3756 the rust resistant variety and S.I. 3560 the susceptible variety next year. The work is being done in collaboration with the Government Mycologist both for field tests and for laboratory tests.

37. (c) *Miscellaneous studies*—(i) *Studies on tillering*.—With a view to induce tillering into Co. 2, the irrigated non-tillering strain, a natural cross from a Co. 2 bulk crop having a number of tillers was taken. Ten heavy tillering selections from it were chosen and were sown in 1951 main season under rainfed conditions along with Co. 2 for comparison. The counts of tillers per plant were recorded. Four single-plants with a large number of tillers from each of the ten F. 3s have been taken for further studies.

With a view to induce tillering into irrigated types, Co. 2 the irrigated non-tillering strain and S.I. 4721 the irrigated Trichy variety were crossed with Co. 3 the tillering dryland strain. Only one F. 1 was obtained from each of the two crosses. The population in one F. 2 was very poor and only one plant could be taken. In the other, the plants segregated for different morphological characters. Bristle length, head shapes and tillering characters were posted and 16 economic selections have been taken. These will be further studied in 1952 main season.

Six contact crosses between Co. 2 and Co. 3 have been made during this season for further studies in tillering.

(ii) *Trial of Eragrostis tef along with tenai*.—A sample of *Eragrostis tef* from Adis Ababa, East Abyssinnia was sent by Dr. E. K. Janaki Ammal to be tried as a cereal in India. The seed was sown and six single plants were chosen. These six selections were sown in uniform plots in 1950 main season under rainfed conditions. The grain yield per acre of the six selections ranged from 125 lb. to 438 lb. To compare this with tenai yields in adjacent plots, these were again sown in uniform plots with tenai Co. 1 as control under rainfed conditions in 1951 main season. Due to damage by ants, the population was very poor and hence the yield of grain of *Eragrostis* could not be compared with that of tenai Co. 1. Two more *Eragrostis* samples were received from the United Kingdom and single plant selections have been taken. A final trial will be given to all these selections during 1952 main season to obtain conclusive results.

38. (d) *Trials of strains in the districts.*—Trials of strains of tenai Co. 1, Co. 2 and Co. 3 were extended to new areas. Tenai strains of Hagari, Nandyal, and Coimbatore were tried at Siruguppa. Out of these, tenai Co. 1 has given the highest yield (i.e.) 20 per cent increased yield over the general mean. In the Cuddapah district, trials were conducted with tenai Co. 2 strain. It has given an increased yield of grain ranging from 28 per cent to 100 per cent over the local in the Pulivendla and Badvel taluks. In the Madurai district, tenai Co. 3 has fared well giving an increased yield of 18 per cent to 63 per cent over the local in the Periakulam and Uthamapalayam taluks.

39. *Programme of work for 1952-53.*—(a) Evolution of high yielding strains—

- (i) Short duration strains less than 85 days.
- (ii) Strains for Tiruchirappalli district (irrigated).
- (iii) Strains for Salem district (rainfed).
- (iv) Strains for Cuddapah district (rainfed).
- (v) Strains for other major districts on zonal basis (rainfed).
- (vi) Strains for other major districts on zonal basis (irrigated).

(b) Evolution of rust resistant strains under field conditions.

(c) Miscellaneous studies—

- (i) Studies on tillering.
- (ii) Trial of *Eragrostis tef* along with tenai.

(d) Trial of strains in the districts.

E. Minor Millets.

40. (a) *Evolution of high yielding strains.*—There are four millets which are of minor importance and hence called Minor Millets. The four of them together occupy an area of 22 lakhs of acres in the Madras State. They are *Varagu* (Arika) *Paspalum scrobiculatum*; *Samai*, *Panicum miliare*; *Panivaragu*, *Panicum miliaceum* and *Kudiraivali*, *Echinochloa frumentacea*. *Varagu*, *Samai* and *Kudiraivali* were raised as dryland crops during the south-west monsoon season and *Panivaragu* crop was raised in the cold weather months of November to January. A total number of 14 cultures of *varagu*, 44 of *samai*, 10 of *kudiraivali* and 12 of *Panivaragu* was raised occupying a total area of 3.4 acres. Most of these cultures were grown for evolving high yielding strains and production of bulk seed. The details regarding these studies are given in the following paragraphs.

Economic selections of P.S. 1 (Arika), P.M. 2 and P.M. 4 (Samai), P.V. 36 and P.V. 14 (Panivaragu) and P.C. 49 (Kudiraivali) were found to be the best yielders and were released for distribution. A total quantity of 512 lb. of P.S. 1, 207 lb. of P.M. 2, 9 lb. of P.M. 4, the short duration economic samai selection, 110 lb. of P.V. 14 the high yielding Panivaragu selection and 47 lb. of P.C. 49 were distributed during this year.

In *Varagu*, 18 fresh samples were collected and 72 single plants were isolated and studied in compact family blocks in 1949. Four selections were found to be superior to the standard P.S. 1. These were tried in preliminary yield trials during 1950 main season. The results were not significant and hence the trial was repeated in main 1951 season in a comparative trial. The results were not significant. Four new selections were also tested in a yield trial with P.S. 1 as control. The differences in grain and straw yields between the varieties were not significant.

In the district trials, P.S. 1 *varagu* has fared well in Mudukulathur and Aruppukottai taluks of the Ramanathapuram district giving increased yield of 8 to 33 per cent over the local.

Six fresh samples of *Samai* were collected and 21 single plant selections were taken. Out of these, nine selections were found promising. Three short duration selections were chosen and tested in a preliminary yield trial in 1950 main season with a short duration economic *Samai* culture P.M. 4 as control. The season was a failure and hence the trial was repeated in 1951 main season. In this trial, one selection, P.M. 289, though it has given a higher yield of grain than the control P.M. 4 by 33 per cent, the difference was not statistically significant. Eight long duration *Samai* selections were tried separately in a preliminary yield trial with the long duration economic *Samai* selection P.M. 2 as control. The results show that none of the selections was superior to the standard P.M. 2. However, one selection P.M. 1 gave 18 per cent more yield than P.M. 2 but the differences in yield between them did not reach the level of significance.

Out of the four selections of *Panivaragu* tested in yield trial plots last year for confirming results, P.V. 14 continued to be the best yielder. Fourteen fresh samples of *Panivaragu* were tested in preliminary yield trial plots in 1950 and four were found promising. These were tried in a yield trial with P.V. 14 as control. The results for grain yield are significant and one selection P.V. 324 was significantly superior to the control giving the highest yield.

Three economic selections of *Kudiraivali* out of seven cultures tested, were advanced to preliminary yield trial and one selection was found superior to P.C. 49 the standard. This was tried in yield trial plots with P.C. 49 as control in 1950 main season. The season was a failure and hence the trial was repeated in 1951 main season. The yield differences are not significant. From six new samples of *Kudiraivali*, 21 selections were chosen for yield tests. Out of these, six were found promising and were tried in a preliminary yield trial in 1951 main season with P.C. 49 as control. The differences in grain yield are not significant but three selections have given higher yields ranging from 1.3 per cent to 14.7 per cent than the control P.C. 49.

(b) *Trial of P.V. 14 in the districts.*—Seeds of P.V. 14 was given out for trials in the districts of Ramanathapuram, Tirunelveli and Madurai. The results are awaited.

41. *Programme of work for 1952-53.*—(a) Evolution of high yielding strains.

(b) Trial of P.V. 14 and others strains in the districts.

42. *F. Miscellaneous crops.*—(i) *Maize.*—There was one yield trial during this season. A variety of maize received from the Italian Federation of Co-operatives was tried along with Repalle maize and local. The Italian variety gave a poor yield when compared to the indigenous ones. The trial will be discontinued.

(ii) *Fruit trees.*—Among the fruit plants planted in 1948 at the Millet Breeding Station, 13 guava, four anona, 14 sapota and three pomegranates have come up well. Two plants in each of the three varieties of Malta lemon were planted during the year, out of which four have established well. Anona and guava have set fruits. All the fruit plants were manured with ash and cattle manure at the rate of two baskets per plant. Periodical hoeing, weeding and watering were also attended to. All the 13 regular mazdoors of the farm were given training in Horticulture.

(iii) *Green manure plants*.—The growing of the green manure plants on the boundaries of the farm, along the sides of roads and other patches of land not used for cultivation was continued and about 800 seedlings of *Gliricidia maculata* were planted during the year. The seedlings were watered periodically and they have come up well. Pits were also dug along field bunds and seeds of *Sesbania speciosa* were sown. *Sesbania speciosa* was also raised along irrigation channels of fields devoted to the raising of cholam, cumbu and ragi crops. A total quantity of 84 lb. of *Sesbania speciosa* and three pounds of seed of *Gliricidia maculata* were collected.

Seeds of *Indigofera teysmannii* received from the Government Lecturing and Systematic Botanist were sown. The percentage of germination and survival of seedlings was rather poor; eleven seedlings of heights ranging from 2 to 9 inches are ready for planting.

(iv) *Grasses—Blou buffel*. (*Cenchrus ciliaris*) received from the Government Lecturing and Systematic Botanist was raised in observation plots along with *Kolukattai* grass in an area of 0.5 cent each. It was found that *Blou buffel* is more vigorous and gives a larger quantity of fodder than *Kolukattai* grass giving almost three times the yield of the latter. A total quantity of 435 lb. of *Blou buffel* and 147 lb. of *Kolukattai* grass was obtained during the course of three cuttings from February 1952.

43. *G. Works*.—The usual annual repairs to both the residential and non-residential buildings were attended to during the year.

SECTION III.—MILLET BREEDING WORK IN THE AGRICULTURAL RESEARCH STATIONS OF THE DISTRICTS.

A. Nandyal.

44. (a) *Season*.—A total rainfall of 22.64 inches was received during the year (from 1st April 1951 to 31st March 1952) distributed over 36 rainy days. This is low compared to a ten-year average of 28.5 inches and 46 rainy days. During this season, all the main crops korra, ground-nut, cotton and jonna were sown at the proper time. The early sown crops korra and groundnut made good progress during their early stages of plant growth, but later suffered due to the continuous period of drought that existed during the months of October and November, recording poor yields. The jonna crop had an initial set back from the sugary disease and heavy infestation of shoot bugs. With the onset of "Pyrugali" in the first week of December accompanied by the chill weather, the crop revived and made rapid progress. In spite of the low rainfall, the jonna yields recorded have been satisfactory this season. The following are the acre yields recorded by the various Millet strains under seed Multiplication plots:—

Millet strains.	Acre yield of grain in pounds.	Remarks.
(1)	(2)	(3)
1 N. 1 Korra	115	Korra sown mixed with Redgram and Budama.
2 N. 1 Jonna	758	Patcha Jonna strains.
3 N. 2 Do.	1,153	Do.
4 N. 3 Do.	530	Do.
5 N. 4 Do.	619	Do.
6 N. 5 Do.	461	Do.
7 N. 6 Do.	906	Do.
8 N. 7 Do.	856	Do.
9 N. 8 Do.	872	Do.
10 N. 9 Do.	872	Do.
11 N. J. 6 (No. 10)	789	Mungari Jonna strains.
12 N. J. 16 (N. 11)	932	Do.
13 N. J. 20 (N. 22)	722	Do.

(b) *Mungari jonna*.—During the period under review, selection work was continued with "Mungari Jonna" selections made from the various taluks of Anantapur and Bellary districts with a view to evolve suitable high yielding Jonna types for the "Mungari Jonna" growing areas in these two districts. Continuous dry weather that prevailed during the first fortnight of November, when all the "Mungari Jonna" selections were in flower, favoured good setting of grain in all the selections sown and the yields recorded have been very good. Nine selections from Bellary district and eight from Anantapur district were under study. From these, promising selections five from Bellary district and six from Anantapur district have been advanced to try them in the districts during the coming season (1952-53). Pure culture and seed multiplication plots are maintained for the three economic selections, N.J. 6, 16 and 20 which are under distribution in Dhone and Pattikonda taluks of Kurnool district.

In view of these three cultures being regularly distributed in Pattikonda and Dhone taluks since 1946-47, and as they have completed district trials satisfactorily, they have been given Station numbers as detailed below:—

Selection No.	Strain No.
N. J. 6	N. 10
N. J. 16	N. 11
N. J. 20	N. 12

(c) *Juicy stem, Pithy stem and Gundu Patcha Jonna Selections*.—These are the main season Jonnas of the tract. Pure culture and seed multiplication plots were maintained for all the nine standard strains N. 1 to N. 9 now under distribution in the districts of Kurnool and Cuddapah and other promising selections given out for trial in observational plots in the districts in these groups.

(d) *Korra*.—Pure culture and seed multiplication plots of N. 1 Korra strain were raised during this season on the station for supply of pure seed to parts of Kurnool and Cuddapah districts for raising primary seed farms.

(e) *District trials*—(i) *Juicy stem selections*.—N. 1 Jonna was tried in observation plots in West Godavari, Guntur and Nellore districts. In most of the centres tried, the crop was a failure due to adverse seasonal conditions excepting at Tungutur village of Guntur district, where a record yield of 2,000 pounds per acre was obtained. These trials will be continued during the coming season.

Selections N.J. 294 and 710 were tried in the juicy stemmed area of Nandyal valley and N.J. 1046 in Pulivendla taluk. As the Jonna crop was a failure in general in these areas, the trials will be continued during the coming season.

(ii) *Pithy stem selections*.—Selection No. N.J. 1031 which was under observation trials in Cuddapah and Proddattur taluks, was found to be more suitable in Proddattur taluk, where the trials will be conducted for one more season.

(iii) *Krishna district*.—Observation trials were conducted in the various Jonna growing taluks of Krishna district with strains N. 2 and N. 3 of Nandyal and Co. 11 of Coimbatore. Due to adverse seasonal conditions, the crop was a failure in most of the places. These trials will be continued during 1952-53 season.

(iv) *Seed multiplication and distribution*.—For seed distribution in Jonna and Korra strains 19,474 pounds of improved seed were produced during 1951-52. The improved seeds in these crops distributed during this season to District officers for raising primary seed farms was 14,578 lb.

B. Hagari.

45. (1) *Jonna*.—In the yield trials with nine promising selections of *Tella Jonna* with H. 1 and M. 47-3 as controls arranged in two sets, seven cultures are promising. Of these seven cultures, selections J. 762 and J. 718 have given the highest yield of grain and selection J. 744, the highest yield of straw. The trial will be repeated in the coming season. There were two series of preliminary yield trials. In the first series, 17 single-plant selections advanced from the previous year, were compared with H. 1 as standard in two sets. The yield differences were not significant. However six selections are promising. In the second series, 14 selections from the advanced progenies of crosses between strain H. 1 and Bombay types were compared with H. 1 and M. 47-3 as standards. The yield differences were not significant. Three hundred and eighty-five F. 3 and F. 4 progenies were studied and 36 promising single plants were carried forward for further work.

(2) *Korra*.—In *Setaria*, eleven cultures were under yield trials, with strains H. 1 and H. 2 as controls. Selection H.K. 289 gave an increased grain yield of 19.2 and 42 per cent over the strains H. 1 and H. 2 respectively the increases being significant. Selection H.K. 336 was on a par with H. 1 and was superior to the strain H. 2 giving an increased yield of 37 per cent over it. Selection H.K. 282 was on a par with H. 1 and H. 2 though it recorded 17.8 per cent increased yield over H. 2. Seeds of selections H.K. 282 and H.K. 289 were issued for district trials, the results of which are awaited. Selection H.K. 336 will be issued for district trials in the coming season along with H.K. 282 and H.K. 289. In the preliminary yield trials, of the 17 cultures tested, 14 are promising and will be carried forward for further trials. Fifty-one selections consisting of 36 from red soil area and 15 from the black soil area were studied and 12 single plant selections from the red soil zone and five from the black soil zone have been selected for further studies. During the period under report, 51 cultures were under study for rust resistance with strain H. 1, the highly susceptible type as the standard. Eleven cultures recorded less than 15 per cent infection. In general, the pigmented types and Coimbatore types were fairly resistant to rust while H. 1 had the maximum infection.

(3) *Ragi*.—Short duration selections AKP. 1, AKP. 2, AKP. 5, R. 4 and R. 78 were compared in an yield trial. The results of grain yields were not significant though AKP. 5, AKP. 1 and AKP. 2 recorded increased grain yields of 9.2 per cent, 7.2 per cent and 3.9 per cent over selection R. 4, AKP. 5 will be issued for district trials.

C. Siruguppa.

46. Briefly the object of the *Hingari Jonna* scheme is to evolve a variety of *Hingari Jonna* suitable for the irrigated black soils of the Tungabhadra Project area. The seasonal conditions were unfavourable for crop production in general and rainfed crops in particular as the rainfall was below normal. The growth of the crop was stunted resulting in low yields.

In the yield trials with eight promising cultures of *Hingari Jonna* with H. 1 and M. 47-3 as controls arranged in two sets, the yield differences were not significant. Seventy-two promising selections from previous collections were arranged in two series of yield trials, the first being of short and the second of long duration. Three cultures of the short duration group and four of the long duration group were significantly superior to the standard in grain yield. Among the 41 promising cultures tested in progeny rows, only one was superior to the standard.

The progenies of the crosses under study in the last year were sown in non-replicated plots to study their genetic behaviour and resistance to the attack of Cholan fly and 172 single plants were selected for further study. Fresh crosses were also made during the year and 143 crosses were taken for further work.

Fresh samples of *Hingari Jonna* collected from Bellary, Kurnool and Anantapur districts totalling 83 in number, were studied and 37 promising selections were taken for further work.

Forty Sorghum types (provincial and extra provincial) were studied for their resistance to Cholan fly which is a serious pest during seedling stages. It was noted that three Coimbatore strains Co. 7, Co. 8 and Co. 12 were more resistant to the fly than the rest.

Eight selections of Tenkasi Cholan were tried in the early and late seasons to find out whether they are suitable to the tract and to find out whether they are resistant to Cholan-shoot borer fly. The results indicated that the Tenkasi Cholan types are more suited to the early than the late season in this tract.

Korra.—Improvement of Korra has been taken up newly at this station and in the bulk trials out of the 20 cultures tested in two sets, only one of the first and one of the second were superior to the standard No. 1 in grain yield. Out of 85 cultures tested in row yield plots in three sets, only nine were superior to No. 1, the standard. Out of 167 cultures sown for observation and selection, 45 were promising and were taken for further work.

In addition to *Hingari Jonna* and *Korra*, work on *Mungari Jonna* and *Ragi* is also taken up at the station and is included in the programme of work given below.

D. Koilpatti.

47. (1) *Cholan*.—(a) *Trungu Cholan*.—(Rainfed) A.S. 7081 an extracted type from a cross between *Periamanjil Cholan* and *Trungu* was tried in an yield trial along with *Trungu* strain K. 1, the seed rate employed being 65 lb. per acre for both. The yield differences were not significant, though A.S. 7081 gave an increase of 16.7 per cent grain and 4.1 per cent straw over K. 1. The experiment will be repeated. In an experiment to determine the optimum seed rate for A.S. 7081, seed rates of 10, 20, 30, 40, 50, 60, 70, 80, 90 and 100 lb. of A.S. 7081 were compared with the local seed rate of 60 lb. of *Trungu* K. 1 as control in non-replicated plots. It was found that grain production was the highest when 10 lb. seed rate was adopted (430 lb. per acre) while straw yield was the highest with 100 lb. seed rate (10,320 lb. per acre). *Trungu* K. 1 at 60 lb. seed rate gave 155 lb. of grain and 7,076 lb. of straw while A.S. 7081 at the same seed rate gave 265 lb. of grain and 6,260 lb. straw. The experiment will be repeated in replicated randomised blocks in the coming season.

(b) *Vellai Cholan*.—Three *Vellai Cholan* selections K.S. 285, K.S. 288 and K.S. 296/4 were consistently giving higher yields than *Vellai Cholan* strain K. 2 during the three years of trial of 1947-48 to 1949-50. In summer 1951, these selections were tried along with strain Co. 9 and Co. 12 and selections A.S. 8155 and A.S. 8159 received from the Millet Breeding Station, Coimbatore, in observation plots. There was severe *Calocoris* attack and the crop was periodically dusted with Gammexane. The results indicated that the selection K.S. 288 and K.S. 296/4 gave an increased grain yield of 5.0 and 3.3 per cent over the strain K. 2, while the other selections gave poor yields. All these have been sown in an yield trial in summer 1952. The crop is on the field and the general stand is good.

(2) *Cumbu (Main)*.—Seven promising selections and 17 cultures were sown in yield trials and preliminary yield trials respectively with K. 1 as control. The season was a failure due to extreme drought.

(Scheme) Seven hybrids which were tested in 1950-51 were tried in an yield trial this season with K. 1 as standard both in the red and black soil areas. The statistical analysis indicated that in the red soil hybrid K. 1 × P.T. 504 was superior to K. 1, though it was on a par with hybrids K. 1 × Co. 3 and K. 1 × Co. 1. In the black soil area, due to drought the stand was gappy. The yield was adjusted to stand. The result showed that hybrid K. 1 × P.T. 504 was on par with K. 1 the highest yielder. The trial will be repeated. Twenty-seven initial crosses with single plants of K. 1 and eight early generation inbreds sent from Coimbatore were effected.

(3) *Ragi*.—K.R. 4, a purple pigmented non-lodging variety along with another high yielding selection K.R. 76 was tried in an yield trial with strain K. 1 as the standard for a second year. The results were not significant, though K.R. 4 and K.R. 76 recorded an increased grain yield of 9.5 and 12.2 per cent respectively over K. 1. The trial will be repeated. During the period under report, 30 selections were tested in preliminary yield trials. Of these, 16 are promising. From the progenies of the crosses between K. 1 and K.R. 4 for introducing non-lodging habit in strain K. 1, 46 selections were tested in preliminary yield trial.

SECTION IV.—REGIONAL MILLET STATIONS.

A. Introduction.

48. From the studies on millets carried out at the Millet Breeding Station, Coimbatore, and from the results of the district trials of millet strains evolved from the Central Station, it was found necessary to evolve suitable strains in each of the important varieties of millets in the several areas in which the millets are grown as the strains were found to have limited spread. To meet this need, the Government sanctioned the opening of four Regional Millet Stations in the important millet growing areas of the State in G.O. No. Ms. 1565, Development, dated 24th March 1949. Accordingly four Regional Millet Stations were opened one at Ariyalur in the Tiruchirappalli district, the second at Tirupattur in North Arcot district, the third at Ongole in the Guntur district and the fourth at Narasapatnam in the Visakhapatnam district. The Millet Specialist at Coimbatore was put in charge of the Scheme and to help him in carrying out the work the following staff was sanctioned :—

Place.	Assistant Research Officers.	Agricultural Upper Subordinates.	Field men.	Clerk.	Peon.
(1)	(2)	(3)	(4)	(5)	(6)
1. Ariyalur	..	1	2	..	1
2. Tirupattur	..	2	2	1	1
3. Ongole	..	1	2	2	1
4. Narasapatnam	..	3	3	1	1
5. Head quarters	1	..	..	1	1

REMARKS.—1. Includes one assistant and one fieldman working at Palur transferred to the Station.

2. Nil.

3. Includes one assistant and one fieldman working at Jam.

4. One assistant and one fieldman was transferred from Anakapalle.

5. Sri V. Krishnaswamy, B.Sc. (Ag.), took charge as Assistant Millet Specialist for this Scheme.

It was ordered that lands should be taken on lease for a period of five years and the work on all the important millets of the tract should be started immediately. The necessary staff to carry on the work at the different regional millet stations was posted and the work on the scheme commenced early in 1949. This is the third annual report of work done on the Scheme.

B. Regional Millet Station, Ariyalur.

49. The Regional Millet Station, Ariyalur, is situated in the Udayarpalayam taluk of the Tiruchirappalli district. A block of 9.95 acres of dry lands, was secured on a five-year lease, near the extension of the Ariyalur town and very near the railway station. The object of starting the sub-station is to improve the millets of the locality. The benefits derived from improvements effected, will be extended to the whole of Tiruchirappalli district and portions of the surrounding districts. The main crops grown under rainfed conditions in the black soil area of this tract, are cholam, Cumbu, Ragi and Varagu. A report of the work done during the year 1951-52 at this sub-station is presented below.

50. *Season and rainfall*.—The total rainfall during the year under report was 38.52 inches received in 46 rainy days as against an average of 38.80 inches distributed in 52.6 rainy days. The south-west monsoon rains were below normal by 2.8 inches and sufficient rains for sowing were received only by the second week of August. The north-east monsoon set in at the correct time by the first week of October and came to an end after the third week of November. The season on the whole was favourable to cholam and varagu but unfavourable to cumbu, and dry ragi crops.

51. *Breeding Work*—(1) *Cholam (Sorghum species)*.—There are four main varieties of Cholam in this tract and work on each of them is described below :—

(a) *Makkatai cholam*.—Of the varieties of cholam cultivated in this tract, Makkatai cholam is the most important in which there are two distinct types easily distinguished by the colour of grain white or yellow. The results of the trials conducted on the station during the last year revealed that A.S. 7537 a selection of *Vellai Makkattai Cholam* was found to be significantly superior to the local bulk. In the yellow grained group, A.S. 8001, a selection from *Periamanjai cholam* and strain Co. 1 (*Periamanjai cholam* of Coimbatore) were found superior to local *Manja Makkattai cholam*. During the year under report, strain Co. 1, A.S. 8001 and A.S. 7537 were tried in yield trial plots against local bulks of both *Vellai Makkattai* and *Manja Makkattai Cholam*. It was found that A.S. 7537 was superior to both the local bulks giving 18.7 per cent higher yield of grain over local *Vellai Makkattai cholam* and 34.7 per cent over *Manja Makkattai*. A.S. 8001 and Co. 1 gave 20.8 per cent and 16.8 per cent higher yields respectively over the local *Manja Makkattai cholam*. All the increases were statistically significant. Ten selections in each of *Manja Makkattai* and *Vellai Makkattai cholam* were tested in preliminary yield trials. Two selections of *Manja Makkattai cholam* were found superior to the local giving 29.9 per cent and 31.7 per cent higher yield of grain over the local. Four selections of *Vellai Makkattai* were found to be superior to the local variety. Out of a total number of 68 fresh collections and 38 single plants of *Manja Makkattai cholam* studied during the year, 198 single plants and 15 promising selections were advanced for further studies.

(b) *Venchamarai cholam*.—This variety of cholam is the same as *Talaivirichan cholam*. Three Coimbatore selections of this variety, A.S. 8008, A.S. 8079, A.S. 8085 and Cholam strain Co. 2 were tested in yield trial plots against local *Venchamarai cholam*. The differences were not significant both for grain and straw. Besides the above, there were two preliminary yield trials in which ten selections were compared against local *Venchamarai cholam*. Five of these collections gave significant increased yields ranging from 37.5 per cent to 56.7 per cent over the standard. These will be advanced for yield trials during the coming season. From 13 fresh collections and 14 single plant selections studied during the year, 27 single plants and eight promising selections were advanced for further work.

(c) *Irungu cholam*.—The grains of the *Irungu* types that are grown in Tiruchirappalli district are partially exposed and are grown both for grain and straw unlike the *Irungu* of Tirunelveli district which has its grains completely enclosed by glumes and which is mainly used for fodder only. In a trial conducted during the last season, two selections A.S. 660, a selection of *Vellai Irungu* and A.S. 7081, a selection from a cross between *Irungu* and *Periamanjai cholam* were found to be superior to the local in the yield of grain. The trial was repeated this year and A.S. 7081 was found to be significantly superior to local *Irungu cholam* giving 20 per cent higher yield of grain, A.S. 660 being on a par with the local. In straw yield, both the selections were found inferior to the local. Ten selections of *Irungu cholam* were tested in preliminary yield trials and seven of them were found superior to the local giving increased yields of grain ranging from 38 to 89 per cent over the control. From 16 fresh collections studied in two row plots, 32 single plants were advanced for further work.

(d) *Sen cholam*.—Six selections were compared in preliminary yield trials against local *Sen cholam*. The results of the trials showed that two selections were significantly superior to the local giving 38 per cent increased yield of grain. Among the 15 single plant selections and 14 fresh collections studied during the year, eight promising selections were advanced for preliminary yield trials and 31 single plants isolated for further study.

52. (2) *Cumbu (Pennisetum typhoides)*.—*Cumbu* is grown under rain-fed conditions in two seasons in Ariyalur tract. *Arisi cumbu*, a short duration variety of 70-75 days is sown in the month of July and is harvested in September. The crop depends entirely on the south-west monsoon. The long duration variety locally known as *Paladam cumbu* or *Pani cumbu* is sown in October with the commencement of the north-east monsoon and is harvested in 3½ months from the date of sowing.

(a) *Arisi cumbu*.—Five cultures of *cumbu* with duration ranging from 70-75 days were compared against local *Arisi cumbu* in yield trial plots. A.C. 50, a new selection was found to be superior to the rest giving 47.5 per cent increased yield over the local. The trial will be repeated during the coming season. Twenty-four single plant selections of *Arisi cumbu* were compared in preliminary yield trials and 11 selections gave significantly higher yields ranging from 19.2 per cent to 42.7 per cent over local. Five of these were advanced for yield trials. Forty-six single plant selections and seventy-nine fresh samples were studied in two row plots from which 20 selections and 104 single plants were advanced for further work.

(b) *Paladam cumbu*.—Twenty-four selections were under preliminary yield trials and three of them gave 16.6 per cent to 31.5 per cent higher yield of grain over the local. Out of 54 single plant selections, studied in two row

plots, 30 selections were advanced for preliminary yield trials. Forty-five single plants isolated from 13 fresh collections were studied during the year under report.

53. (3) *Ragi (Eleusine coracana Gaertn.)*.—*Ragi* is grown as a rainfed crop during the months of July-August and harvested in November-December. Thirty-six selections of *ragi* were compared in preliminary yield trials. Forty single plant selections and 21 fresh collections were sown and studied in two row plots. The crop was affected by the drought in September 1951. The yield data available from only one set of preliminary yield trials, revealed that out of the seven selections tried, one selection A.R. 45 gave 34.3 per cent higher yield of grain over the local. The trials with the rest of the selections will be repeated in the coming season.

54. (4) *Varagu (Paspalum scrobiculatum)*.—*Varagu* is one of the most important millets in this tract. The crop is sown in August and harvested in December. Four selections of *Varagu* A. 117, A. 148, A. 416 of Palur and P.S. 1 of Coimbatore were compared with local *Varagu* in yield trial plots. P.S. 1 was found to be the highest yielder giving 25.6 per cent significantly higher yield of grain over the local. Four selections of *varagu* received from Coimbatore, were put under preliminary yield trial against the local and P.S. 1 of Coimbatore. Selection P.S. 76 gave the highest yield of 34.5 per cent of grain over the local, the increase in yield being significant. Out of 182 single plants and 248 fresh selections studied in two-row plots, 353 selections were carried forward for further work.

55. (5) *Green manure crops*.—A total quantity of 25 lb. of seed of *Sesbania speciosa* was collected from plants grown along the bunds of the farm. Sunnhemp was grown in the inter space in *Varagu* crop and 98 lb. of seed were obtained.

56. *Compost*.—All the available organic waste materials on the farm and stubbles collected from fields were put in pits and composted.

Seed distribution.—Nucleus seed to the extent of 1,070 lb. was grown on the station and distributed during the year for seed farms and trials.

57. Programme of work for 1952-53 :—

(1) *Cholam*.—Evolution of high yielding strains of the important varieties of *Manja Makkattai*, *Vellai Makkattai*, *Talaivirichan*, *Irungu* and *Sen Cholam*.

(2) *Cumbu*.—Evolution of high yielding strains of *Arisi Cumbu* and *Paladam Cumbu*.

(3) *Ragi*.—Evolution of high yielding strains.

(4) *Varagu*.—Evolution of high yielding strains.

C. Régional Millet Station, Tiruppattur.

58. The Regional Millet Station, Tiruppattur, is situated about a mile away from Tiruppattur town on the Tiruppattur-Pudupet road very near the Christukula Asramam, a rural reconstruction centre. A block of about 20 acres of land was taken on a five-year lease and work on the improvement of local millets was started in 1949. The important millets grown in the locality are cholam, cumbu, ragi, samai and varagu. The improvements effected on the station will be applicable to the districts of North Arcot and portions of Salem, Chittoor and Chingleput districts. This is the third annual report of the station.

59. *Season and rainfall.*—A total rainfall of 26.42 inches, was received in 37 rainy days as against the previous years' rainfall of 22.19 inches received in 40 rainy days. Owing to the late receipt of the south-west monsoon rains, the sowings of cholam, cumbu, ragi, samai and varagu, were completed only during the first week of July 1951. Due to the severe drought that prevailed in September 1951, the crop had a set-back, the cumbu crop suffering most. Due to the adequate rains received in October and November 1951, the cholam crop gave a good yield, while the performance of the rest of the millets was generally poor.

60. *Breeding work*—(1) *Cholam (Sorghum species)*.—The important variety of cholam cultivated in the tract is *Talaivirichan cholam*, which is grown under rainfed conditions, as a mixture with cumbu in dry lands. Five economic cultures of *Talaivirichan cholam* (Cholam Co. 3, A.S. 8006, A.S. 8008, A.S. 8080 and A.S. 8083) received from Coimbatore were compared with the local variety in yield trial plots, this being the third year of trial on the station. All the five cultures have out-yielded the local, the increased yields of grain which ranged from 25.8 per cent to 77.6 per cent being statistically significant. As regards straw (dry yield) the increases ranged from 20.6 per cent to 95.6 per cent over the control. In this trial, A.S. 8006 was found to be the best yielder, giving significant increases of 77.6 per cent grain and 95.6 per cent of dry straw over the local variety. Hence A.S. 8006 will be issued for trials in the districts during the ensuing season, along with A.S. 8008 and Co. 3. The trial will be repeated during the coming season after the elimination of A.S. 8083 and the inclusion of three more selections advanced from preliminary yield trials. Out of a total number of 17 seed samples collected from Chittoor and North Arcot districts and studied, 17 single plants were carried forward for further work. Twenty-eight selections were found promising out of 138 cultures of *Talaivirichan cholam* grown in two row plots on the station. Four selections received from Coimbatore and 24 *Talaivirichan cholam* cultures grown on the station were tried in four groups of preliminary yield trials along with Co. 3 and the yield differences were significant only in one group. Three of the best cultures (T.S. 21, T.S. 25 and T.S. 29) were advanced for yield trials during the coming season. Five economic selections of *Periamanjil cholam* (Cholam Co. 1, A.S. 60, A.S. 8001, A.S. 8002 and A.S. 8112) received from Coimbatore, were compared with the local *Talaivirichan cholam* for a second time. The *Periamanjil cholam* cultures compared favourably with the local *Talaivirichan cholam* in duration, height and grain setting. A.S. 8112 (juicy stalked *Periamanjil cholam*) was found to be earlier than the other cultures by about a fortnight. The grain yield differences were not statistically significant, even though Co. 1, A.S. 8112, A.S. 8002 and A.S. 8001 gave increases of 16.3 per cent, 16.1 per cent, 8.4 per cent and 7.7 per cent over the local *Talaivirichan* respectively. In straw yield, all the five *Periamanjil cholam* cultures have given significant increases ranging from 21 per cent to 60.7 per cent over the local. From the feeding trials conducted both with the farm and cultivators' animals, *Periamanjil cholam* straw was found to be far superior to the *Talaivirichan cholam* straw. The trials will be repeated during the coming season.

61. (2) *Cumbu (Pennisetum typhoides)*.—Next to cholam, cumbu is the most important millet of the dry lands. Due to the unfavourable seasonal conditions, the cumbu crop was a failure. Eight selections of cumbu (P.T. 734/1, M.S. 5665/1, M.S. 5774/1, M.S. 5775/1, B.T. 5/2, P.T. 732, M.S. 5634/1 and M.S. 5782/1) received from Coimbatore and advanced from the preliminary yield trials of last year, were compared with the local in two

groups. Due to adverse seasonal conditions, the performance of the selections was poor and the yield differences were not significant in both the trials. The trial will be repeated during the coming season. Twenty-five samples of seed from Chittoor and North Arcot districts were grown on the station out of which 20 economic single-plants were isolated for further study. Twenty-four cultures were found promising out of 145 single plant cultures studied in two row plots. In the preliminary yield trials of 24 economic selections with the local variety, only five cultures T.C. 4, T.C. 7, T.C. 33, T.C. 45 and T.C. 97 gave significant increases over the local and were carried forward for further trials in the coming season.

62. (3) *Ragi (Eleusine coracana)*.—This crop is raised both as an irrigated crop and as a dryland crop. As a dryland crop, ragi is sown in June-July and harvested in September-October. Thirty-three samples of seeds collected from the districts and 18 single plants isolated on the station were grown for study. Due to the highly unfavourable season, the crop dried up completely.

The irrigated ragi crop is sown in November and harvested in February. Out of a total number of 14 samples of seeds collected and studied, 20 single plants were isolated. Out of 34 economic single plants studied, nine were found suitable and were carried forward for preliminary yield trials. Ragi Co. 1 and Co. 2 were compared with local ragi in randomized observation plots with eight replications. Co. 1 and Co. 2 gave better yields than the local seed, Co. 2 being the best.

63. (4) *Samai (Panicum miliare)*.—Out of a total number of three new samples examined, two samples were found economic from which eight single plants were isolated for further study during the coming season. Forty-two economic single plants isolated at this station during last season and three types from Coimbatore were examined in two row plots to assess their economic possibilities. Eight cultures which are promising will be advanced to preliminary yield trials during the coming season.

64. (5) *Varagu (Paspalum scrobiculatum)*.—Out of the seven samples of varagu collected from the districts and studied on the station, 15 single plants were isolated for further study. Out of the 15 single plants selected during last year and studied in two row plots, five were found suitable for this tract and will be tried in preliminary yield trials during the next season. Three promising cultures of varagu (P.S. 1, A. 117 and T.V. 2) were compared with local varagu in preliminary yield trial plots with five replications. The yield differences were not significant.

65. (6) *Other crops*—(i) *Maize*.—Maize was grown for fodder purposes and a total quantity of 2,740 lb. of green fodder was obtained and fed to the farm animals. Repalle maize was compared with the local maize in observation plots and found unsuitable to the tract.

(ii) *Grasses*.—Two varieties of grasses, *Panicum antidotale* and *Cenchrus ciliaris* were tried for the first time on the station and found to do very well. Seeds of the above grasses were collected for multiplication and distribution.

(iii) *Green manure plants*.—Seedlings of *Gliricidia maculata* were planted along the boundary of the farm and all available places. The growth was however hampered by prolonged drought.

Seed distribution.—Nucleus seed to the extent of 2,768 lb. was produced on the station for distribution during the year.

66. *Programme of work for 1952-53*—(1) *Cholam*.—Evolution of high yielding strains of rainfed cholams.

Five economic selections await yield trials. Introduction and trial of *Periamanjai cholam*.

(2) *Cumbu*.—Evolution of high yielding strains of rainfed cumbu, Eight selections will be put under yield trials.

(3) *Ragi*.—Evolution of high yielding strains of irrigated and dry ragi. Thirty-eight single plants were taken for further study.

(4) *Samai*.—Evolution of high yielding strains. Eight cultures were advanced for preliminary yield trials.

(5) *Varagu*.—Evolution of high yielding strains. Three high yielding selections await yield trials.

D. Regional Millet Station, Ongole.

67. The main purpose of starting the Regional Millet Station at Ongole is to improve the *Pyrus jonna* and *variga* crops of the Guntur district. The work that was going on at the Agricultural Research Station, Lam, on these crops did not progress satisfactorily owing to the unsuitability of that locality to these crops. The station is situated very near the Ongole railway station in the Ongole taluk of the Guntur district. In addition to these two millets *Pyrus jonna* and *variga*, maize varieties are also tested at this station. The improvements achieved at this station are applicable to the whole of *Pyrus jonna* and *variga* area of the district.

68. *Season and rainfall*.—The rainfall during the year under report (1951-52) was 28.47 inches in 43 rainy days as against the normal rainfall of 35.25 inches in 43.97 rainy days thereby showing a deficiency of 6.78 inches. The south-west monsoon rains though set in at the correct time, were in deficit later on with the result that the crops suffered. The north-east monsoon rains were below normal by 5.68 inches and as a consequence, the *Pyrus jonna* and *variga* crops gave less than the normal yields.

69. *Breeding work*—(1) *Jonna* (*Sorghum species*).—Seven selections of *Pyrus jonna* from Guntur were compared in two series of yield trials along with the local *jonna* and G. 2 the *Pyrus jonna* strain. In the first group, four selections J. 11, J. 12, J. 16 and J. 17 were compared against local *jonna* and G. 2 *Pyrus jonna* strain. Two selections J. 11 and J. 17 were on a par with the local *jonna* in point of grain yield while they were significantly superior to the control in straw yields giving increased yields of 10 per cent and 14 per cent respectively.

In the second series J. 1, J. 4 and J. 5 were compared against local *jonna* and G. 2. The yield differences of grain were not significant though J. 1 and J. 5 gave 10 per cent and 14 per cent increased yield of straw respectively over the standard. Twenty-six local selections with medium compact panicles and 17 selections from Krishna district of both medium compact panicles and loose panicles were tried in four groups of preliminary yield trials along with the local *jonna* and G. 2. It was found that two local selections J. 26 and J. 102 and one selection from Krishna district J. 152 gave significant higher yields of 21 per cent and 13 per cent and 17 per cent of grain over the local *jonna* respectively. The differences of straw yields were not statistically significant. Eighty single plant selections collected from the standing crops in

villages were sown in observation plots along with the local as control and 19 were carried forward for further study. Sixty-nine single plants were also selected from villages for study on the station.

70. (2) *Variga* (*Panicum miliaceum*).—This millet is grown as a cold weather crop in the dry lands of this tract. Twenty local selections and one selection from Coimbatore were sown in two groups of preliminary yield trials with local *variga* as control. It was found that although five local selections gave higher yields than the control, V. 27 giving significantly higher yield of 23 per cent grain, the rest V. 7, V. 40, V. 45 and V. 56 though giving about 15 per cent higher yield than the control were statistically only on a par with it. Eighty-one single plants selected from villages were sown in two row observation plots along with local *variga* and 12 promising selections were carried forward for further trials. Sixty single plants were selected from standing crops in villages for trial on the station.

71. (3) *Maize* (*Zea mays*).—There was one comparative yield trial in maize. Repalle maize (a variety reported to give high yield at Repalle, Guntur district) and local maize were put under yield trial. Repalle maize was found to yield 1.2 per cent lower than the local maize, though the difference in yield is not statistically significant.

72. *Manurial trial on rainfed millets*.—To study the effect of application of ammonium sulphate on rainfed millets two adjacent plots each measuring 10 cents were marked out. Both the plots were manured with a basal dressing of cattle manure at $3\frac{1}{2}$ tons per acre. One of the plots was later top dressed with ammonium sulphate at 80 lb. per acre. It was found that the application of ammonium sulphate increased the yields of grain and straw by 17 per cent and 25 per cent respectively over the control, the actual increases being 190 lb. of grain and 1,533 lb. of straw per acre. The net monetary gain as a result of manuring *jonna* with 80 lb. of ammonium sulphate per acre works out to Rs. 29 per acre.

Seed distribution.—Nucleus seed to the extent of 2,475 lb. was grown on the station and distributed during the year.

73. *Programme of work for 1952-53*—(1) *Jonna*.—Evolution of high yielding strains of the local varieties of *Pyrus jonna* by selection.

Seven cultures are under yield trials.

(2) *Variga*.—Evolution of high yielding strains by selection.

Of the 20 single plants tested in preliminary yield trials, five selections are promising.

E. Regional Millet Station, Narasapatnam.

74. The Regional Millet Station, Narasapatnam, is situated in the Golconda taluk of Visakhapatnam district. A block of land, 30 acres in extent, was secured on a three-year lease. The land consists of dry lands, garden lands and wet lands. The station was started with the object of improving the major millets of the tract, namely, ragi, ganti (cumbu) and *jonna* (cholam). The benefits of the work of this station will extend to the southern areas of Srikakulam, Visakhapatnam and northern areas of East Godavari district. Owing to the unwillingness of the cultivators to let the land on lease, the work on millets could be started only in 1950 and the millet work that was in progress at the Sugarcane Research Station, Anakapalle, was transferred to this station.

79. *Season and rainfall*.—The total rainfall received during the year was 43.37 inches as against a normal rainfall of 44.31 inches. Though the rainfall was almost normal, it was heavy during the south-west monsoon season and below normal during the north-east monsoon period. As such the *Pyrus* season crops suffered badly. During the *Punasa* season, timely rains were not received for transplanting the cumbu nurseries with the result that planting was delayed. Again heavy rains at the flowering time of cumbu resulted in poor yields.

76. *Breeding work*—(1) *Ragi* (*Eleusine coracana*).—There are three seasons in which this millet is cultivated in this tract. *Punasa* is the early season when ragi is grown in May and harvested in August. *Peddapanta* or the main season dry ragi commences from August to December and *Pyrus* or late season is from December to April.

(a) *Punasa ragi*.—Five promising cultures were tried for a second time in comparative yield trials with AKP. 2 and local as controls. The yield differences were not significant. The trial will be repeated in the coming season. Sixteen promising cultures collected from 40 single plants were tried in two groups of preliminary yield trials with AKP. 2 and local as controls. Out of these, seven cultures gave increased yields over the controls and they were carried forward to be put under yield trials during the coming season. Seventy-seven single plants isolated from 43 seed samples were studied for purity and yield and 12 promising ones were selected for preliminary yield trials. During the season, 56 single plants were selected from the ryots' bulks and they will be sown in observation plots during the next season.

(b) *Main ragi*.—Six selections with AKP. 7 and local as controls were put under yield trials for a second time and the differences in yield were not statistically significant. The trial will be repeated in the coming season. Twelve selections from 78 single plants isolated during the last season were put under preliminary yield trials with AKP. 7 and local as controls. Out of these, four gave significantly higher yields of grain than the local and were carried forward for yield trials in the ensuing season. Out of 35 single plants isolated from 20 seed samples during last season and studied for purity and yield, nine were found to be pure and economic and were carried forward for further trials. Seven seed samples were collected and studied out of which 12 promising single plants were isolated. In addition, 51 single plants were selected from the cultivators' fields for study on the station.

(c) *Pyrus ragi*.—Thirty-two single plants were selected from ryots' fields and were sown in observation plots for study of purity and yield. Out of these, seven were found to be pure and economic and hence were carried forward. Seven loose seed samples collected from the taluk were sown in observation plots from which 10 single plants were selected.

77. (2) *Ganti*—*Cumbu* (*Pennisetum typhoides*).—Next to ragi, *Ganti* is the important millet of this tract. Sixty-four single plants were selected from 62 seed samples sown in observation plots. Out of these, 13 pure and economic selections were carried forward for preliminary yield trials. The other yield trials with *Ganti* were failures due to late planting and adverse season.

78. (3) *Jonna*—*Cholam* (*Sorghum species*)—(a) *White-grained group*.—Five *Talaivirichan* jonna selections of Coimbatore were tried in comparative yield trial with local as control for a second time. The results were significant, A.S. 475 giving the highest yield of grain over the local. The trial with four selections of compact white cholam (one from Coimbatore, one from

Anakapalle, one from Nandyal and one from Hagari) was not a success as the flowering was late and the setting poor. Twenty-three bold-grained *Talaivirichan* selections from Coimbatore were put under preliminary yield trials against the local and none of them was found superior to the local. Forty-four single plants collected from ryots' fields were sown during the season for observation of purity and yield and six of them which were found promising were carried forward for preliminary yield trials in the coming season.

(b) *Yellow grain group*.—Two promising cultures A.J. 138 and A.J. 140 from Anakapalle were tried along with the strains N. 1, AKP. 1, AKP. 3 and local *Patcha jonna* as control during last season. One selection A.J. 138 gave significant increase of 92.7 per cent of grain over local. The trial was repeated during the year using two more cultures A.S. 7540 and A.S. 7541 from Coimbatore. The differences were not statistically significant. The trial will be repeated in the coming season.

79. (4) *Other crops*—(i) *Fodder jonna*.—An area of 3.30 acres was sown for fodder with Co. 11 jonna during the *Punasa* season. The crop grew well and yielded 13,428 lb. of dry fodder.

(ii) *Gingelly*.—T.M.V. 3 gingelly was raised in an area of 4.46 acres. Due to drought at flowering time, the yield of the crop was affected. A total quantity of 488 lb. of grain was obtained.

(iii) *Greengram*.—An area of one acre was sown with greengram culture No. 127 and 83 lb. of seed were obtained.

(iv) *Blackgram*.—An area of 1.17 acres was sown under Culture No. 154 and 200 lb. of seed were obtained. The local variety which was sown in 0.80 acre yielded 106 lb.

(v) *Horsegram*.—Culture No. 76 was sown in 0.90 acre and it gave 281 lb. of seed. The local variety sown in 0.85 acre yielded 209 lb. of seed.

(vi) *Paddy*.—An area of 1.61 acres was planted with paddy from which 1,883 lb. of G.E.B. 24 and 1,508 lb. of *Krishnakattukulu* local seed were obtained.

(vii) *Green manure plants*.—Seedlings of *Sesbania speciosa* were planted along field bunds and 61 lb. of seed were obtained. Seedlings of *Gliricidia maculata* planted along the boundary of the farm are coming up well.

80. *Manurial experiment on dry ragi*.—The effect of application of cattle manure, groundnut cake and ammonium sulphate on dry ragi was studied. It was found that an application of 80 lb. ammonium sulphate gave an increased yield of 460 lb. of grain or 74.2 per cent over no manure, the money value of the increase being Rs. 42-8-0 per acre.

Seed distribution.—Nucleus seed to the extent of 8,695 lb. was grown on the Station and distributed during the year.

81. *Programme of work for 1952-53*—(1) *Ragi* (Chodi).—Evolution of high yielding strains for the three important seasons.—(a) *Punasa* (Early).—Five selections are under yield trials.

(b) *Peddapanta* (Main).—Six selections are under yield trials.

(c) *Pyrus* (Late).—Thirty-two selections are under study.

(2) *Cumbu* (Ganti).—Evolution of strains better than AKP. 1, AKP. 2 and AKP. 3. Regional hybrids will also be tried. Thirteen selections have been carried forward for preliminary yield trials.

(3) *Cholam* (Jonna).—Evolution of high-yielding strains. Five selections of *Tella jonna* (*Talaivirichan*) and two of *Patcha jonna* are under yield trials.

SECTION V.—SCHEME FOR THE EVOLUTION AND DISTRIBUTION OF HYBRID CUMBU SEEDS (I.C.A.R. SCHEME).

82. *Introduction*.—After Sorghum, cumbu is the most important millet in this State and it occupies an area of nearly 26 lakhs of acres. As a result of selection work carried on at the Millet Breeding Station, Coimbatore, three strains of cumbu Co. 1, Co. 2 and Co. 3 were released for distribution.

Co. 1 is suitable for growing both under irrigated and rainfed conditions, while Co. 2 is suited to rainfed lands and Co. 3 to irrigated areas. These strains are spreading in parts of the southern districts where they have been found suitable. As wide variations are met with in this crop, and many more strains suited to the different tracts are needed to meet the demands of the cultivators, further selection has been in progress. Apart from the evolution of strains through selection, the production of hybrids is also taken up in cumbu, as the high percentage of cross pollination met with in this crop under natural conditions facilitates hybridization under field conditions. This work is now being carried on, under a scheme called the Hybrid Cumbu Scheme with financial aid from the Indian Council of Agricultural Research. The original sanction for two years expired on 19th March 1952, and the Scheme has now been extended in G.O. No. 539, Food and Agriculture, dated 28th March 1952, for a period of five years from 20th March 1952. This report relates to the work done during the year ending 30th June 1952 (fasli 1361). The officer and staff employed during the previous two years have continued without change in strength. Sri A. Kunhikoran Nambiar, B.Sc. (Ag.), Assistant Millet Specialist, was in immediate charge of the scheme during the year, except for four months during his leave when Sri B. L. Narasimhamurthi, B.Sc. (Ag.) was in charge as Assistant Millet Specialist. Work was continued at the Millet Breeding Station, Coimbatore, under the administrative and technical control of the Millet Specialist. One unit of staff consisting of an Assistant and a Fieldman transferred to Koilpatti to take up regional problems, carried on the work under the technical guidance of the Superintendent, Agricultural Research Station, Koilpatti. The technical programme of work, as approved by the Indian Council of Agricultural Research, was carried on, and the progress achieved during the year under the different items of work is briefly reported below. (A detailed annual report of the work on the Scheme has been separately submitted.)

83. *Research work at the Millet Breeding Station, Coimbatore*.—During the period under report, two crops of cumbu were raised, one under irrigation in April and the other under rainfed conditions in the north-east monsoon season. The irrigated crop had to be limited to an area of 2.66 acres, as water supply was very much restricted. In the monsoon season, the experimental portion of the crop occupied an area of 5.85 acres, and consisted of 536 cultures sown in 988 plots. The multiplication of parents of hybrids and other strains was done on a bulk scale on 10.79 acres. The results presented below relate to the summer and the monsoon season crops of 1951. The irrigated crop was normal and good yields were obtained. But the rainfed crop suffered due to excessive rain at flowering time.

84. (1) *Collection and study of fresh samples of seed*.—During the year under report, 85 new samples of cumbu were collected, 25 from Coimbatore, 35 from Nellore, two from Chittoor, seven from Visakhapatnam, nine from East Godavari and seven from French West Africa. These await studies. Forty-one samples tested in the previous year and advanced for further examination were also studied in observation plots in 1951 summer season, and 16 new samples collected during the previous year were tested for the first time during the year.

85. (2) *Inbreeding of superior selections from new samples and also those which have been previously isolated*.—Thirty-six inbreds of short duration and 64 of medium duration, possessing superior combining ability, isolated from early test crosses were further inbred and selection was continued in the progeny. After inbreeding for two more generations, 26 out of the 36 lines of short duration and 64 of medium duration have been brought to the S. 6 generation, and the remaining ten lines of short duration to the S. 5 generation. It is observed that a few lines have become so reduced in vigour that with further selfing, it would not be possible to propagate them. Most of the lines possess a satisfactory degree of vigour, and desirable characteristics, though their yield is much poorer than that of the open pollinated lines. Of the 33 inbreds chosen from district samples, only 26, which were promising, were selected for further inbreeding and they have been brought to the S. 4 generation. From the new samples tested in the previous year, 91 selections were selfed for inbreeding, and they were grown for study during the year under report. Out of these, only 71 were found promising and these along with 18 new inbreds, selected during the year, have been advanced for further work.

The number of generations of inbreeding necessary before taking up hybridization for commercial purposes is being investigated with reference to a few superior hybrids. The hybrid seeds produced by crossing inbred parents of these hybrids at successive generations of selfing are tested for yield to compare the performances at different stages and to see when uniformity is reached. Data about the performances of hybrids at early tests and also when the same inbreds are crossed at S. 3 generation are on hand and under study. Seeds of the same hybrids have been produced after inbreeding the parents further to S. 5 generation and this will be tested only in the next year. It is proposed to cross the parents referred to above in their S. 6, S. 7, S. 8 and succeeding generations also so as to observe the stage at which constancy in performance in most cases is reached. That will give an estimate of the number of generations of inbreeding necessary for commercial breeding purposes.

86. (3) *Early test crosses for judging the combining ability of superior selections*.—During the year, 12 early test crosses were made between superior selections from varieties under observation. Some of the inbreds in S. 3 were chosen for early crossing and 24 crosses between inbreds of medium duration and 14 between those of short duration were also effected. Of the short duration inbreds brought to the S. 5 generation, a few were found to be superior in vigour and highly uniform. Therefore, nine crosses were effected between these inbreds.

87. (4) *Top-crossing of inbreds with adapted varieties to judge their combining ability*.—Top-crossing of inbreds of short duration with Co. 3 and P.T. 833 was taken up, and 24 crosses were made. The remaining short duration lines and the medium duration lines will be crossed with suitable varieties in the succeeding year.

88. (5) *Interim crosses of inbreds brought to the S. 3 and S. 4 generations for comparison of the specific combining ability expressed in early and advanced generations.*—It was stated in the previous report that the seeds of 20 superior hybrids (11 of short duration and 9 of medium duration) were produced by hand pollination by crossing the parents in S. 3 generation. Trials with these were conducted in 1951 summer season and considering the results, seven hybrids of short duration and five of medium duration were advanced for further tests. These results are presented under (6) "Testing of hybrids for yield." During the current year, the seeds of these 12 hybrids were produced on a large scale by hand pollination of their inbred parents after they had been selfed to S. 5 generation. The seeds of five hybrids between high combiner inbreds of short duration and Co. 3 advanced from initial tests, were also produced on a large scale by artificial pollination of the inbreds, which had been brought to the S. 5 generation.

89. (6) *Testing of hybrids and selections for yield—A. Initial tests—*
(i) *Hybrids between high combiner inbreds and strains.*—Fourteen hybrids of short duration between S. 3 inbreds and Co. 3, produced in the previous year, were tested in row yield trials along with the parents and standard Co. 3 in the summer season. Nine of these were superior to the standard and parents, three superior to the parents only, while in two sets the differences were not statistically significant. Considering their performance in general, five promising hybrids were advanced for further test in the succeeding year. These gave increases in yield ranging from 25 to 242 per cent over the standard.

(ii) *New crosses between inbreds.*—Fourteen new hybrids between the inbreds of short duration made during the year, were tested in the monsoon season in replicated row yield plots. Only one of the hybrids was superior to the standard and parents. Five of them were superior to both the parents, but not to the standard, while five were superior to one of the parents, and three statistically equal to the parents.

Fifteen new crosses between high combiner inbreds of medium duration were tested in row yield trials in the summer season. In the yield of grain, five of the hybrids were superior to their parents and standard Co. 1. Three were superior to Co. 1. Eight of the hybrids which were superior to the standard Co. 1 in these trials have been advanced for further trials.

In another set, 24 new hybrids effected between inbreds randomly selected, during the year were tested in 1951 monsoon season along with their parents and standard Co. 1. Yield data showed that only one hybrid was superior to the standard and both the parents, while eight were superior to both the parents but not to the standard. Among the remaining hybrids, six were superior to and the rest equal to the parents.

B. Interim tests.—Twenty hybrids (11 of short duration and 9 of medium duration) advanced from early tests were put for interim tests in row yield trials and yield trials after crossing the parents which had been inbred to S. 3 generation. In the row yield trials, each of the hybrids was tested along with the parents and standard in the same manner as the initial tests. In the yield trials, however the comparison was limited to the hybrids and standard, or to the hybrids, standard and a few of the high yielding parents involved in the crosses.

(i) *Row yield trials.*—Eleven hybrids of short duration and nine of medium duration, advanced from initial tests, were tested in row yield plots, the seeds of these having been produced by crossing the parents which were

inbred to the S. 3 generation. The results showed that of the 11 hybrids of short duration, seven were superior to the standard and both the parents, and two were superior to the male parent and standard, while the differences were not significant in the remaining two. Of the nine hybrids of medium duration tested, four were superior to both their parents and standard, two to one of the parents and standard, while the differences were not significant in the remaining three.

(ii) *Yield trials—Short duration hybrids.*—Two yield trials were laid out in the summer season with five of these hybrids of short duration, and they were divided into two groups of one involving P.T. 833 as one of the parents of the hybrids, and the other with P.T. 835 as one of the parents.

In group I, two hybrids H. 865 and H. 866, were tested along with three superior parents and standard Co. 3. The yield data showed that in weight of grain, both the hybrids were superior to the standard and the parents tested. The hybrids have given appreciably high yield (2,281 lb. of grain per acre) with an increase of 19.7 per cent over the standard. Their duration is also shorter than Co. 3. In the yield of straw and money value of the produce, the hybrids were on a par with Co. 3. It is seen that the parents are reduced in yield, two of them being equal to the standard, and one inferior to it statistically.

In group II, three hybrids were tested with four parents and standard Co. 3. In the yield of grain all the hybrids were on a par with Co. 3 but two of them, viz., H. 874 and H. 857 were significantly superior to their parents. In the yield of straw, H. 874 was superior to the standard Co. 3 and the parents, but the other two were equal to it, and the parents statistically. In money value of the produce, the hybrids were on a par with Co. 3.

Yield trials were conducted with these hybrids in the rainfed season also. In the first group, three hybrids were compared with the standard Co. 3. Hybrid H. 854 (P.T. 834/2 Bajri Bombay × P.T. 827/2 Kottapuli Cumbu, Salem) was found to be significantly superior to the standard in the yield of grain giving an increase of 11.2 per cent over it. The other two hybrids were statistically on a par with Co. 3. In the yield of straw and money value of the produce, the two hybrids H. 854 and H. 853 were on a par with Co. 3, while H. 850 was inferior to it.

In the second group, four hybrids were tested along with Co. 3. In grain yield, none of the hybrids was significantly superior to the standard, but three of them, viz., H. 857, H. 874 and H. 863 were equal to it. In the yield of straw H. 857 was superior to Co. 3. In money value of the produce the three hybrids mentioned above were on a par with Co. 3.

It may be mentioned here that only three of the hybrids, viz., H. 865; H. 874 and H. 857 could be tested in yield trials of both irrigated and rainfed seasons, due to limitations of space and irrigation facilities. Of the three tested two, viz., H. 874 and H. 857 have been found to be on a par with Co. 3 in both the seasons, while the other H. 865 has been superior to Co. 3 in the irrigated condition alone. Amongst the other five hybrids tested, only in one of the seasons, H. 866 was found to be higher yielding than Co. 3 under irrigated conditions and H. 854 under rainfed conditions. The performance of these has to be studied further in later tests.

Yield trials with medium duration hybrids.—A yield trial was conducted in 1951 monsoon season with five hybrids of medium duration and standard Co. 1. In yield of grain, all the hybrids were superior to the

standard, the percentages of increase in yield ranging from 33 to 70 per cent in respect of the different hybrids. The increase in yield of straw was significant only in the case of H. 837, the others being equal to the standard. In money value of the produce also, the hybrids were superior to Co. 1. The results of the yield trials fully confirm the performance in the row yield trials of the previous season.

C. *Yield trials with high yielding selections.*—The testing of selections isolated from varieties to evolve high yielding strains was also continued during the year to a limited extent. Seventeen selections from the samples collected from the different districts of the State, advanced for multiplication and further trial after preliminary tests were put for yield tests during the year. The selections were divided into two groups, nine of short duration and eight of medium duration and tested along with appropriate standards.

Nine selections of short duration were compared with Co. 3 in randomized blocks with six replications. It was observed that none of them was superior to Co. 3, but eight selections were equal to it. The differences in straw yield and money value of the produce were not significant.

Eight selections of medium duration were compared with Cumbu Co. 1 in yield trial plots. In this trial, three of the selections, viz., P.T. 860 (local sajja, Hospet, Bellary), P.T. 862 (sajja, Rapur, Nellore) and P.T. 854 (local sajja, Kalyandrug, Anantapur) were significantly superior to the standard in the yield of grain. The others were all on a par with Co. 1. In the yield of straw, only one selection, P.T. 852 was superior to the standard, while in money value of the produce, three selections P.T. 860, P.T. 854 and P.T. 862 were superior to it.

90. (7) *Testing of hybrids in the fields of the cultivators in the districts.*—During the year under report, the two hybrids X. 1 and X. 2 were sent for further trial to the districts of Srikakulam, West Godavari, North Arcot, South Arcot, Salem, Coimbatore, Tiruchirappalli, Madurai, Tanjore and Tirunelveli. The performance of the strains in Srikakulam was reported to be quite encouraging. Trials were conducted in four different taluks, and at all the centres, the hybrids were higher yielding than the local type, the increases in yield over the local ranging from 10 to 23 per cent with an average of 17 per cent in the case of X. 1 and from 10 to 25 per cent with an average of 18 per cent in the case of X. 2. This is an area where medium duration varieties are mostly grown, and X. 1 and X. 2 being of the same duration as the local types and higher yielding, they can be considered suitable for the tract. The results of trials conducted in Coimbatore, confirm the previous results. Reports of good performances of the two hybrids have been received from Dharapuram, Udumalpet and Coimbatore. The average increases in yield of grain over the local recorded at these centres were 38 per cent in the case of X. 1 and 47 per cent in respect of X. 2. In the districts of West Godavari, North Arcot, Tiruchirappalli and Tanjore the trials conducted during the year failed due to continuous drought. The results of trials conducted in South Arcot, Salem, Madurai and Tirunelveli, have not yet been received.

Strains Co. 1 and Co. 2 were tried along with local varieties in Anantapur, Chingleput and North Arcot districts. In Anantapur district, out of four centres, the trials did not succeed in three places due to drought, while in one taluk, Kalyandrug, Co. 1 and Co. 2 were reported to have given higher yield than the local. Co. 2 was reported to have given an increase in yield of 35 per cent over the local in Chingleput district.

New selections P.T. 856 and P.T. 859 were tested in four taluks in Bellary district. The selections were much earlier in maturity than local and as such were subject to heavy bird attack. No conclusive results of the experiments could therefore be obtained. P.T. 866 and P.T. 868 were sent for trial to four taluks in Chittoor. In Chandragiri, they were found to be much better than the local types giving an increase in yield of 56 per cent in the case of P.T. 868 and 25 per cent in the case of P.T. 866. Another selection, P.T. 833 was also superior to the local, the increase in yield being 31 per cent of grain. The trials of selections P.T. 859, P.T. 853 and P.T. 833 in Cuddapah were not successful. In Kurnool district also, the trials of selections P.T. 853, P.T. 854 and P.T. 857 were not conclusive. Selections P.T. 861 and P.T. 862 were tested in five taluks in Nellore district. In Darsi taluk, P.T. 862 gave an increased grain yield of 16 per cent over the local. But they gave lower yields than the local in other taluks. Seeds of strains Co. 1, Co. 2, Co. 3 and the hybrids and other promising selections have been sent to the District Officers for conducting further trials.

91. (8) *Multiplication of parents, hybrids and strains.*—During the year under report, 5,216 lb. of seeds of X. 1, 4,340 lb. of X. 2, 8,878 lb. of Co. 1, 9,515 lb. of Co. 3, 3,667 lb. of parents of X. 2 and 3,555 lb. of selections were procured from seed farms. Seeds of parents and strains were multiplied at the Millet Breeding Station and the Central Farm also. The four parents 350, 348, 411 and 422 were raised in isolated blocks, and 2,098 lb. of parents of X. 1 and 2,356 lb. of parents of X. 2 were produced. In addition to these 246 lb. of Co. 1, 1,725 lb. of Co. 2 and 180 lb. of P.T. 833 were obtained from bulk crops of these strains raised during the year.

The seeds of strains and hybrids continued to be in great demand and the indents from districts could not be met in full in most cases. Though large areas of seed farms were arranged due to inadequate water-supply, the expected quantity of seeds could not be procured. In addition to this, the price offered also was not attractive, compared with the prices prevailing in the village markets and hence great difficulty was experienced in this work. Seeds have been distributed to the local ryots for running fresh seed farms. Large quantities of cumbu seeds were also distributed for general cultivation from the Millet Breeding Station. The list of strains with quantities of seeds issued for seed farms and for general distribution is given below:—

Cumbu seed distribution statement for fasli 1361.

Strain or selections.	Quantity of seed distributed in lb. for		
	Seed farm.	Trials.	Total.
(1)	(2)	(3)	(4)
Co. 1	8,881	56	8,937
Co. 2	804	20	824
Co. 3	9,243	81	9,324
X. 1	5,045	151	5,196
X. 2	4,030	155	4,185
348	350	..	350
350	175	..	175
411	328	..	328
422	3,360	..	3,360
833	274	119	393
836	2,357	48	2,405
Miscellaneous	224	..	224
Total	35,071	630	35,701

The total quantity of seeds supplied from the Millet Breeding Station during the year was 35,701 lb. The two short duration selections P.T. 833 and P.T. 836 have become popular in Coimbatore district on account of their short duration and comparative high yield and they were also therefore multiplied and distributed to local cultivators. They will be given station numbers.

92. *Programme of work for 1952-53.*—(1) *Collection and study of fresh samples and selection of superior cultures.*

(2) *Inbreeding of superior selections from new samples and also those which have been previously isolated.*

(3) *Early test crosses for judging the combining ability of superior selections.*

(4) *Top crosses of inbreds with the adapted varieties, P.T. 833, and Co. 3 for short duration ones, and Co. 1 and Co. 2 for medium duration ones, to test the general combining ability.*

(5) *Interim crosses of inbreds brought to the S. 4, S. 5 or S. 6 generation for comparison of the specific combining ability expressed in early and advanced generations.*

(6) *Testing of hybrids for yield.*—Initial test crosses and interim crosses are to be tested in row yield trials and superior hybrids advanced are to be tried in large scale comparative trials along with parents and standard strains.

(7) *Testing of hybrids in the fields of the cultivators in the districts.*—The hybrids already released are to be put for further confirmatory tests in those places where their performances have not been conclusive. New hybrids found worthy of distribution, will be put for trial in the fields of the cultivators along with local varieties in observation plots.

(8) *Multiplication of seeds of parents, hybrids and other strains.*—Seeds of strains and hybrids will be multiplied at the station and also in seed farms arranged in the fields of the cultivators.

SECTION VI.—SCHEME FOR THE CONTROL OF STRIGA ON SORGHUM IN THE MADRAS STATE (I.C.A.R. SCHEME).

93. *Introduction.*—The scheme for the control of Striga on Sorghum sanctioned in G.O. No. 824, Food and Agriculture, dated 26th August 1949 was in progress in all the four centres of work in the Madras State, viz., Coimbatore, Nandyal, Guntur and Hagari. The Officer in direct charge of the scheme is Sri P. Subramanyam, B.Sc. (Ag.) with headquarters at Nandyal. Striga is a parasitic plant attacking Sorghum and reducing its yields considerably. The main object of the scheme is to build up homozygous strains of Sorghum resistant to Striga attack and to find out suitable agronomic methods to control Striga attack on Sorghum in the Sorghum growing areas of the Madras State. Work was in progress at all the centres of work as per the approved technical programme. A brief report of work done is given below: (A detailed annual report of the scheme has been separately submitted.)

94. (a) *Agronomic experiments.*—With satisfactory artificial initial infection of Striga obtained during 1950-51 season, regular experiments were commenced at Coimbatore and Nandyal centres in the three agronomic experiments (i) trap cropping, (ii) handweeding and spraying experiment and (iii) deep cultivation experiment. In the trap-cropping experiment, it was observed that there was significant reduction in Striga infection in the plots

from which one trap crop of Sorghum was taken, both at Nandyal and Coimbatore. In the handweeding and spraying experiment, it was noticed that the two treatments, spraying and handweeding, did not increase the yield of the crop over what was obtained from the control plot which did not receive the treatments. These treatments could be given only after Striga has appeared above the ground. By this time, it has already spent nearly six weeks of its life underground as a complete parasite on Sorghum roots. The damage done to the crop is greater when it is still underground than when it has come above ground. To kill the Striga plants after they have come above the ground has therefore not been so effective. The reduction in Striga incidence by one year's deep summer cultivation was significant at Nandyal while at Coimbatore, the deep summer cultivation did not have significant effect. The temperatures were higher and the rainy days fewer at Nandyal than at Coimbatore during the summer period and the deep cultivation in summer reduced Striga incidence at Nandyal. The summer at Coimbatore was mild and it could not effectively reduce the incidence of Striga by deep cultivation. This treatment cannot therefore be advocated for Coimbatore conditions. In the experiment on soil treatment with chemicals the sites were reinfected with Striga and sown to bulk jonna crops at these two centres for establishing satisfactory Striga infection. At Lam and Hagari centres, the agronomic experimental sites were reinfected with Striga seed and sown to bulk jonna crops with the strains of the respective stations for establishing satisfactory Striga infection, which was attained in 1951-52 season. Regular experiments will commence from 1952-53 season at these stations. Preliminary experiments to determine the safe period of interval between the treatment of soil with chemicals and the sowing of jonna crop, were conducted at all the centres. It is established that at least a period of 2½ to 3 months interval should be given between the treatment of the soil and the sowing of jonna seed to avoid the deleterious effect of the chemicals used on the germination of jonna seeds. Based on the results of these preliminary experiments, regular experiments will be commenced from 1952-53 season.

95. (b) *Control of Striga by the evolution of resistant strains.*—Selections collected from ryots' holdings, as apparently resistant to Striga in heavily infected areas, have been tested for their Striga resistance character at all the centres. Promising selections were carried forward for further tests. At Nandyal, crossed derivatives of N. 1 × A.S. 4003 (resistant African type) and T. 6 × A.S. 4003 belonging to F. 7 and F. 8 generations were tried under row trials to study their Striga resistance character. Selections showing a low percentage of infection as the African parent were taken for further tests. At Coimbatore, derivatives of crosses of A.S. 4003 × A.S. 60 (*Periamanjil cholam*) of F. 5 generation (both simple and back crosses) and F. 4 generation and F. 1 and F. 2s of crosses with Co. 1, Co. 2 and Co. 3 with A.S. 4003 were sown for testing their Striga resistance character. It was seen that resistance to Striga is practically a complete dominant character. From the F. 4 and F. 5 progenies, selections showing a low percentage of infection have been taken for further trials. Nine selections which are derivatives of crosses of (Co. 1 × A.S. 4003) × Co. 1 were tested for their Striga resistance character and yield with Co. 1 as control. All of them are superior to Co. 1 and equivalent to A.S. 4003 as regards their Striga resistance character. Six selections are significantly superior to Co. 1 in grain yield while all the nine are significantly superior to Co. 1 in straw yield. At Guntur crossed heads of 1950-51 were sown during this season to pick out F. 1s. F. 1s showing the dominant characters, 'Nil' awn and Brown grain have been picked. Their behaviour

towards Striga resistance has also been studied. Fresh crosses were made during 1951-52 season between the standard strains of the respective stations and A.S. 4003, a reputed Striga resistant selection, the latter being used as male parent. These heads will be sown next year for picking out F₁s.

96. Programme of work for 1952-53.—(1) Evolution of strains of cholam resistant to Striga by (a) Selection and (b) Hybridization.

(2) Agronomic studies (a) Trap-cropping experiment and (b) Deep summer cultivation.

(3) Combined experiment for handweeding and spraying.

(4) Chemical treatment of soil.

LAWLEY ROAD P.O., COIMBATORE,
11th August 1952.

P. KRISHNA RAO,
Millet Specialist.

APPENDIX I.

SANCTIONED POSTS IN THE MILLET SECTION.

Name of service and post.	Number of sanctioned posts.				Remarks.
	Permanent.		Temporary.		
	At Coimbatore.	At out stations.	At Coimbatore.	At out stations.	
(1)	(2)	(3)	(4)	(5)	(6)
<i>Millet Breeding Station.</i>					
I Millet Specialist ..	1	..	..	..	* Sanctioned in G.O. Ms. No. 2146, Food and Agriculture, dated 6th November 1951.
II Upper Subordinates ..	9	8	..	..	
III Fieldmen ..	11	7	..	..	
IV Ministerial service ..	2	..	1 *	..	
V Inferior service ..	3	..	..	..	
<i>Hybrid Cumbu Scheme.</i>					
I Assistant Millet Specialist.	..	..	1	..	Latest sanction in G.O. No. 539, Food and Agriculture, dated 28th March 1952.
II Upper Subordinates ..	..	..	3	1	
III Fieldmen ..	..	..	5	1	
IV Ministerial lower division clerk.	..	..	1	..	
V Store-keeper ..	..	..	1	..	
VI Inferior service ..	..	..	2	..	
<i>Scheme for the production of improved strains at Regional Millet Stations.</i>					
I Assistant Millet Specialist.	..	..	1	..	Sanctioned in G.O. No. 1565, Development, dated 24th March 1949.
II Upper Subordinates ..	..	..	..	4	
III Fieldmen ..	..	..	..	6	
IV Ministerial service:					
Upper division clerk.	..	..	1	..	
Lower division clerk.	..	..	..	2	
V Inferior service ..	..	..	1	4	
<i>Scheme for the control of Striga on Sorghum.</i>					
I Assistant Millet Specialist.	..	..	..	1	Latest sanction HQ. Nandyal G.O. No. 2432, Food and Agriculture, dated 29th December 1950 and G.O. Ms. No. 1323, Food and Agriculture, dated 28th June 1951.
II Upper Subordinates ..	..	..	1	3	
III Fieldmen ..	..	..	1	3	
IV Ministerial service:					
Lower division clerk.	..	..	..	1	
V Inferior service: peons.	..	..	..	2	

APPENDIX II.

APPENDIX TO THE ADMINISTRATION REPORT OF THE MILLET SPECIALIST FOR 1951-52—
BROAD OUTLINES OF THE PROGRAMME OF WORK AND RESULTS ACHIEVED IN
MILLETS AT EACH OF THE STATIONS IN THE MADRAS STATE DURING 1951-52
(FASLI 1961).

I. Millet Breeding Station, Coimbatore—Programme of work for 1951-52—
A. Cholam—Rainfed cholams—(1) Periamanjol cholam.—(a) Evolution of high yielding strains with reddish purple straw and juicy stalk.

(b) Improvement of grain size in Periamanjol cholam.

(c) The study of the effect of drought on the development of Periamanjol cholam by means of morphological and histological studies.

(2) Talaivirichan cholam.—(a) Evolution of strains yielding higher than Co. 2 (chalky) and Co. 3 (pearly).

(b) Evolution of a strain of white chalky Talaivirichan cholam for Chittoor district.

(c) Improvement of grain size in Talaivirichan cholam.

(d) Improvement of the fodder quality of Talaivirichan cholam.

(3) Irungu cholam.—Improvement of grain size, grain colour, and yield of grain and straw in Irungu cholam.

(4) Kaki jonna.—Evolution of a juicy stalked Kaki jonna strain for fodder.

(5) Strains for late sowings in dry lands of Coimbatore district.—Evolution of short duration rainfed cholam strains for late sowings in Coimbatore district.

Irrigated cholams—(1) Sen cholam.—(a) Evolution of a Sen cholam strain with bolder grain than Co. 4 the Sen cholam strain.

(b) Evolution of a juicy stalked Sen cholam strain.

(2) Chinnamanjal cholam.—(a) Evolution of a strain yielding higher than Co. 5 (Chinnamanjal cholam).

(b) Improvement of grain size in Co. 5 (Chinnamanjal cholam).

(3) Vellai cholams.—(a) Evolution of a strain yielding higher than Co. 9 (Kesari cholam) with juicy stalk.

(b) Eliminating the red wash from strain Co. 9 (Kesari).

(c) Introducing juiciness into the short duration strain Co. 12 (Mottai vellai) to improve the fodder quality.

(d) Evolution of strains yielding higher than Co. 12 (Mottai vellai) with the same duration.

(e) Evolution of a strain yielding higher than Co. 12 or at least giving the same yield but with shorter duration.

District trials.—Trials of improved strains and selections in the cultivators' fields in the various districts to test their suitability to the tracts, in co-operation with the District Staff.

Results achieved during 1951-52.—During the period 1951-52, the main cholam crop was practically a total failure due to severe drought that prevailed particularly during the early stages of the crop. Hence no conclusive results could be had from the main 1951 crop. For the evolution of strains for late sowings (September) in dry lands in Coimbatore district, 94 cultures collected from late sowing tract of Coimbatore district were studied in 1951 main sowings and 50 promising selections from those consisting of 38 yellows and 12 whites were advanced for trials during the coming main season.

As for the summer 1951 crop, the season was normal and the following results were achieved. In an yield trial for the evolution of a juicy stalked Sen cholam selection, none of the four selections compared were found to be better than the standard Co. 4 in grain yield. In straw yield, all the four selections were significantly superior to the standard Co. 4 giving an increased yield of 65.9 to 84.5 per cent over it. Chemical analysis has revealed that all the four selections have better nutritive value than the standard Co. 4. In Chinnamanjal

cholam for the improvement of straw quality in an yield trial, three selections A.S. 8338/7, A.S. 8339/8, and A.S. 8338/8 were significantly superior to the standard Co. 5 giving increased yields ranging from 48.6 to 53.9 per cent over the standard. To evolve a strain yielding higher than Co. 9 but without its red wash, seven crosses with reciprocals were made between A.S. 8159 (extracted type allied to Co. 9) and Co. 12 the *Mottai Vellai cholam* strain in 1951 summer season. The extracted "*Periamanjai Irungu*" type, A.S. 7081, gave 65.6 per cent more grain yield and 26.2 per cent more straw yield over local *Irungu* in district trials. The irrigated *Vellai cholam* selections A.S. 8155 and A.S. 8159 were found to have given 20 per cent more yield than the local at Sattur and 15 per cent more yield at Srivilliputtur, Mudukulathur and Aruppukottai.

B. *Ragi* (*Eleusine coracana*)—Programme of work for 1951-52—(a) Evolution of improved strains.—1. Short duration ragi.

2. *Karumsuruttai ragi*.

(b) Disease resistance studies.—Evolution of strains resistant to *Piricularia*.

(c) Trial and spread of strains in the districts.

(d) Fundamental Research.

Results achieved in 1951-52.—E.C. 4601, a short duration selection that matures 11 days earlier and yielding 15.5 per cent more grain and 10 per cent more straw than *Ragi* Co. 2, the standard short duration strain, has been isolated. The earliness of the selections can be considered as a decided advantage over Co. 2. It awaits further trial. Two *Karumsuruttai* selections E.C. 4573 and E.C. 4576 were significantly superior to *Ragi* Co. 1 yielding 58 and 54 per cent more grain respectively. E.C. 4310 an improved white ragi selection, yielded as much as *Ragi* Co. 1. The performance of these selections being consistent over a number of years, the better of the two *Karumsuruttai* selections, E.C. 4573, and the white grained variety E.C. 4310 have been advanced to the district trials. None of the ragi selections under investigation was immune to *Piricularia* infection. A total quantity of 12,592 lb. of improved ragi seeds were distributed from the Millet Breeding Station.

C. *Tenai* (*Setaria italica*, Beauv)—Programme of work for 1951-52—

(a) Evolution of high yielding strains by hybridisation.—(1) Short duration strains less than 85 days.

(2) Strains for Tiruchirappalli district.

(b) Evolution of rust resistant strains under field conditions.

(c) Trials of strains in the districts.

Results achieved during 1951-52—*Tenai*.—At Coimbatore, one selection S.I. 4894 is promising giving increased grain yield of 17.3 per cent over the short duration high yielding selection of Salem. In the trial for the evolution of a suitable strain for the Tiruchirappalli district, one selection S.I. 4946 continues to be significantly superior to the local variety received from Tiruchirappalli which was used as the standard. Two selections S.I. 5017 and S.I. 4975 appear to be fairly resistant to *tenai* rust. A total quantity of 3,846 lb. of seeds of improved strains was distributed to cultivators from the Millet Breeding Station.

D. Minor Millets—Programme of work for 1951-52.—(1) Evolution of high yielding strains in each of the four minor millets, varagu, samai, panivaragu and kudiraivali.

(2) Trial of P.V. 14 and other strains in the districts.

Results achieved during 1951-52.—One selection in samai and one in panivaragu significantly superior to their standards, have been isolated at the Millet Breeding Station and 884 lb. of seeds of improved varieties were distributed from Coimbatore.

Regional Millet Stations—A. Ariyalur (Tiruchirappalli district)—Programme of work for 1951-52—*Cholam*.—Evolution of high yielding strains of the important varieties of *Manjamakkattai*, *Vellaimakkattai*, *Talaivirichan*, *Irungu* and *Sen cholam* grown in the tract

Cumbu.—Evolution of high yielding strains of *Arisi cumbu* and *Paladam cumbu*.

Ragi.—Evolution of high yielding strains of local varieties.

Varagu.—Evolution of high yielding strains of local *varagu*.

Results achieved during 1951-52.—The results of trial with *Makkattai cholams* revealed that A.S. 7537, a selection from *Vellaimakkattai cholam* was significantly superior to the local bulks of *Vellaimakkattai* and *Manjamakkattai cholam*. In the yellow grained group, A.S. 8001, a selection from *Periamanjai cholam* from Coimbatore, was found superior to the local *Manjamakkattai cholam*. Five selections of *Venchamarai cholam* gave increased yields ranging from 37.5 per cent to 56.7 per cent over the standard (local *Venchamarai cholam*). In the yield trial with *Irungu cholam*, A.S. 7081, a selection from a cross between *Irungu* and *Periamanjai cholam* was found to be significantly superior to the local *Irungu* giving 20.1 per cent higher yield of grain. Two selections of *Sen cholam*, in a preliminary yield trial yielded 38 per cent increased yield over the local the increase being statistically significant. Out of five cultures of *Arisi cumbu* tested in a yield trial, one selection A.C. 50 gave significant increase of 47.5 per cent over the local. Twenty-four selections of *Paladam cumbu* were put under preliminary yield trials and three of them gave increases of 16.6 per cent to 31.5 per cent of grain over the local. Out of seven selections of ragi tried, one selection A.R. 45 gave 34.3 per cent higher yield of grain over the local. Four selections of *varagu* received from Coimbatore, were put under preliminary yield trial against the local and P.S. 1 of Coimbatore. Selection P.S. 76 gave the highest yield of 34.5 per cent of grain over the local, the increase in yield being significant.

B. Tirupattur (North Arcot district)—Programme of work for 1951-52—*Cholam*.—Evolution of high yielding strains of rainfed *cholam*. Five economic selections await yield trials. Introduction and trial of *Periamanjai cholam* strains in the tract.

Cumbu.—Evolution of high yielding strains of rainfed *cumbu*.

Ragi.—Evolution of high yielding strains of irrigated and dry ragi.

Samai.—Evolution of high yielding strains.

Varagu.—Evolution of high yielding strains.

Results achieved during 1951-52.—Out of the five economic selections of *Talaivirichan cholam* received from Coimbatore, A.S. 8006 was found to be the best yielder giving significant increases of 77.6 per cent grain and 95.6 per cent of dry straw over the local. Five economic cultures of *Periamanjai cholam* were compared with the local *Talaivirichan cholam* for a second time and were found to compare favourably with the local *Talaivirichan cholam* in duration, height and grain setting. In the preliminary yield trials of 24 economic selections, five cultures gave significant increases over the local and were carried forward for further trials. Out of 34 economic single plants of ragi studied, nine were found suitable and were carried forward for preliminary yield trials. *Ragi* Co. 1 and Co. 2 were compared with local ragi in randomised blocks with eight replications. It was found that ragi Co. 2 was the best. Out of 42 economic single plants of samai, eight cultures were found promising and will be advanced for further trials. Out of the 15 single plants of *varagu* grown in two row plots and studied, five were found suitable and will be advanced for preliminary yield trials in the coming season.

C. Ongole (Guntur district)—Programme of work for 1951-52—*Jonna*.—Evolution of high yielding strains of the local varieties of *Pyrjonna*.

Variga.—Evolution of high yielding strains.

Maize.—Testing of maize varieties for yield and suitability to the tract.

Results achieved during 1951-52.—Two selections of *jonna* J.11 and J.17 were on a par with local *jonna* in point of grain yield while they were significantly superior to the control in the matter of straw yield giving increases of 10 per cent and 14 per cent respectively. Similarly J1 and J5 gave 10 per cent and 14 per cent increased yield of straw over the standard; though the differences in

grain yield were not significant. In preliminary yield trials, three selections J.26, J.102 and J.152 gave significantly higher yields of 21 per cent, 13 per cent and 17 per cent of grain respectively over the local jonna. Sixty-nine single plants were also selected for study on the station. Five local selections of variga gave higher yields of grain over the local though only one of them was significantly superior to the control. Eighty-one single plants selected from the villages were sown in two row plots and 12 promising ones were carried forward. Sixty-nine single plants were also selected from villages. In the trial with maize varieties, Repalle variety was found to yield only as much as the local.

D. Narasapatnam (Visakhapatnam district)—Programme of work for 1951-52—Ragi.—Evolution of high yielding strains for three important seasons—

- (i) Punasa (early).
- (ii) Peddapanta (main season).
- (iii) Pyru (late).

Cumbu (ganti).—Evolution of strains better than AKP. 1, AKP. 2 and AKP. 3.

Cholam (jonna).—Evolution of high yielding strains of jonna.

Results achieved during 1951-52.—Out of 16 promising cultures of *Punasa ragi*, seven cultures gave increased yields over the control and were carried forward for yield trials. Out of 77 single plant selections studied, 12 promising ones were selected for preliminary yield trials. In the main season ragi trials, six selections with AKP. 7 and local as controls were put under yield trials and the results were not statistically significant. Twelve selections were put under preliminary yield trials with AKP. 7 and local as controls and four of them gave significantly higher yields than the local. Out of 35 single plants studied for purity and yield, nine were found to be pure and economic. Fifty-four single plants were selected from cultivators fields for further study. In *Pyru ragi* out of 32 single plants studied, seven were found to be pure and economic and were carried forward for further trials. In *cumbu*, 64 single plants were studied and 13 pure and economic selections were carried forward for preliminary yield trials. In *cholam* five *jonna* selections (*Talaivirichan*) of Coimbatore were tried in yield trials with the local and the results were significant, A.S. 475 giving the highest yield of grain over the local. Forty-four single plants collected from ryots' fields were sown during the season and six of them were carried forward for preliminary yield trials.

Hybrid Cumbu Scheme (Indian Council of Agricultural Research)—Programme of work for 1951-52.—(1) Collection and study of fresh samples and selection of superior cultures.

(2) Inbreeding of superior selections from new samples and also those which have been previously isolated.

(3) Early test crosses for judging the combining ability of superior selections.

(4) Top crosses of inbreds with the adapted varieties P.T. 833 and Co. 3 for short duration ones and Co. 1 and Co. 2 for medium duration ones, to test the general combining ability.

(5) Interim crosses of inbreds brought to the S.3 or S.4 generation for comparison of the specific combining ability expressed in early and advanced generations.

(6) Testing of hybrids for yield. Initial test crosses and interim crosses are to be tested in row yield trials and superior hybrids advanced are to be tried in large scale comparative trials along with parents and standard strains.

(7) Testing of hybrids in the fields of the cultivators in the districts.—The hybrids already released are to be put for further confirmatory tests in those places where their performances have not been conclusive. New hybrids found worthy of distribution, will be put for trial in the ryots' fields along with local varieties in observation plots.

(8) **Multiplication of seeds of parents, hybrids and other strains.**—Seeds of strains and hybrids will be multiplied at the station and also in seed farms arranged in the fields of cultivators.

Results achieved in 1951-52.—*Cumbu* is the next important Millet in this State. The evolution of hybrids has been found to be a promising and practicable method for the improvement of this crop and a considerable amount of success has been achieved. During the year 1951-52, three hybrids of short duration, H. 866, H. 865 and H. 854 were found to be significantly higher yielding than the standard Co. 3, the former two maturing earlier also. Five hybrids of medium duration compared with Co. 1 in yield tests were also markedly higher yielding than the standard. The parents of these hybrids and of others in preliminary stages of tests consisting of 215 lines were all selfed and brought to different stages of inbreeding. Three selections P.T. 860, P.T. 862 and P.T. 854 of medium duration were found to be significantly higher in yield of grain, in a comparative trial of pure line selections with *cumbu* Co. 1. Trial of hybrids X1 and X2 in the ryots' fields in Srikakulam and Coimbatore have given very encouraging results. In Srikakulam, increases in grain yield of 17 per cent in case of X1 and 18 per cent in case of X2 over the local variety have been recorded. In Coimbatore, X1 has given an average increase of 38 per cent and X2 an increase of 47 per cent over the local variety in yield of grain. The demand for the seeds of improved strains has been great and a total quantity of 35,701 lb. of *cumbu* seed was distributed from the Millet Breeding Station during the year.

Scheme for the control of Striga on Sorghum (Indian Council of Agricultural Research)—Programme of work for 1951-52.—(1) Evolution of strains of *cholam* resistant to striga by—

(a) Selection.

(b) Hybridization.

(2) Agronomic studies—

(a) Trap crop.

(b) Deep ploughing.

(3) Combined experiment for hand weeding and spraying.

(4) Chemical treatment of the soil.

Results achieved in 1951-52.—*Striga* is a serious root parasite on *Sorghum* that causes severe losses in yield in certain seasons. Experiments on the control of this parasite by the evolution of resistant varieties and by agronomic methods were in progress at four centres under a special scheme of work, partly financed by the Indian Council of Agricultural Research. The progenies of crosses between representative types of the various centres and A.S. 4003 Bonganbilo, are under various stages of trials. Nine *Periamanjil cholam* selections, progenies of (Co. 1 × A.S. 4003) × Co. 1 cross stood on a par with A.S. 4003 with regard to striga resistance. All of them gave significantly higher yield of straw than Co. 1, the susceptible *Periamanjil cholam* strain and six of them gave significantly higher yield of grain. As a result of taking one trap crop, significant reduction in incidence was noticed both at Nandyal, and Coimbatore. Hand-weeding and spraying with Fernoxone, and Agrozone did not increase the yield of the crop, probably due to much of the damage to the crop being done when the striga is beneath the soil and totally parasitic on the host and the operations becoming due only after the parasite has appeared above the ground. As a result of deep summer cultivation there was a significant reduction in striga incidence at Nandyal, where the temperatures were higher than at Coimbatore and the number of rainy days was fewer. At Coimbatore, the greater number of rainy days and the lower temperatures contributed towards neutralising the treatment. As a result, the treatment was not effective. At Hagari, and Guntur, satisfactory striga infection has been established in all the agronomic sites. In the chemical treatment of soil experiment plots at Nandyal and Coimbatore, and in the supplementary Trap Crop Experiment plots at Coimbatore also satisfactory striga infection has been established and regular experiments will commence in 1952-53.

AREA SOWN WITH THE SEEDS OF IMPROVED STRAINS OF MILLETS AND AN ESTIMATE OF THE PROFIT DUE TO THEIR CULTIVATION IN 1951-52.

(Appendix to the Administration Report of the Millet Specialist for the year ending June 1952.)

Name of the districts.	Departmentally distributed area.	Natural spread area.	Total area.	Profit.
(1)	(2)	(3)	(4)	(5)
	ACS.	ACS.	ACS.	RS.
CHOLAM.				
1 Srikakulam	410.75	918.62	1,329.37	5,316
2 Visakhapatnam ..	20.00	5,517.00	5,537.00	55,370
3 East Godavari ..	10.50	..	10.50	44
4 West Godavari ..	212.30	1,772.00	1,984.30	47
5 Krishna	..	..	..	..
6 Guntur	2,516.00	26,600.00	29,116.00	45,800
7 Kurnool	69,849.00	240,413.00	310,262.00	12,41,048
8 Cuddapah	23,580.00	51,400.00	74,980.00	1,49,980
9 Bellary	43,221.00	243,312.00	286,533.00	8,59,598
10 Anantapur	3,567.00	25,000.00	28,567.00	4,28,505
11 Chingleput	190.00	2,568.91	2,758.91	55,140
12 Chittoor	40.00	925.00	965.00	96,500
13 Nellore	Information not furnished for the whole district.			
14 South Arcot	60.56	44,549.00	44,609.56	255
15 Tanjore	..	..	..	..
16 Tiruchirappalli ..	1,575.00	..	1,575.00	23,475
17 Madurai	635.00	..	635.00	9,525
18 Tirunelveli	695.00	3,712.00	4,407.00	66,105
19 Ramanathapuram ..	818.00	5,520.00	6,338.00	1,26,760
20 Salem	780.00	3,905.00	4,685.00	46,850
21 North Arcot	235.00	5,164.00	5,399.00	79,075
22 Coimbatore	740.00	51,994.00	52,734.00	5,30,728
23 Nilgiris	7.00	..	7.00	315
24 Tellicherry (North Mala- bar).	10.00	5.0	15.0	60
25 Shoranur (South Mala- bar).	16.0	..	16.0	12
26 South Kanara	..	..	..	..
	<u>149,188.11</u>	<u>713,273.53</u>	<u>862,461.64</u>	<u>28,20,889</u>

CUMBU.				
1 Srikakulam	313.00	546.65	859.65	4,295
2 Visakhapatnam ..	150.00	12,108.00	12,258.00	1,22,580
3 East Godavari ..	..	..	..	..
4 West Godavari ..	20.00	409.00	429.00	45
5 Krishna	..	..	..	..
6 Guntur	2.00	13,530.00	13,532.00	87,600
7 Kurnool	..	..	..	..
8 Cuddapah	..	..	..	..
9 Bellary	..	5,440.00	5,440.00	..
10 Anantapur	..	..	..	..
11 Chingleput	45.00	677.00	722.00	10,830
12 Chittoor	..	..	..	..
13 Nellore	Received information only for two taluks.			
14 South Arcot	218.60	34,107.00	34,325.60	2,167
15 Tanjore	2.50	60.00	62.50	312
16 Tiruchirappalli ..	150.00	..	150.00	2,250
17 Madurai	645.00	..	645.00	9,675
18 Tirunelveli	1,485.00	16,000.00	17,485.00	1,39,880
19 Ramanathapuram ..	1,349.00	13,640.00	14,989.00	2,24,835
20 Salem	1,200.00	4,620.00	5,820.00	52,200
21 North Arcot	120.00	2,775.00	2,895.00	13,260
22 Coimbatore	3,277.00	10,972.00	14,249.00	2,13,097
23 Nilgiris	..	..	..	..
24 Tellicherry (North Mala- bar).	..	..	..	..
25 Shoranur (South Mala- bar).	0.20	..	0.20	..
26 South Kanara	..	..	..	..
	<u>8,977.30</u>	<u>114,884.65</u>	<u>123,861.95</u>	<u>8,63,086</u>

Name of the districts.	Departmentally distributed area.	Natural spread area.	Total area.	Profit.
(1)	(2)	(3)	(4)	(5)
	ACS.	ACS.	ACS.	RS.
RAGI.				
1 Srikakulam	15.80	..	15.80	..
2 Visakhapatnam ..	9,118.00	22,521.00	32,639.00	3,26,390
3 East Godavari ..	50	..	0.50	..
4 West Godavari ..	42.50	883.00	925.50	85
5 Krishna	..	..	..	..
6 Guntur	6.90	15.00	21.90	392
7 Kurnool	12.00	785.00	797.00	7,970
8 Cuddapah	453.00	3,100.00	3,553.00	28,344
9 Bellary	294.00	278.00	572.00	17,172
10 Anantapur	300.00	10,000.00	10,300.00	1,54,500
11 Chingleput	625.00	16,288.00	16,913.00	5,07,390
12 Chittoor	1,132.00	25,179.00	26,311.00	26,31,100
13 Nellore	..	..	..	..
14 South Arcot	2,185.00	24,995.00	27,180.00	36,195
15 Tanjore	30.00	120.00	150.00	750
16 Tiruchirappalli ..	375.00	..	375.00	5,475
17 Madurai	1,874.00	..	1,874.00	28,110
18 Tirunelveli	252.00	3,990.00	4,242.00	63,630
19 Ramanathapuram ..	1,491.00	6,302.00	7,793.00	1,54,060
20 Salem	1,754.00	18,664.00	20,418.00	1,04,180
21 North Arcot	601.00	15,923.00	16,524.00	2,06,067
22 Coimbatore	15,420.00	6,571.00	8,113.00	1,32,605
23 Nilgiris	3.00	..	3.00	..
24 Tellicherry (North Mala- bar).	3	7.00	10.0	100
25 Shoranur (South Mala- bar).	11.00	15.00	26.00	150
26 South Kanara	8.00	140.00	148.00	1,480
	<u>22,038.70</u>	<u>156,776.00</u>	<u>178,814.70</u>	<u>44,07,235</u>
TENAI.				
1 Srikakulam	..	..	..	..
2 Visakhapatnam ..	..	..	..	..
3 East Godavari ..	..	..	..	..
4 West Godavari ..	..	..	..	..
5 Krishna	..	..	..	..
6 Guntur	772.00	5,885.00	6,657.00	17,486
7 Kurnool	90,938.00	112,270.00	203,208.00	6,09,624
8 Cuddapah	6,650.00	12,450.00	19,100.00	18,200
9 Bellary	27,629.00	154,990.00	182,619.00	3,65,238
10 Anantapur	22,400.00	16,000.00	38,400.00	4,76,000
11 Chingleput	1.00	5.00	6.00	60
12 Chittoor	..	..	..	..
13 Nellore	..	..	..	..
14 South Arcot	10.00	7,122.00	7,132.00	120
15 Tanjore	..	..	..	..
16 Tiruchirappalli ..	..	..	..	..
17 Madurai	..	..	..	..
18 Tirunelveli	..	..	..	..
19 Ramanathapuram ..	..	50.00	50.00	..
20 Salem	41.50	151.00	192.50	1,920
21 North Arcot	..	..	..	..
22 Coimbatore	45.00	1,271.00	1,316.00	26,520
23 Nilgiris	..	..	..	..
24 Tellicherry (North Mala- bar).	..	..	..	..
25 Shoranur (South Mala- bar).	3.00	..	3.00	..
26 South Kanara	..	..	..	..
	<u>148,489.50</u>	<u>310,194.00</u>	<u>458,683.50</u>	<u>15,15,168</u>

112 ADMINISTRATION REPORTS OF SUBORDINATE OFFICERS OF

Name of the districts.	Departmentally distributed area.	Natural spread area.	Total area.	Profit.
(1)	(2)	(3)	(4)	(5)
	ACS.	ACS.	ACS.	RS.
TOTAL.				
1 Srikakulam	739.55	1,465.27	2,204.82	0,611
2 Visakhapatnam	9,288.00	41,146.00	50,434.00	5,04,340
3 East Godavari	11.00		11.00	44
4 West Godavari	274.80	3,064.00	3,338.80	177
5 Krishna				
6 Guntur	3,296.90	46,030.00	49,326.90	1,31,138
7 Kurnool	160,799.00	353,468.00	514,267.00	18,58,642
8 Cuddapah	30,683.00	66,950.00	97,633.00	1,96,504
9 Bellary	71,144.00	404,020.00	475,164.00	12,42,009
10 Anantapur	26,267.00	51,000.00	77,267.00	10,59,005
11 Chingleput	861.00	19,536.91	20,397.91	5,73,420
12 Chittoor	1,172.00	26,104.00	27,276.00	27,21,600
13 Nellore				
14 South Arcot	2,474.16	110,773.00	113,247.16	38,737
15 Tanjore	32.50	180.00	212.50	1,062
16 Tiruchirappalli	2,100.00		2,100.00	31,200
17 Madurai	3,154.00		3,154.00	47,310
18 Tirunelveli	2,432.00	23,702.00	26,134.00	2,69,615
19 Ramanathapuram	3,568.00	25,512.00	29,080.00	5,05,655
20 Salem	3,775.50	27,340.00	31,115.50	2,05,150
21 North Arcot	956.00	23,862.00	24,818.00	2,99,002
22 Coimbatore	5,604.00	70,808.00	76,412.00	9,04,040
23 Nilgiris	10.00		10.00	315
24 Tellicherry (North Mala- bar).	13.00	12.00	25.00	160
25 Shoranur (South Mala- bar).	30.20	15.00	45.20	162
26 South Kanara	8.00	140.00	148.00	1,480
	328,693.61	1,295,128.18	1,623,821.79	96,06,378

NOTE.—Information for the whole district was not received from Nellore and Coimbatore.

ADMINISTRATION REPORT OF THE OILSEEDS SPECIALIST,
COIMBATORE, FOR THE YEAR 1951-52 (FASLI 1361).

1. *Charge*.—Sri G. Venkatanarayana continued to be the Oilseeds Specialist up to the end of 29th February 1952 after which date he proceeded on leave on average pay for four months granted to him in G.O. Ms. No. 216, Food and Agriculture, dated 16th February 1952. Sri C. R. Seshadri, Assistant Oilseeds Specialist, officiated as the Oilseeds Specialist during this period of leave. The Oilseeds Specialist continued to be in technical control of the scheme of scientific aid to pepper industry financed by the Indian Council of Agricultural Research and worked at the Agricultural Research Station, Taliparamba, and in technical as well as administrative control of the scheme of scientific aid to cardamom industry financed by the Indian Council of Agricultural Research and worked at the Singampatti Group, Kallidaikurichi.

2. *Staff*.—On reversion from foreign service under the Government of the United State of Sourashtra, Sri C. R. Seshadri, proceeded on leave on average pay for four months from the 1st September 1951. After expiry of the leave he assumed charge as the Assistant Oilseeds Specialist, Zonal Nucleus Seed Farm Scheme, Coimbatore, on the 9th January 1952 as per the order No. K. 1-840/51, dated 26th December 1951, of the Director of Agriculture, Madras. Sri M. Bhavani Shanker Rao, Superintendent, Agricultural Research Station, Tindivanam, continued to be in charge of the post throughout the year. Sri K. V. Govindan Nair, Farm Manager, Nileshwar II, continued to be in full additional charge of the post of the Superintendent, Agricultural Research Station, Nileshwar, till 14th November 1951 from which date he proceeded on earned leave for three months. Janab P. M. Sayeed, Coconut Nursery Assistant, Pattambi, was transferred as Assistant, Agricultural Research Station, Nileshwar, and he held full additional charge of the post of the Superintendent of that station. He was appointed as the Superintendent, Agricultural Research Station, Nileshwar, under emergency provisions in G.O. No. 881, Food and Agriculture, dated 30th May 1952, and he assumed charge of the post on 6th June 1952 forenoon. Sri S. G. Aiyadurai, Assistant Oilseeds Specialist, Comprehensive Coconut Nursery Scheme, Coimbatore, was posted as Assistant Oilseeds Specialist, Zonal Nucleus Scheme, Coimbatore, from 1st March 1952 consequent on the promotion of Sri C. R. Seshadri, as Oilseeds Specialist. The latter held additional charge of the post of the Assistant Oilseeds Specialist, Comprehensive Coconut Nursery Scheme, Coimbatore, from 1st March to 1st May 1952. Sri S. D. S. Albuquerque, Senior Farm Assistant, Central Coconut Research Station, Kasargod, who was appointed under emergency provisions as the Assistant Oilseeds Specialist, Comprehensive Coconut Nursery Scheme, Coimbatore, in G.O. Ms. No. 674, Food and Agriculture, dated 16th April 1952, took charge of the post on 1st May 1952. Sri P. Abraham and Sri V. Gomathinayagam Pillai continued

to be the Pepper Specialist and Cardamom Specialist at Agricultural Research Station, Taliparamba and Singampatti group respectively throughout the year. The services of Sri M. M. Krishna Marar, Senior Assistant in Oilseeds, Coimbatore, were lent to the Indian Central Coconut Committee, from 24th October 1951. In his vacancy Janab S. Varisai Muhammad, Senior Assistant, Agricultural Research Station, Tindivanam, was posted and he joined duty on the 19th November 1952 at Coimbatore. The staff at the headquarters at Coimbatore is too meagre to cope with the rapidly increasing work and has to be augmented at the earliest. About 20 acres of land in the Central Farm has been transferred to the Oilseeds Specialist to be managed by him independently but no additional staff has been sanctioned for this purpose. Great difficulty is being experienced in managing the farm without extra staff and facilities by way of store room, implements, work animals, etc. Additional assistants one each for the Agricultural Research Stations, Tindivanam, Nileshwar II and Nileshwar III, are also needed for the efficient conduct of research as envisaged in the three-year programme of work relating to the Oilseeds Section.

3. *Research and Seed Multiplication Schemes.*—The following schemes of research and seed multiplication have been in progress in the oilseeds section during the year:—

(1) *Extension scheme of the research on the coconut.*—The scheme which is partly financed by the Indian Central Coconut Committee and worked at the Agricultural Research Station, Nileshwar II, for an extended period of seven years terminated on the 31st March 1952. The main objective of the scheme is to investigate into certain economical and practical problems connected with the coconut such as establishment of proper criteria for the selection of seedlings that would ultimately give good yields, determining the causes for the shedding of buttons in the coconut, etc. The year under report is the seventh and the last year of working of the extension scheme.

(2) *The Comprehensive Coconut Nursery Scheme.*—Under the scheme which is also financed partly by the Indian Central Coconut Committee, nine coconut nurseries are being run one each at Nileshwar, Pattambi, Coimbatore, Pattukkottai, Tindivanam, Maruteru, Samalkota, Anakapalle and Marudur. The object of the scheme is to produce and distribute annually about 166,000 selected seedlings among the coconut growers of the State. The year under report is the fifth year of working of the scheme and a total of 163,390 selected coconut seedlings were raised in these nurseries and sold to the public during the year.

(3) *Scheme for multiplication and distribution of the seeds of *Crotalaria striata*—green manure crop.*—The scheme which is subsidised by the Indian Central Coconut Committee and worked in eight selected taluks of South Kanara and Malabar districts with the object of popularising the green manure crop in these districts was terminated on the 30th June 1952. The sanctioned period of the scheme is five years and is normally due to terminate on 2nd May 1953. But on account of the high cost involved in the collection of seeds in the ryots' fields and consequent poor response from the ryots and also on account of the heavy drain of the soil fertility by repeated growing of this crop for seed at the Agricultural Research Station, Nileshwar, the scheme was ordered to be terminated in the Director of Agriculture's No. D. 2.21/52, dated 4th May 1952.

(4) *Scheme for the multiplication of improved strains of groundnut.*—This scheme is being worked partly with the financial assistance from the Indian Central Oilseeds Committee. The object of the scheme is to produce nucleus seeds of improved strains of groundnut on a large scale for distribution in the districts for organizing primary seed farms. The scheme in its original form was sanctioned for a period of five years for multiplication of three improved strains of groundnut, namely, TMV. 1, TMV. 2 and TMV. 3 in a leased out area of 50 acres near the Agricultural Research Station, Tindivanam, and worked for a period of about four years commencing from 1st July 1948. On account of the growing demand for the seeds of improved strains of groundnut and the difficulty experienced in meeting the demand from the produce of this limited area, a scheme on an enlarged basis was sanctioned for a period of five years. This scheme which is financed by the Indian Central Oilseeds Committee and the State Government was started with six zonal nucleus seed farms of 50 acres each at Adoni, Vayalpad, Pollachi, Salem, Srivilliputtur and Tindivanam. The original scheme that was worked at Tindivanam was merged into the enlarged scheme from 29th December 1951. The improved strains of groundnut, namely, TMV. 1, TMV. 2, TMV. 3 and TMV. 4 and of castor, namely, TMV. 1 and TMV. 2 will be multiplied and the demands of the State will be met. Under the original scheme a total quantity of 11,347 lb. of picked groundnut seed pods was obtained at Tindivanam during the year (fourth year). The yield was very low owing to the failure of both the monsoons during the growth period of the crop and the target production of 40,000 lb. of groundnut seed pods of the strains could not be reached.

(5) *Scheme for the multiplication of the improved strains of gingelly.*—The scheme is being financed by the State Government and worked at the Agricultural Research Station, Tindivanam. The object of this scheme is to produce 4,800 lb. of the seeds of the improved strains for trial and multiplication in the districts. The scheme was worked for the fifth year and a total quantity of 1,100 lb. of seeds of the three improved strains were produced. The low yield was mainly due to the failure of monsoon rains and the consequent failure of water-supply in the irrigation sources of the Research Station.

(6) *Scheme for the large scale trial of insecticides and fungicides for the control of 'Surul' pest and 'Tikka' leafspot disease of the groundnut crop.*—The scheme is being financed by the Indian Central Oilseeds Committee and the State Government and worked at the Agricultural Research Station, Tindivanam, with a leased out area of 60 acres. The main object of the scheme is to carry out trials on a large scale, with the insecticide D.D.T. (5 per cent) and fungicides Bordeaux mixture $\frac{3}{4}$ per cent and sulphur which have been found from previous experiments to be effective against 'Surul' pest and 'Tikka' disease respectively and to work out the economics of the treatments. It was also the object of the scheme to carry out a small scale trial to determine the effect of lower strengths of D.D.T. and cheaper insecticides like 5 per cent B.H.C. and 10 per cent B.H.C. both as spray and dust. The scheme which was sanctioned for a period of two years commenced working from 1st July 1951. The period under report is the first year of the scheme. The trials contemplated in the scheme were conducted and it was noted that dusting twice with D.D.T. 5 per cent at the rate of 20 lb. per acre against 'Surul' pest gave remunerative returns and spraying Bordeaux mixture $\frac{3}{4}$ per

cent twice and dusting 'sulphur' three times against the 'tikka' disease gave more profitable yields. These results will be confirmed during the next year which is the final year of the scheme.

(7) *Scheme of scientific aid to cardamom industry in South India, Madras State.*—The scheme is being worked with the financial assistance of the Indian Council of Agricultural Research at the Singampatti group of hills in Tiruvelveli district with the object of investigating the ways and means of controlling the major pests and diseases of cardamom and to bring the yield to normal by selection and hybridization. The scheme was sanctioned originally for a period of five years from 1st April 1944 but it was actually started on the 1st October 1944. It was first extended by three years. But later the period was modified as two years and the scheme is therefore due to terminate on the 31st March 1954. This is the first year of the extended period of the scheme. The survey of cardamom plantations, collection and study of types, studies on other agronomic problems, study of cardamom thrips and diseases and their control measures were the items of work in progress under this scheme.

(8) *Scheme for scientific aid to pepper industry in South India.*—The scheme is being financed by the Indian Council of Agricultural Research and it has been worked at the Agricultural Research Station, Taliparamba, and the venue will be shifted to the newly opened Pepper Research Station, Panniyur, North Malabar. The object of the scheme is to rehabilitate the pepper industry in South India by growing higher yielding varieties of pepper, controlling insect pests and diseases, gathering data regarding the manurial requirements of the crop and by adopting improved methods of cultivation. It is also the object to assist small growers by supplying them with suitable high yielding and disease resistant types of pepper and improve the gardens of Malabar and South Kanara. The scheme was originally sanctioned for a period of five years and work was actually started on 23rd December 1949. The period under report is the third year of the scheme. The survey and collection of varieties and testing them, study of the cultural, manurial and other agronomic practices to be adopted and also investigation of the major diseases such as 'Pollu' and 'Wilt' and insect pests and their control were under progress during the year under report.

Details of the work done under these schemes are given in the reports of the schemes.

4. *Season and rainfall.*—The total rainfall received at Coimbatore during the period of report was 16.18 inches on 33 rainy days as against 22.42 inches on 39 days of last year and a ten-year average of 23.04 inches on 43 rainy days. Both the monsoons again failed. The successive failures of the monsoon rains affected considerably all the sources of water-supply to crops. The seasonal conditions were adverse to all the oilseed crops sown in the dry land area. Sowing was much delayed and was actually taken up in the last week of August 1951. Germination in all the three major oilseed crops, namely, groundnut, gingelly and castor was badly affected owing to the drought that prevailed after the sowing. The north-east monsoon rains though feeble improved the growth of the castor crop to a certain extent especially the long duration types. The short duration types of castor, groundnut and gingelly failed completely on account of the failure of the early rains and very poor yields were obtained.

At the Agricultural Research Station, Tindivanam, a total rainfall of 30.70 inches was received during the year on 45 rainy days. Though the rainfall was higher than that of the last year (26.60 inches on 44 rainy days), it was in deficit of the normal rainfall of the tract by ten inches. This was mainly due to the failure of the north-east monsoon in the later stages. Successive failure of the monsoon for the last five years resulted in poor yields of the oilseed crops. The south-west monsoon also set in very late and was feeble in the early stages. The abrupt cessation of the north-east monsoon in the latter half was responsible for the poor yield of groundnut and complete failure of cold weather gingelly. Even the castor crop has recorded low yield during this year. Because of the failure of both the monsoons the water-level in the wells went down considerably and considerable difficulty was experienced in raising gingelly and groundnut crops under irrigation during summer. The absence of summer showers added to the difficulties.

At the Agricultural (Coconut) Research Station, Nileshtar, a total rainfall of 124.79 inches was recorded on 116 rainy days during the year. The total rainfall is less than the average rainfall for the past ten years. The south-west monsoon was not strong and the rainfall received was below normal (95.45 inches on 80 rainy days). The north-east monsoon was beneficial and 20.18 inches of rain was received on 25 rainy days. The summer showers were again below normal, though 9.16 inches of rain was received towards the end of April and in May. This facilitated the sowing and planting of green manures and other subsidiary crops. In general, the year's rainfall was more beneficial to the coconut than during the previous three years.

5. *Oilseeds crops*—A. *Groundnut.*—(i) *General.*—The area under the groundnut crop in the Madras State during 1951 was estimated at 4,147,200 acres which was 4.8 per cent more than that of the previous year and 4.7 per cent more than the five-year average. During the year a decrease in the area was recorded in the districts of Srikakulam, Krishna, Cuddapah, Chingleput, Chittoor and Salem and an increase in other regions of the State except in the East Godavari, West Godavari, Ramanathapuram, Tirunelveli and Malabar where the area remained stationary. The crop was affected by heavy rains in West Godavari district and by inadequate rainfall in the districts of Krishna, Guntur, Kurnool, Anantapur, Cuddapah, Nellore, Chingleput, Chittoor, North Arcot, Coimbatore and Madurai. The crop was affected by insect pests in Bellary, South Arcot and Salem districts. The yield per acre was normal in East Godavari and below the normal in all the other regions of the State. The total yield was estimated at 1,519,800 tons of unshelled nuts as against 1,619,700 tons for the corresponding period of last year, representing a decrease of 6.2 per cent, and a decrease of 3.8 per cent when compared with the average yield for five years ending with 1949-50. The prices of groundnut kernels, oil and cake came down markedly and the prices of groundnut kernels at the end of the year was nearly half the price that prevailed during last year.

(ii) *Improved strains.*—The indents for the improved strains of groundnut continued to be on the increase and it was not possible to meet the demand on account of the failure of both the monsoon rains. The yield of groundnuts at the Agricultural Research Station, Tindivanam, was very poor being 35,000 lb. pods from 125 acres. Out of this 27,000 lb. of pods were required for starting the Zonal Nucleus Seed Farms at six centres in the State under the scheme for large scale multiplication of improved strains of groundnut and castor. With the commencement of this scheme this year it

is hoped that a good proportion of the demands of the State will be met. The requirements of seeds for conducting observation and trial plots and for the trial in single-crop wet lands in the different parts of the State were met with. The total quantity of seeds supplied during the year was 35,000 lb.

There was also keen demand for the improved strains from other States and foreign countries. During the year, seeds of the improved strains of groundnut were supplied to the States of Rajasthan and Indore.

(iii) *Experiments and research.*—Research on groundnut was continued with the main object of evolving strains with high yield, high oil content, good shelling percentage and possessing resistance to pests and diseases. The optimum cultural and manurial requirements of the crop were also under investigation.

(a) *Comparative yield tests of varieties and selections.*—Three bunch strains from Bombay, Madhya Pradesh and Mysore were compared with TMV. 2 strain of the State. The strains from Mysore yielded significantly less than the other two which were on par with TMV. 2 strain. Regarding quality, the strain from Mysore was as good as the local strain while the other two strains were very poor.

Two spreading strains from Kanpur (Uttar Pradesh) and Punjab and 14 selections from the progenies of crosses and 'Local Mauritius' were compared with the standard strains and the local spreading groundnut. Six selections were found to be better than the local groundnut, five better than TMV. 3 and two better than TMV. 1 strain in yield. The strains from other States were not in any way better than the local strains and their quality was decidedly poor.

(b) *Preliminary yield trials.*—Four bunch selections and nine spreading selections made from large seeded varieties for dessert purpose were put under preliminary yield trials in two separate series. In the bunch series, the yield differences were not significant. In the spreading series two selections gave significantly increased yields over the standard strain TMV. 3 while seven were superior to the local groundnut. Selection A.H. 1720 isolated from the variety 'Virginia Bunch' recorded significantly higher yield than all the others. The qualitative characters were also determined for all the selections so as to have a rigid selection on the basis of yield and quality.

(c) *Seed multiplication of selections.*—Six bunch selections from the dormant bunch strain A.H. 6481 and 49 spreading selections were multiplied for further trials. Out of the bunch selections, one which had non-dormant character and other undesirable features was rejected. The other five will be carried forward for trial during the next season. Out of the spreading selections seventeen from varieties Rangoon, Texas, Mauritius Virginia and Mosambique were marked out for further trial as they have shown promise of high yield and desirable qualitative characters.

(d) *Replicated row tests.*—Fourteen bunch selections from progenies of crosses and varieties were compared with TMV. 2 bunch groundnut in replicated rows. Only one selection recorded significantly increased yield over the control and the others were on a par with it. This outstanding selection along with three other promising ones will be multiplied next year for further trial.

Forty-five spreading selections from progenies of crosses and varieties were put under trial along with local spreading groundnut. Twenty selections gave significantly increased yield over the control and they will be multiplied next year for further trial.

(e) *Row tests.*—Nine bunch and 36 spreading selections were compared for their yields under two tests. Five bunch and 19 spreading selections out-yielded their adjacent controls.

(f) *New introductions.*—The forty-five varieties of groundnut obtained during 1950-51 from the Head of the Division of Botany, Indian Agricultural Research Institute, New Delhi, were sown again in small plots and studied in great detail. Only one bunch variety from East Africa which possessed white seed was utilized for breeding white seeded high yielding strains. Single plants numbering 126 which showed desirable combination of economic characters among the bunch varieties were selected for further trial. There were seven varieties with semi-spreading habit of growth which were in general better than the spreading varieties and out of these, 17 promising single plants were selected for further trial. Among the spreading varieties A.H. 6633 Dixie runner from United States of America had good pod and kernel characters and 10 selections were made for further observation.

Another set of nine new 'varieties' of groundnuts received from the Head of Division of Botany, New Delhi, were also grown and observed. Only one among them A.H. 6728 (E.C. 2128) a bunch variety with large number of three-seeded pods and white seed coat appeared to be a new type not already represented in the present collection. This new type will be raised again and utilized for economic work.

A third set of 10 'varieties' was received late in the season and all the ten 'varieties' were sown in observation plots under irrigated conditions. Observations on these are in progress.

(g) *Hybridization.*—Twenty-four new crosses were attempted between selected purelines with the following objects:—

- (i) To evolve a dormant bunch strain,
- (ii) to evolve a white seeded strain, and
- (iii) to improve the shelling outturn of TMV. 1 strain.

The hybrid seeds were carefully collected and preserved for further trials next year.

The F₁ progenies of 24 crosses made last year were grown along with their parents and studied. The F₂ and F₃ progenies of crosses made earlier were grown and studied and 54 families from F₂ progenies and 24 single plants with desirable economic features from F₃ progenies were selected for further observation and trial.

(h) *Manurial experiments.*—Manurial experiment with four levels of potash (0, 25, 50 and 75 lb. of K₂O per acre) in the form of potassium sulphate and four levels of phosphoric acid (4, 20, 40 and 60 lb. of P₂O₅ per acre) in the form of superphosphate with and without a basal dressing of cattle manure at 5 tons per acre, was repeated for the fourth time during the year. The differences in yield between the different manurial treatments were significant. The plots treated with cattle manure gave better yield than the plots without it, and the combination of cattle manure, potash and phosphoric acid also gave high yields. In the previous years, the yield differences were not significant but the beneficial effect of cattle manure was always in evidence.

(i) *Cultural experiment.*—The cultural experiment with 9 tillage treatments was continued for the fourth year. The object of the experiment is to determine the best and the most economic cultivation practices to be adopted for the groundnut crop. As in the previous years the differences in yield between the various treatments were not significant. The economics

of the different cultivation practices adopted were also worked out. In general, the yield was very poor on account of the adverse seasonal conditions. However, ploughing with "Mould-board plough twice" and with "Country plough four times" gave maximum net returns. This is not in conformity with the results obtained last year. The trial will be repeated for a few more seasons to obtain conclusive data.

(j) *Rotation experiment.*—The rotation experiment started in 1945-46 with the object of finding out the effect of rotating groundnut with other cereal crops like *Cumbu*, *Unolam* and *Varagu* was continued with the scheduled treatment and lay out. There was no significant difference in the yield of groundnut following groundnut and groundnut following the three cereals as in previous years. However, the cereals following groundnut yielded much better than the cereals following the cereals. This observation is in conformity with the results of the previous years.

(k) *Mixed cropping of groundnut with cotton.*—With a view to determining the strain of cotton best suited to the tract and the optimum time of sowing of it as a mixture with groundnut a mixed cropping experiment was started in dry land during the rainfed season. Three cotton strains, namely, Co 2, Mu 2 and 881F were sown on the day of sowing groundnut and at the time of first hoeing and weeding of groundnut. As the rainfall during the year was deficient and ill-distributed the cotton crop proved a failure and it was not possible to determine the best strain suited to the tract. The cotton crop that was sown on the day of sowing groundnut, however, gave better yield than the cotton crop sown at the time of first hoeing and weeding of groundnut.

(l) *Groundnut harvesting and curing trials.*—The experiment was continued during the year with the bunch variety of groundnut to find out the optimum time of harvest and the best method of curing (process of drying after harvest). The bunch variety of groundnut was harvested ten days in advance of the normal time of harvest, and at the normal time of harvest. The produce with haulms was cured by the following methods:—

(1) Plants pulled out with pods and left in the field for a week, (2) plants pulled out and stripped immediately and (3) plants pulled out and stacked on a pole for a week. Qualitative studies conducted on the produce did not reveal any difference due to the treatments. The study will be repeated during the next season.

(m) *Breaking the dormancy of the seeds of spreading variety of groundnut.*—The seeds of bunch variety of groundnut are non-dormant while that of the spreading variety are dormant, i.e., do not germinate immediately after harvest. In order to break the dormancy in the spreading variety by use of chemicals ethylene chlorhydrin and ammonium sulphocyanide were tried at 0.1 per cent and 1 per cent strengths respectively for different hours and then allowed to germinate. Soaking for 24 hours appeared to have affected the germination in the case of ammonium sulphocyanide, but in the case of ethylene chlorhydrin poor germination was recorded. The experiment will be repeated by soaking seed in different strengths of solutions of the chemicals for different periods and their effect on dormancy will be studied.

(n) *Study of the effect of sowing groundnut with shell on as opposed to sowing kernels.*—With a view to investigating into the advantages and disadvantages of sowing groundnut with shell, an experiment was started this year with sowing groundnut as (1) kernels, (2) as pods broken

into bits and (3) pods just split. It was observed that the germination percentage was decidedly high in the case of kernels than in others and it was also found that the other methods are not economical on account of the time and labour consumed in splitting the pods and also the extra quantity of seed material required for sowing.

(o) *Vegetative propagation of groundnut.*—Normally groundnut is propagated by seed but in order to determine whether propagation by cuttings is feasible and practicable, this experiment was started during the year. Cuttings were taken at weekly intervals commencing from the time of first flowering from the rainfed crop of both the bunch and the spreading varieties of groundnut and they were planted after treating them with Hormone A. It was found that the cuttings established themselves and put forth vegetative growth and produced pods like the normal plant. The experiment is being repeated during this summer and the observations are in progress.

(p) *Control of earwig attack on groundnut.*—Of late, the earwig pest has been found to damage a large percentage of groundnut pods in the field and an effective control measure is very necessary. B.H.C. 5 per cent and D.D.T. 5 per cent at 10 lb. per acre were tried for the first time. The chemicals were incorporated into the soil where a spreading groundnut crop was grown. Application of the chemicals once (two months after sowing) and twice (two months and three and a half months after sowings) was tried. Both the insecticides were found to reduce the infestation of the pest. The experiment will be repeated.

(q) *Irrigated (summer) season-trials.*—Work on the irrigated groundnut was commenced for the first time this year at the Agricultural Research Station, Tindivanam. For want of irrigation facilities some of the experiments had to be conducted at the Agricultural Research Station, Palur. The following were the important items under study:—

(i) *Preliminary yield tests of selections.*—Fourteen bunch and 21 spreading selections were sown under preliminary yield tests with the established irrigated strains T.M.V. 2 and T.M.V. 4 as the respective controls. Observations connected with this trial are in progress.

(ii) *Groundnut, ragi and cotton mixed cropping experiment.*—With the object of working out the economics of raising mixed crop of groundnut, cotton and ragi, an experiment was started during this year at the Agricultural Research Stations, Palur and Tindivanam. Groundnut was dibbled in ragi plots when the latter was in the flowering stage. Cotton was sown just after transplantation of ragi in rows three feet apart. The growth and setting of grain in ragi were good and fair yields were obtained. Cotton and groundnut crops are in the field and observations are in progress.

(iii) *Groundnut irrigation experiment.*—With a view to determining the optimum number of irrigations to be given to the groundnut crop the irrigation experiment was started at the Agricultural Research Station, Palur, with the following frequencies of irrigation, namely, once in 7 days, 11 days, 15 days and 19 days. The growth of the crop is observed to be satisfactory. Detailed observations are in progress.

(r) *Mechanical cultivation of groundnut.*—(i) *Harvest.*—Mechanical harvest of groundnut was tried during the year with the object of reducing the time and labour involved in the operation. A curved guntaka blade six feet long switched behind a 'John Deere' tractor was utilized for lifting the plants. The working of the implement was satisfactory and it was

found to be economical as it cost Rs. 3-12-6 against Rs. 5-13-0 for executing the same work with bullock-drawn implements. The implement proved effective and efficient even when the soil was hard under which condition the local methods of harvest could not be of any use. The only difficulty encountered was the twining of the vines round the blade which impeded the working of the implement now and then. This must be got over by some auxiliary device attached to the implement.

(ii) *Picking*.—The Ransomes Peanut Picker (Minor) worked with the oil engine was tried with a new set of closely pitched drum and concave sent by the manufacturers for stripping pods from vines and cleaning. It was satisfactory and the percentage of unpicked pods was only eight. With this machine, it was observed that the vines from an area of 10 acres could be stripped in a working day of eight hours. Further trials will be conducted and the economics worked out.

(s) *Large-scale trials with insecticides for the control of 'Surul' pest and with fungicides for 'Tikka' leafspot disease*—(i) *Surul pest—Control*.—Large-scale trials with D.D.T. 5 per cent dust.—With a view to working out the economics of the application of D.D.T. (Geigy 5 per cent) for the control of *Surul* pest, the experiment was started this year and it was found that there was no difference in the intensity of attack in plots under different dustings; but the yield of pods was found to increase with the increase in the frequency of dustings. Dusting of the crop twice with 5 per cent D.D.T. at the rate of 20 lb. per acre was found to give remunerative returns.

(ii) *Surul control—Comparison of D.D.T. and B.H.C. at varying strengths as spray and as dust*.—The experiment was tried for the first time this year with a view to determining whether lower strengths of D.D.T. will be as effective as 5 per cent strength and also comparing DDT with Benzene hexachloride both as spray and as dust. The strengths of DDT (Geigy) dust tried were 5 per cent, 4 per cent and 3 per cent and of B.H.C. (I.C.I. product) were 5 per cent and 10 per cent. The strengths of the spray were Guesarol 550—0.1 per cent and 0.05 per cent and P.520 (I.C.I. product) 0.1 per cent and 0.05 per cent. These were applied once (four weeks after sowing) and twice (four weeks and eight weeks after sowing). The infestation of '*surul*' was less in all the treated plots and increased yields were obtained in case of the treatments 5 per cent D.D.T. dusted twice, 10 per cent B.H.C. dusted twice and 4 per cent D.D.T. dusted once. The increase in yield due to dusting was not large enough in all cases so as to leave a fair margin of profit after meeting the cost of dusting. The insecticides when applied as sprays were not effective in reducing the infestation of the pest. There was also no significant increase in yield of the crop due to these treatments.

(iii) '*Tikka*'.—Large scale trials with Bordeaux mixture and sulphur.—The experiment was started for the first time this year. The object was to work out the economics of the large scale application of Bordeaux mixture and sulphur for the control of '*Tikka*' disease. Bordeaux mixture $\frac{3}{4}$ per cent and sulphur at 15 lb., per acre were applied once, a month after sowing, twice, (1) a month after sowing and (2) two months after sowing and thrice, (1) one month, (2) two months and (3) three months after sowing. The assessment of '*Tikka*' infestation both before and after spraying did not disclose any effect in favour of any of the treatments. There was increase in yield due to the treatments, but the differences were

not significant. The maximum yield was recorded in the case of plots sprayed twice with Bordeaux mixture. When the economics of spraying were worked it was found that spraying twice with Bordeaux mixture was more remunerative.

The reduction in the infestation of '*tikka*' due to the dusting of sulphur was not pronounced. The sulphur-dusted plots recorded higher yields than the untreated plots. All the treatments were remunerative and maximum return was obtained by dusting three times.

(t) *Maintenance of forms and types*.—All the available forms and extracted types numbering about 100 were grown and maintained. Their morphological characters were described and their qualitative characters determined and recorded. The paper on "Varieties and Forms of Groundnut—their Classification and Economic Characters" was returned by the Indian Council of Agricultural Research, New Delhi, with certain remarks of the referees. The queries were answered and the paper was accepted by the Council for publication.

(u) *Seed multiplication of improved strains of groundnut*.—Strains of T.M.V. 1, 2 and 3 were grown in a total area of 50 acres for seed multiplication under the scheme financed by the Indian Central Oilseeds Committee. A total of 11,347 lb. of picked pods of the strains were produced. This quantity of seeds was utilized for sowing in the six Zonal Nucleus Seed Farms in the State under the enlarged scheme started from January 1952. Sowings of improved strains of groundnut and castor were made at Pollachi, Salem and Adoni and the crop at these centres is satisfactory. Sowings will be taken up at the remaining centres on receipt of sowing rains.

(v) *District trials*.—The improved strains of groundnut TMV. 1, 2, 3, 4 and 5 (A.H. 6481) and also the promising selections, namely, A.H. 4111, A.H. 4515 and A.H. 4218 were under trial at some of the Agricultural Research Stations and in the districts. Among the bunch selections tried at the Agricultural Research Station, Nandyal, TMV. 2 has given consistently better yield than the local and other improved selections. On an average it has given 13 per cent increase over the local (control). In Guntur district TMV. 5 (A.H. 6481) has given high yield at Gurzala, Narasaraopet and the adjoining taluks and there is a great demand for this new strain in that tract. In the black soil area of the Agricultural Research Station, Siruguppa, TMV 2 strain has given increased yield over the other bunch selections and the local and the actual percentage increase recorded over the local was 36. In the black soils at Kovilnatti though only poor yield was recorded in general, all the bunch selections excepting A.H. 4515 have proved better than TMV. 2. A.H. 4111 an improved selection has given 37 per cent more yield than TMV. 2. There was a heavy demand for seeds of TMV. 2 strain for trial in single crop wet lands after the harvest of paddy. The strain was tried in most of the deltaic areas of the State and in other single crop wet lands wherever facilities existed. In Krishna district, TMV. 2 has given high yields. At Coimbatore TMV. 2 has recorded up to 1,400 lb. of pods per acre in the wet lands. At the Agricultural Research Station, Pattukkottai, the strain has given an acre yield of 1,800 lb. grown under irrigation in the orchard area. The crop raised in rice fallows did not prove a success for want of proper irrigation and due to late sowing of the crop.

B. Gingelly—(i) *General*.—The area sown with gingelly in the Madras State during 1951-52 was estimated at 713,600 acres as compared with the area of 669,800 acres estimated for the corresponding period of last year and

the average area of 672,000 acres during the previous five years. The estimate for the year revealed an increase of 6.5 per cent and for the previous five years 6.2 per cent. The increase in area is mainly due to timely rains at the time of sowings in parts of central districts. An increase in area was estimated in the districts of Srikakulam, Visakhapatnam, Guntur, Bellary, South Arcot, North Arcot, Salem, Coimbatore, Tiruchirappalli and Madurai and a decrease in the other districts of the State. The crop was reported to have been affected by inadequate rains in the growing period in Krishna, and delayed and inadequate rains in the districts of Kurnool, Anantapur, Cuddapah, Nellore, Chittoor, South Arcot and Tanjore. The yield per acre was estimated to be below the normal in all the districts of the State. The total yield was estimated at 78,400 tons compared with the yield of 74,400 tons for the corresponding period of last year and the average yield of 77,100 tons for the previous five years and this represented an increase of 5.4 per cent and 1.7 per cent respectively. The price level of gingelly seed and oil recorded a downward trend and there was a reduction of about 24 to 39 per cent over the previous year.

(ii) *Improved strains*.—There was a good demand for seeds of the improved strains of TMV. 1, TMV. 2 and TMV. 3 evolved in the section both from the different districts of the State and outside. A total quantity of 1,325 lb. of seeds of the improved strains were supplied to the district centres in the State. On account of the consecutive failure of monsoon rains and poor water-supply in the irrigation sources at the Agricultural Research Station, Tindivanam, it was not possible to meet the entire demand of the State during the year.

(iii) *Experiments and research*.—Research on gingelly was continued with the main object of evolving high yielding strains with desirable economic characters like short duration, high oil content, white colour of seed, suitability to different seasons, etc.

(a) *New introductions*.—Five new strains obtained from Bombay, Uttar Pradesh and Madhya Pradesh were raised in small observation plots and studied in detail. The strains from Bombay and Uttar Pradesh appeared promising as they possessed desirable characters like short duration, 4-8 loculed capsules and white seeds. The strains from Madhya Pradesh were of longer duration.

(b) *Cold weather crop*—(1) *Replicated row tests and row tests*.—Forty-one selections were sown under replicated row tests and row tests with the local gingelly as control. Consequent on the failure of rains after sowing the crop was not a success and hence the yields were not comparable. The trial will be repeated during the next season.

(2) *District 'varieties'*.—Twenty-two cold weather varieties and 18 'Pyrus' varieties obtained from different parts of the State were tried in small plots. Twenty-five single plants with certain economic features were selected for further trial.

(3) *Hybridization*.—The F_2 progenies of crosses made during 1950-51 cold weather season were raised along with their parents and studied in detail. Twenty single plant selections with promising economic characters were selected for further observation.

(c) *Summer (Irrigated Crop), 1952*—(i) *Comparative yield tests of selections*.—Two selections from the local gingelly and a variety from Karur were compared with the standard strains TMV. 1, TMV. 3 and local gingelly. The yield differences were not significant. Another series of trial

was conducted to compare four selections from TMV. 1 representing the four seed colour grades, namely, black, dark brown, brown and red brown with the local gingelly and TMV. 1 strain for the fifth time this year. The crop is on the field and the observations are in progress.

(ii) *Preliminary yield tests*.—Two strains from Bombay and Uttar Pradesh and four selections from varieties were tried under preliminary yield tests. On account of the severe summer conditions and failure of irrigation sources the trial was not a success. The observations indicated that the strain from Uttar Pradesh was shorter in duration while the strains from Bombay were of same age as TMV. 2. The trial will be repeated.

(iii) *Replicated row tests and row tests*.—Forty-six selections which showed promising results during the last season were tried with the local gingelly as control under replicated row tests and the crop is under observations. Selfing of select plants in all the varieties was done for maintaining the purity of the selections.

Fifty single plants from progenies of crosses and 25 from varieties selected for their desirable economic characters were sown in single rows with local gingelly as the control. The observations on these are in progress.

(iv) *Seed multiplication of selections*.—Nineteen selections which proved to be high yielders in the previous season were sown in small plots for multiplication of their seed for further trial.

(v) *Hybridization*.—Nine new crosses were attempted this season between selected parents with the following objects:—

- (1) To evolve a high yielding white seeded type,
- (2) to combine all the desirable economic characters in one and the same strain.

The hybrid seeds of these crosses and selfed seeds of the parents were gathered and preserved carefully. The F_1 and F_2 progenies of earlier crosses were raised along with their parents and studied in detail.

(vi) *Maintenance of varieties and types*.—The existing collection of 107 varieties suited to summer conditions and 86 selfed types were raised in small plots. Their morphological characters were described in detail and type plants were selfed in each, and selfed seeds obtained in order to maintain the purity of the 'varieties' and types.

(vii) *Spacing trial*.—The experiment started in 1947-48 with the object of determining the economic spacing to be adopted for the crop was repeated for the fifth time this year. Five spacings, namely, 6 inches by 6 inches, 9 inches by 9 inches, 1 foot by 1 foot, 1½ feet by 1½ feet and 2 feet by 2 feet were adopted. The differences in yield between the different spacings were statistically significant. The spacing of 1 foot by 1 foot has resulted in significant increase in yield over the spacing of 2 feet by 2 feet and 6 inches by 6 inches. The spacing 6 inches by 6 inches has given the lowest yield. The yield difference did not attain the level of significance in two of the previous years' trials while in one year the crop failed. In the first year, the spacing 1 foot by 1 foot gave significantly increased yield over the spacing 1½ feet by 1½ feet and 2 feet by 2 feet. Developmental studies carried out on select plants under each spacing revealed that wider spaced plants have greater height, more number of flowers, higher percentage of setting of capsules and longer duration. Plants in the widest spacing (2 feet by 2 feet) had maximum development of all the characters while those with minimum spacing (6 inches by 6 inches) had the poorest development.

(viii) *Study on the deterioration of gingelly seeds under storage.*—With the object of finding out the effect of storage of gingelly seeds on oil and free fatty acids contents and viability, this experiment was started for the first time this year. Fresh seeds of TMV. 3 gingelly were stored in mud pots, tins, gunny bags and glass bottles after ascertaining the initial germinability of the seeds and the oil and free fatty acids contents. Samples drawn at monthly intervals are being studied to see the nature of deterioration, occurring in the different containers.

(ix) *Time of sowing experiment.*—With a view to determining the optimum period of sowing of gingelly in summer season under irrigated conditions, fortnightly sowings were made commencing from the second fortnight of February 1952 and continued up to the end of May 1952. The first sown crop was healthy and normal and the subsequent sowings were a failure on account of severe summer conditions and inadequate water-supply in the irrigation wells, and the different sowings could not be compared. The experiment will be repeated during next year.

(x) *District trial of improved strains.*—The seeds of the three strains TMV. 1, TMV. 2 and TMV. 3 were distributed in the different districts in the State for trial and seed multiplication. Strain TMV. 3 has given good yield in Musiri taluk of Tiruchirappalli district, Tiruchendur taluk of Tirunelveli district and Parvatipur in Srikakulam district. It has also done well in the rice fallows at Tanjore and Coimbatore. Strain TMV. 1 has given increased yield in Allagadda in Kurnool district. Seeds of all the three strains have again been distributed in the different districts for the purpose of repeating the trials and multiplying the seeds.

C. Castor—(i) *General.*—The area sown with castor in the Madras State during 1951 was estimated at 211,700 acres. Compared with the area of 217,400 acres estimated for the corresponding period of previous year it showed a decrease of 2.6 per cent. The area during 1951 was less than the average area of 231,800 acres for the previous five years ending with 1949-50 by 8.7 per cent. The decrease in area during this year was due largely to failure of rains at the time of sowing. An increase in area was estimated in the districts of Srikakulam, East Godavari, Guntur, Kurnool, Tiruchirappalli and Tirunelveli and a decrease in the area in the other regions of the State except in Visakhapatnam, Krishna, South Arcot, Tanjore, Ramanathapuram and South Kanara districts where the area was the same as that of last year. The crop was affected by inadequate rains and drought in Kurnool, Anantapur, Cuddapah, Chittoor, North Arcot and Coimbatore and by pests in Nellore district. The total yield was estimated at 19,100 tons. Compared with the yield of 20,400 tons estimated for the corresponding period of previous year the present estimate showed a decrease of 6.4 per cent. The estimate for 1951 was less than the average yield of 20,000 tons during the five years ending with 1949-50 by 4.5 per cent. The decrease was mainly due to adverse seasonal conditions. The prices that prevailed during 1951 when compared with those during 1950 showed an increase of 12 to 38 per cent.

(ii) *Improved strains.*—There was more demand for the improved strains of castor seed from the district centres in the State than in last year. A total of 4,137 lb. seeds of the improved strains, namely, TMV. 1, TMV. 2 and TMV. 3 were distributed during the year. The three strains will be multiplied in the zonal nucleus seed farms started in January 1952 under the scheme for large-scale multiplication of improved strains of groundnut and castor, and the growing demand for these strains will be largely met.

(iii) *Experiments and research.*—The research work on castor was continued with the object of evolving strains with high yield, early maturity, high oil content, non-shattering nature of capsules, etc.

(a) *Collection and testing of new varieties.*—The variety obtained from South Africa was of very short duration (4½ months) and this character was taken advantage of in making artificial crosses with the established strains which are of comparatively longer duration (6½ to 8 months). The hybrid seeds of the crosses effected were collected and preserved. This variety which is very short and non-bushy was also tried under closer spacings with a view to working out the economics of its cultivation. The crop was a failure on account of failure of monsoon rains. Another variety received from the Italian Federation of Co-operatives was sown in observation plots. This variety was also of short duration and short stature. It did not appear to be an economic type but seemed to be of use in breeding. Four improved strains from other States were obtained and tried. The strain from Kanpur (Uttar Pradesh) was found to be promising and this will be tried further in the next season.

(b) *Comparative yield tests of selections.*—Eight selections from the progenies of a cross between Namakkal and Kumbakonam varieties and one variety obtained from South Africa were compared with the established strains, namely, TMV. 1, TMV. 2 and TMV. 3 separately in three series. The South African variety gave significantly lower yield for the second time in succession than the standard strains. Hence the trial of this will not be pursued further; but it will be utilized as a basic material for evolving strains with short duration, high yield, non-shattering and non-spiny capsules. Among the eight selections from the progenies of crosses two have given significantly higher yields of 19 per cent and 25 per cent over TMV. 1 which is an established high yielding strain. Five selections out of the eight were observed to be of shorter duration by a month to a month and a half than the standard strains. This is definitely a step in advance in the castor improvement work. The future performance of these selections will be watched with great care.

(c) *Preliminary yield tests.*—Fifteen selections from the progenies of a cross were compared with TMV. 2 strain under preliminary yield tests. Out of these, four selections gave significantly higher yield than the control while others were on par with it. The four high yielding selections were also shorter in duration by a month to a month and a half than the control. Further performance of these selections will be observed with interest.

(d) *Replicated row tests.*—Fourteen short duration selections from the progenies of a cross between 'Namakkal' and 'Kumbakonam' varieties were tested under replicated conditions with TMV. 1 short duration strain. The yield differences were not significant. Still eight other selections which were of shorter duration than TMV. 1 by 3 to 4 weeks have given increased yield over the standard.

(e) *Purity studies.*—Ninety-two selections made from varieties and progenies of a cross between 'Namakkal' and 'Kumbakonam' varieties were sown in single rows for testing their purity and yielding ability. From detailed study of their morphological characters, 37 of them were found to be promising. They will be subjected to further yield tests.

One hundred selections from progenies of crosses and varieties having desirable economic characters were also selected for the purpose of studying their purity and yield during the next season.

(f) *Hybridization*.—Six new crosses were effected between the three established strains, the 'South African' variety and one of the ornamental types of castor with green double bloom stem and yellow capsules, with the following objectives :—

- (1) To reduce the duration of the existing strains,
- (2) to impart distinct colour to the strains for easy identification in ryots field, and
- (3) to study the inheritance of the number of nodes to the first inflorescence.

The hybrid seeds of the crosses along with selfed seeds of the parents were gathered to raise the first generation next season.

The F_1 progenies of five crosses made last season between the same set of varieties and strains were grown and studied with their parents. The duration and the general height of the progenies were intermediate between those of the parents. Selfed seeds of the progenies were gathered for further observation and selection.

(g) *Spacing trials*.—With a view to determining the optimum spacing for the South African variety of castor which is short in stature and in duration, a spacing trial was started with seven spacings ranging from 1 foot by 1 foot to 3 feet by 3 feet. The crop was a failure on account of the drought that prevailed immediately after sowings. The experiment will be repeated during the next season.

(h) *Insecticidal trial for the control of semi-looper pest*.—To find out effective control measures for the semi-looper (*Achaea janata*) pest which is a serious menace to the castor crop an insecticidal trial with lead arsenate, D.D.T. (wettable), Gammexane, etc., was planned. But as the incidence of the pest was usually low the trial was not undertaken. The trial will be conducted during the next year.

(i) *Maintenance of inbred and ornamental types*.—One hundred and thirty-three inbred types isolated from varieties were grown during this season and studied in detail for their morphological characters. Two type plants in each were selfed and the seed material gathered for further propagation and maintenance.

The eight ornamental types of castor evolved were grown and large quantity of selfed seed materials gathered for distribution to the public.

(j) *Maintenance of vigour and purity of strains*.—With the object of maintaining the vigour of purity of the three established strains, namely, TMV. 1, TMV. 2 and TMV. 3 nine outstanding single plant selections from TMV. 1, ten from TMV. 2 and seven from TMV. 3 were grown in isolated blocks and tested under progeny row trials. Three selections from TMV. 1, one from TMV. 2 and three from TMV. 3 recorded increased yields over their respective means. The produce of these selections will be pooled out and utilized for raising the composite blocks of the strains during the next season. From the bulk area of the strains further selections were made for next seasons progeny row trials. By adopting this method of spatial isolation and further selection, the strains appear to have attained a fairly satisfactory standard of purity and vigour.

(k) *Perennial castor*.—There was considerable demand for the seed of the perennial castor strain Co. 1 from many parts of this State and the adjoining States of Travancore and Cochin. Planters from Singampatti, Travancore, Cochin and the Nilgiris indented for seeds of the strains in large

quantities and their requirements were met only to a limited extent. The demand was particularly heavy from the West Coast where this perennial type was found to withstand the heavy rainfall conditions as compared with the annuals.

(l) *District trials of improved strains*.—The seeds of the improved strains of castor, namely, TMV. 1, TMV. 2 and TMV. 3 were tried in many parts of the State during the year. The trials have failed in Chittoor and the Ceded districts on account of adverse seasonal conditions. The strain TMV. 3 gave increased yields in Nellore, Guntur and Krishna districts, TMV. 2, in North and South Arcot and Ramanathapuram districts and TMV. 1 also in Ramanathapuram district. A large quantity of seeds of these strains have again been sent for further trial during the ensuing season.

D. *Coconut*—(i) *General*.—The area under the coconut in the Madras State is about 6.2 lakhs of acres. There was a sudden fall in the prices of coconuts and coconut products to almost half of the ceiling prices prevalent previously. This did not deter the coconut growers from taking up fresh plantations.

(ii) *Experiments and research*.—The main object of research on the coconut is to determine the optimum and economical practices of cultivation and manuring in order to increase the yield of coconut. Investigations on hybrid vigour, exotic varieties and control measures of pests and diseases were also in progress.

(a) *Manurial experiments*.—The manurial dose recommended for coconut trees growing in gravelly laterite and loamy soils consists of $4\frac{1}{2}$ lb. of ammonium sulphate or $13\frac{1}{2}$ lb. of groundnut cake, 30 lb. of ash, 2 lb. of bonemeal and 100 lb. of green leaves per tree, per year. Experiments were in progress to find out the best method of application of these manures. The experiment was started in 1948 with three treatments, viz., applying the manures in circular basins to a radius of 8 feet round the tree and depth of 1 foot, broadcast and ploughing in and in linear trenches 2 feet wide and 1 foot deep. The data gathered so far have not given any significant results.

Potash is the most important manurial requirement of the coconut. Applied in the form of ash in addition to ammonium sulphate and green leaves, this has proved beneficial to the coconut. But ash being in short supply it has to be substituted by other potassic manures. In the experiment to find out a suitable substitute for ash, two inorganic fertilisers, viz., potassium sulphate and muriate of potash were compared with ash, applied on equivalent potash basis. The treatments were given only in 1951 and it is too early to assess the effect of the treatments.

(b) *Cultural experiments*.—Regular cultivation besides adequate manuring has been found to be indispensable to improve and maintain the yield of the coconut gardens at a satisfactory level. The usual cultivation given to coconut gardens is either ploughing or digging with mamuti. In 1942, an experiment was started to compare the effect of ploughing the garden with digging with mamuti and also to determine the optimum number of ploughings required to get good yields. No significant differences in yield of nuts due to the treatments were noticed during the year as in the previous years. Plots dug with mamuti had less of weed growth.

The experiment started in 1948 to find out the correct depth to which coconut gardens have to be cultivated was continued. Three different depths of cultivation, viz., 4 inches, 5 inches and 6 inches are under trial. The differences in yield due to the treatments did not yet attain the level of significance.

(c) *Trial of green manure crops.*—Coconut soils of the West Coast are deficient in organic matter and the easiest way of augmenting it is to grow and incorporate into the soil a green manure crop every year. Trials were conducted with several new, green manure crops to spot out the best suited one. Of the many crops tried, *Crotalaria striata* proved to be the best. *Hyptis suaveolens*, a local herbaceous weed was found to give high acre yield of green stuff in laterite gravelly soils but could not withstand the heavy rains in the seedling stage.

Observations on the introduced green manure crops like *Pueraria phaseoloides*, *Calopogonium mucunoides*, *Centrosema pubescens*, were continued during the year. Of these *Pueraria phaseoloides* came up well in the red loamy soils, and in the sandy soils.

(d) *Seedrate trials with Crotalaria striata.*—To determine the optimum seedrate of *Crotalaria striata* to be used to get the maximum quantity of green stuff, trials with seedrates of 1 lb., 5 lb., 10 lb., 20 lb. and 40 lb. per acre were carried out. The germination of the seeds was satisfactory, but the stand was poor due to the heavy rains soon after germination of the seeds; at Nileswhar III, while 20 lb. seed rate gave good yields at Nileswhar II.

(e) *Subsidiary crops for coconut gardens.*—Crops like dry paddy, tapioca, elephant yam, cotton, turmeric, ginger and pineapple were grown in the shade of the coconut trees. The object of the trial is to spot out crops that will come up well and give the maximum profit. During the year elephant yam gave the maximum money return per acre. As in the previous year tapioca and pineapple were attacked by wild boars and consequently their yields were reduced.

(f) *Button shedding.*—The effect of planofix in reducing the shedding of buttons was under trial during the year. The chemical was not found to be effective.

(g) *Coconut varieties suited for cultivation in low lying areas.*—Nine selected 'varieties' of the coconut were planted in a low lying area at the Pilicode station in 1947, to find out the 'varieties' best suited to be grown in lowlying areas subject to water stagnation during the south-west monsoon months. The observations on these seedlings were continued during the year. Java, Philippines, Fiji, Tall × Dwarf and Laccadive ordinary were found to be more vigorous than the rest, judged by the values of the vegetative characters of the young palms.

(h) *Coconut breeding.*—With a view to producing superior forms of the coconut by hybridization, a number of intra and inter-varietal crosses had been effected in previous years and the seedlings were planted out to study their performance. Of these, the progenies of Tall × Dwarf crosses which were found to be early bearing with good nut and copra characters, continued to give satisfactory performance. Among intra-varietal crosses, combinations involving high female flower production and high yield and large size of nut were found promising. Progenies from low yielding groups and selfed progenies continued to exhibit poor vigour. Fresh crosses between the West Coast Tall and Dwarf varieties and between Andaman ordinary and Straits of Settlements were effected during the year. A total of 424 inflorescences of the former and 20 of the latter were cross pollinated during the year.

(i) *F₂ progenies of Tall × Dwarf crosses.*—In order to study the performance of the F₂ progenies of the Tall × Dwarf crosses, 140 progenies from 10 selected parent trees (Tall × Dwarf) at Nileswhar were planted in 1950 at the Pilicode Station. Their economic characters will be judged as they grow up.

(j) *Depth of planting.*—The object of this experiment is to find out the proper depth of planting coconut in the littoral sandy soils. Seedlings were planted in pits 3 feet and 6 feet deep respectively in 1939 and observations were made on growth of the seedlings. There were no significant differences in the growth due to the treatments.

(k) *Copra and oil studies of nuts from Tall × Dwarf progenies.*—The yield of nuts from the Tall × Dwarf progenies was satisfactory. The object of these studies is to compare the quality and quantity of copra and oil from these nuts with those of the West Coast Tall variety. The data gathered during the year showed that the quality and quantity of copra and oil from the Tall × Dwarf progenies compared favourably with those of the West Coast Tall.

(l) *Watering experiments.*—The effect of pot-watering the coconut trees in sandy soils during summer months on the yield of trees has been studied in these experiments started in 1945. The beneficial effect of the treatment was first seen in 1949 when the watered trees showed an increase in the number of functioning leaves over the control trees. The data gathered during the year were in favour of the watered trees, only in respect of the number of functioning leaves and the rate of leaf production, whereas in the previous year, there were marked differences in favour of treated trees in respect of yield and female flower production also.

A similar trial was started in red loamy soil at Nileswhar II in 1950. The observations made during the year 1951, tended to be in favour of watered trees.

(m) *Underplanting in a poor plantation in sandy soil.*—Coconut trees planted at the surface of soil in 1918 had not yet come to normal bearing in spite of the best attention paid to them. Therefore a trial was started in 1948 to underplant the area with selected seedlings in 2 feet and 3 feet deep pits. The growth of both the groups of seedlings is satisfactory at present. Observations on the growth of seedlings are in progress.

(n) *Study of exotic varieties and forms.*—The study of exotic varieties and forms was continued. Forms Laccadive ordinary, Andaman ordinary, Laccadive small and Philippines were found promising.

(o) *Study of the deterioration of coconut oil in storage.*—The object of this investigation was to determine the influence of factors like nature of the container, addition of salt or jaggery, preheating, etc., on the deterioration of the oil on storage. The experiment conducted during 1949-50 have shown that (i) the free fatty acids content remained at a low level in the oil which was given a preliminary heating before storage, for about one and a half years and then showed an increase.

(ii) Addition of salt kept down the free fatty acids content of the oil for about an year.

(iii) Jaggery showed no protective influence. On the contrary the free fatty acids content increased rapidly.

(iv) Among the bottles of different tints, the oil kept in dark red bottle showed greater deterioration than the others.

To confirm the above findings, a fresh set of oil samples were kept in bottles of different tints of colour and in aluminium and tin containers. Samples of oil are drawn periodically and analysed for free fatty acids content.

(p) *Miscellaneous trials*—(1) *Study of germinating nut*.—The study of the changes taking place in the kernel and the development of roots and leaves as the nut germinates and grows into seedling was started in 1950 and is in progress. Seedlings are being removed every month from the nursery commencing from germination and studied for seedling and kernel characters. The data will be examined when the study is completed.

(2) *Inheritance of characters in the coconut*.—Preliminary observations on the inheritance of characters, viz., size and shape of the nut and thickness of kernel have been taken up and are in progress.

(3) *Incidence of rhinoceros beetle attack*.—The data gathered during the year on this aspect confirmed the previous years' findings, viz., that the attack is maximum during the summer months and that the exotic varieties are more susceptible to the attack than the West Coast tall variety.

(4) *Assessing loss due to beetle attack*.—The experiment initiated in 1949 to assess the extent of loss in yield of nuts due to the attack by the rhinoceros beetle was continued. One set of coconut trees was kept rigorously free from beetle attack by regular search while a second set was left without search as control.

The data gathered during the past three years were examined but the data were found insufficient to assess the true extent of loss due to beetle attack, as the yields of both the sets of trees were poor during 1951.

(5) *Experiments to control rhinoceros beetle*.—Rhinoceros beetle is a serious pest on the coconut. The control measure now advocated, viz., to search for, remove and kill the beetles regularly is a laborious and costly operation. Therefore, experiments were conducted to find out whether spraying the crowns of trees with Guesarol 550 is effective in controlling the pest. Twenty-five trees were sprayed at weekly intervals while an equal number of trees was left untreated as control. Beetle counts taken on the two sets of trees revealed that the chemical was effective in reducing the incidence of the beetle attack, though it could not completely prevent the attack.

(6) *Crotalaria viability studies*.—Seeds of *crotalaria striata* were stored in gunny bags and screw capped bottles and samples of seeds drawn from each tested for their germination capacity every month. The experiment was started in November 1950. The data gathered during the year showed the following:—

(i) The germination capacity declined steadily but it was more rapid in the case of seeds stored in gunny.

(ii) At the end of a period of storage of 20 months the germination capacity of seeds kept in gunny bag and screw capped bottles declined to 2 per cent and 36 per cent respectively from an initial germination capacity of 71 per cent.

6. *Other oilseed crops*—(i) *Cashew nuts*.—The study of the various problems such as manurial requirements, vegetative propagation, study of the yield of trees in relation to other fruit characters, etc., relating to cashewnut which were hitherto carried out in this section was discontinued from this year as per the decision of the Research Council and consequent on the sanctioning of a separate scheme for the improvement of the crop. However, from the established trees in the Coconut Research Stations, Pilicode, Nileshtar I

and Nileshtar II and at the Agricultural Research Station, Taliparamba, good seed nuts were collected and the growing demand for its seeds was met. A total quantity of 1,751 lb. of seeds of good quality were supplied to the various District Officers of the State.

(ii) *Sunflower*.—Ten varieties of sunflower received from Australia, Hungary and Italy through the kind courtesy of the Indian Central Oilseeds Committee, New Delhi, two varieties available with the Superintendent, Central Farm, Coimbatore, and one variety obtained from the Nilgiris were tried under observation plots during the year. Their morphological characters were studied in detail and the yield of grain recorded. The two varieties from Hungary were the earliest to come to harvest (80 days) while the two local varieties and the one from the Nilgiris were found to be of longer duration (105 to 120 days). The local variety with many heads in the axils and the variety 'sunrise' from Australia gave more yield of grain than the local (mixed giant). Selfed seeds of all the varieties were obtained for further trial during the next season. Both the varieties from Coimbatore and the variety 'annua' from Italy were found to give the highest oil content. (32.4 per cent to 34 per cent.)

(iii) *Linseed*.—Two linseed varieties N.P. 68 and K. 2 Punjab received from the Indian Council of Agricultural Research and Linseed Breeding Station, Nagrota (Bagwan), respectively were tried at Coimbatore and at eight agricultural research stations in the State with a view to finding out the best yielding variety of linseed and thus popularising its cultivation in the State. The results varied widely owing to failure of seasonal rains in most of the centres. The variety N.P. 68 gave maximum yield of 491 lb. of seed per acre at the Agricultural Research Station, Siruguppa, and K.2 Punjab gave a maximum of 212 lb. per acre at Coimbatore. As both the varieties were not tried under identical conditions at the same time the above observational trial will be repeated in all the stations during the next season along with the three new varieties IPI.6, IPI.11 and IPI.65 received from the Director, Indian Plant Institute, Indore, during this year.

(iv) *Safflower*.—With the object of introducing the cultivation of safflower in different parts of the State and finding out a suitable high yielding strain, five of the safflower types obtained from Hagari were tried at the Agricultural Research Station, Kovilpatti and at Coimbatore. The variety C.T.68 was found to be a heavy yielder in the 1951 season at the Agricultural Research Station, Kovilpatti. At Coimbatore the types C.T.63 and C.T.68 recorded high yields. These types are proposed to be sown again at the two centres under comparative yield tests.

(v) *Niger*.—In order to see whether niger crop comes up well in this tract, seeds obtained from the Special District Agricultural Officer, Arakku Valley, were tried. The seeds failed to germinate. Fresh seed material from different parts of the State have been collected for further trial.

(vi) *Rape seed*.—With the object of finding out the suitability of the variety in the Nilgiris, two pounds of rape seeds received from the Italian Federation of Co-operatives through the Head of the Division of Botany, Indian Agricultural Research Institute, New Delhi, were tried at the Agricultural Research Station, Nanjanad. The seeds in the first two sowings did not germinate on account of the failure of rains. But the seeds sown for the third time in the middle of March 1952 sprouted well and the crop is making progress. The plants have developed pods. Further progress is being watched with interest.

(vii) *Oilpalm*.—The African oilpalms growing at the Coconut Research Stations were continued to be observed for their morphological and other characters. The trees are being maintained by manuring with ash and ammonium sulphate. Sandy soil is not suitable for this palm.

(viii) *Strychnos innocua*.—Five pounds of seeds of *Strychnos innocua* (an oil seed) were obtained from the Union of South Africa and sown at eleven Agricultural Research Stations and at Coimbatore. The seeds failed to germinate. Repeated sowings with the available seeds were attempted but without success. The seeds were subjected to the various tests by the Plant Physiologist, Coimbatore and were declared to have lost their viability. Attempts were being made to obtain fresh supplies from South Africa.

(ix) *Oysternut or Kweme nut*.—In the course of study of literature during this year a reference about the Oysternut or the Kweme nut was met which is grown largely in Rhodesia. (*Telfairia pedata*, Hook). It is a tall climber of perennial habit giving an average of about 62 per cent to 66 per cent of edible oil. The nuts are edible.

Fifteen seeds of this nut were obtained from the Secretary, Indian Council of Agricultural Research, New Delhi. The seeds will be tried at the Agricultural Research Station, Nileshwar, Tindivanam and at Coimbatore.

7. *Miscellaneous crops*—(i) *Doum Palm*.—Observations on the progress of the seedlings of the Doum Palm (*Hyphaene thebaica* and *H. Boriceaxe*) transplanted in the field at Coimbatore and at Tindivanam were continued. The seedlings have established well at Tindivanam and the growth was vigorous during the year. At Coimbatore, the growth was rather slow and the seedlings are somewhat stunted.

(ii) *Vegetables*.—Eight varieties of bitter gourd from Kumbakonam, Aduthurai, Bangalore, Nandyal, Coimbatore and Poona were tried. The varieties from Aduthurai and Bangalore gave good yield and proved early. Other vegetables like Bendai, brinjal, ashgourd, pumpkin, snakegourd, etc., were raised and large quantity of seeds were collected and distributed.

(iii) *Redgram varietal trials*.—The short duration variety from Tenkasi was grown side by side with the local variety. The Tenkasi variety gave very poor yields but it maintained its earliness as compared with the local.

(iv) *Sweet potato*.—Four varieties, B.55, V.12, V.10 and V.8 of sweet potato were tried and the variety V.8 gave the highest yield of 14,000 lb. of tubers and 10,572 lb. of vines per acre.

(v) *Cacao*.—Twenty-four cacao plants were planted in October 1951 at the Coconut Research Station, Pilicode, and observations on growth were made. The plants have established well but the growth is rather slow.

(vi) *Pepper*.—At the Coconut Station, Pilicode, 500 pepper cuttings were planted using coconut palms as the standard. The cuttings have sprouted well. They will be observed for their growth under the shade of the coconut.

(vii) *Cotton*.—Observations on the growth of Sea-island and perennial cottons grown at the Agricultural Research Station, Pilicode, Nileshwar II and Nileshwar III, were made. Among the three perennial cottons 'moco' was found to give the best yield. The Sea-island cotton as a seed sown crop was compared with transplanted crop. It was observed that the transplanted crop commenced flowering a month earlier and gave better yield than the seed sown crop. The variety 'Vincent' gave higher yield of Kappas than the variety—'Monte Serrafe'.

(viii) *Subterranean clover*.—Three varieties of subterranean clover (*Trifolium subterraneum*) were tried at eight centres in the State including Coimbatore. Germination and growth were good in A.C.C. 334. But the plants did not flower and fruit even after a period of five months from the date of sowing at Coimbatore. The plants dried up after that period. Even at the other centres they did not come up well.

(ix) *Indigofera teysmanii*.—Seeds of *Indigofera teysmanii* received from the Systematic Botanist, Coimbatore, were sown. Very low germination was recorded. The sprouts did not develop further but wilted and died probably due to the severe summer conditions that prevailed at the sowing time. Further sowing of the seeds will be attempted after the receipt of monsoon rains and their progress watched.

8. *Oil analyses*.—Samples of groundnut, gingelly, castor and copra drawn from the produce of different experiments were analysed for their oil and free fatty acids contents. In all 285 samples of oilseeds and oils were analysed during the year.

9. *Miscellaneous*—(i) *Advisory work*.—A large number of enquiries on the cultivation and utilization of oilseeds were received and replied to. Of late, this item of work has increased considerably. However, every enquiry was promptly attended to with difficulty on account of the meagre staff at the headquarters.

(ii) *Exhibition*.—Exhibits of all oilseed crops were sent to the various exhibitions held throughout the State during the year. The most important exhibition in which the section displayed number of exhibits with self-explanatory and attractive charts was the Park Fair Exhibition held in Madras during December-January 1952.

(iii) *Committees and meetings*.—On behalf of the Director of Agriculture, Madras, I attended the meetings of the fifth annual general and ninth ordinary meeting of the Indian Central Oilseeds Committee at New Delhi during March 1952 and attended the various meetings of Research Council, Estate Committee, Plant Breeding Sub-committee, Perennial Crops Sub-committee meetings and study group meetings held at Coimbatore.

10. *Lecture*.—At the invitation of the Syndicate of the University of Madras, Sri G. Venkatanarayana, Oilseeds Specialist, Coimbatore, delivered two lectures under the auspices of the Maharajah of Travancore Curzon Endowment lectures in agriculture for the year 1951-52 on "Groundnut and its importance in the Madras State," on 21st and 22nd January 1952. These lectures were published in the Madras Agricultural Journal with the permission of the Registrar of the Madras University.

11. *Publications*.—The following papers were prepared during the year. They are awaiting publication :—

- (i) Groundnut Rotation Experiments.
- (ii) Growth and Development in the groundnut varieties and forms.
- (iii) Ontogeny of the coconut leaf.
- (iv) A gigas form of the coconut.

Besides these, notes were published from time to time in the *News Letter*, *Mezhi Chelvam* and *The Villagers' Calendar*.

12. *Seed distribution.*—The following quantities of improved seeds and seedlings were distributed by the section during the year:—

Groundnut pods	...	...	...	...	35,000 lb.
Groundnut kernels	...	...	...	...	244 „
Gingelly seeds	...	...	...	...	1,325 „
Castor seeds	...	...	...	...	4,137 „
Cashewnut seeds	...	...	...	...	1,751 „
Coconut seedlings	...	...	...	...	163,390 Nos.

13. *Inspection.*—The following offices were inspected by the Oilseeds Specialist, during the year:—

(i) Office of the Assistant Botanist (Cardamom Specialist), Singampatti Group.

(ii) Office of the Coconut Nursery Assistant, Agricultural Research Station, Pattambi.

(iii) Office of the Coconut Nursery Assistant, Agricultural Research Station, Pattukkottai.

(iv) Office of the Coconut Nursery Assistant, Agricultural Research Station, Marudur.

(v) Office of the Coconut Nursery Assistant, Agricultural Research Station, Tindivanam.

(vi) Office of the Superintendent, Agricultural Research Station, Tindivanam.

G. V. NARAYANA,

Oilseeds Specialist and Vice-Principal.

AGRICULTURAL COLLEGE AND RESEARCH INSTITUTE,
LAWLEY ROAD P.O.,
2nd August 1952.

APPENDIX I.

SUMMARY OF RESULTS OF PRACTICAL IMPORTANCE ACHIEVED IN THE OIL SEEDS SECTION DURING 1951-52.

Research work on the important oilseeds 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. The achievements of the section during the year which are of practical importance to the ryots are the following:—

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 significant increase in yield over the local.

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' 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. This trial however requires further confirmation.

A curved *guntaka* blade six feet long switched 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. Therefore, the cultivators who have large holdings and who find very difficult to get enough labour during harvest time may, with great advantage, use this implement.

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 very satisfactorily. With this machine the produce from an area of 10 acres could be stripped and cleaned in a day of about eight hours. Therefore, this implement also may be made use of by cultivators growing groundnut over a large area.

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 trial of spraying Bordeaux mixture, and dusted thrice with sulphur at 15 lb. per acre. 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 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 selection A.H. 4111/A.H. 4215 and A.H. 6481 proved successful giving increased yields over a 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, Pattukkottai in Tanjore district and at Coimbatore. The results of these trials are good indications which can be easily taken advantage of to popularise these strains.

All the four strains evolved in the section were multiplied and a total quantity of 35,000 lb. of pods and 244 lb. of kernels were distributed in the districts. In order to meet the demand of the State five more nucleus seed farms were started in different parts of the State.

2. *Gingelly*.—Among the several cultures obtained from various States, the strain from Uttar Pradesh proved earlier than TMV. 2 a strain with short duration 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' x 1' for the crop grown under irrigation was found to be optimum. Hence the crop when sown broadcasted may be thinned a spacing of 1' x 1'. If plants are crowded or 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 Allagada in Kurnool district and TMV. 3 in Musiri taluk of Tiruchirappalli district and in Parvathipur of Sriakulam district. The strains TMV. 1 and TMV. 3 can be grown in these tracts with profit.

During the year a total quantity of 1,325 lb. of seeds of these strains were distributed.

3. *Castor*.—The variety obtained from the Italian Federation of Cooperatives and the variety from South Africa were found to be of very short duration (4½ months). They were utilised for evolving high yielding short duration types. Among the selections tried two gave significantly higher yields of 19 per cent and 25 per cent over the standard strains TMV. 2. 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.

A total quantity of 4,137 lb. of seeds of the improved strains of castor were supplied to different parts of the State for trial and seed multiplication. There was a great demand for the strain of perennial or tree castor particularly from the plantation area of the Nilgiris and from the West Coast as it was found to withstand heavy rainfall.

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. Trials on the optimum method of cultivation of coconut gardens showed that ploughing thrice was more economical than digging once, though the effect on the yield of both the treatments was more or less the same.

(b) *Increasing the humus content of soil—Crotalaria striata*.—Which is being recommended as a suitable green manure crop for coconut gardens on the West Coast continued to give the best performance among the various crops tried. The ryots are advised to grow this green manure in their coconut gardens and cut and incorporate it into the soil, when they are three to four 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 without affecting the yield of the latter. Growing of this subsidiary crop will be a source of additional income to the coconut grower.

(d) *Coconut breeding*.—Progency palms of Tall x Dwarf crosses, continued to give good yields. The oil content and other economic characters compared favourably with that of the superior Tallparent. The seedlings of Tall x Dwarf crosses have been in great demand and their superiority is further borne out by this fact. For large scale production of these seedlings 386 inflorescences of the Tallmother palm were pollinated with Dwarf pollen to get hybrid nuts.

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

(f) *Watering the coconut*.—Pot watering the coconut during the rainless summer months has 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 or watering facilities.

(g) *Exotic varieties*.—Laccadive ordinary, Laccadive small, Andaman ordinary and Phillippines 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 550 at weekly intervals was found to be effective in reducing the incidence and damage by this pest.

(i) *Supply of quality seedlings*.—In order to realize economical returns from the coconut, it is very necessary that seed material of good quality is used for planting. With the object of eliminating the possibility of coconut growers planting inferior seedlings, a total of 163,390 selected seedlings were supplied to the public at the rate of annas 8 each, from the nine coconut nurseries in the State. The ryots are advised to go in for these quality seedlings supplied by the department.

APPENDIX II.

SUMMARY OF RESULTS ACHIEVED DURING 1951-52 IN EACH OF THE AGRICULTURAL RESEARCH STATIONS UNDER THE CONTROL OF THE OILSEEDS SPECIALIST.

1. *I. Research schemes*.—The following schemes of research on oilseeds were worked at the station during the year:—

(1) *Scheme for the large scale trials with insecticides and fungicides for the control of Surul pest, and Tikka leaf spot disease of groundnut crop*.—This two-year scheme was started on the 1st July 1951. The results achieved are the following:—

(i) *Surul control—Large scale trials with D.D.T. 5 per cent dust*.—Assessment of the intensity of 'Surul' attack revealed that there was considerable reduction of infestation in the dusted plots and that the percentage of reduction increased with the number of dustings given. The reduction in the pest attack was well reflected in the increased yield of the dusted plots. Dusting the crop twice with 5 per cent D.D.T. at the rate of 20 lb. per acre was found to give remunerative returns.

(ii) *Surul control*.—Comparison of D.D.T. and B.H.C. at varying strengths and as dust: The infestation of *Surul* was significantly less in all the treated plots compared with the untreated plots. Increased yields were obtained in case of the treatments 5 per cent D.D.T. dusted thrice, 10 per cent B.H.C. dusted twice and 4 per cent D.D.T. dusted once. The insecticides when applied as sprayer were not effective in reducing the intensity of the attack nor was there any significant increase in yield of the crop due to the treatment.

(iii) *Tikka control*.—Large scale trials with Bordeaux mixture and sulphur.—Assessment of 'Tikka' infection before and after spraying did not disclose any effect in favour of the treatments. The maximum yield was recorded in the plots wherein Bordeaux mixture was sprayed twice. When the economics of the sprayings were worked it was found that spraying B.M. $\frac{3}{4}$ per cent twice was most remunerative.

The reduction in the infection of *Tikka* due to the dusting of sulphur was not pronounced. The sulphur dusted plots recorded higher yields than the untreated plots. All the treatments were remunerative and maximum return was obtained by dusting three times.

(2) *Scheme for the multiplication of improved strains of groundnut*.—The scheme was continued as in previous year till 31st December 1931 after which date it merged into the Zonal Nucleus Seed Farms Scheme sanctioned in G.O. No. 1082, Food and Agriculture Department, dated 25th May 1951. During the period a total quantity of 11,347 lb. of seeds of improved strains of groundnut were produced for large scale distribution in the districts.

(3) *Scheme for the multiplication of improved strains of gingelly*.—This scheme was continued on the original basis as in previous years and a total quantity of 1,100 lb. of seeds of the three improved strains were produced and distributed.

(4) *The Comprehensive Scheme for the establishment of Government coconut nurseries on the important districts of the Madras State*.—One of the coconut nurseries under this scheme is located at this Research Station. During this year a total number of 4,552 selected coconut seedlings were produced and distributed.

II. *Results achieved on the station*.—(a) *Comparative trial of selections*.—Three bunch strains one each from Bombay, Madhya Pradesh and Mysore were compared with TMV. 2 strain. The strain from Mysore yielded significantly less than the other two which were on a par with TMV. 2 strain. Two spreading strains one from Kanpur (Uttar Pradesh) and the other from Punjab and fourteen selections were compared with the standard strains and the local spreading groundnut. Six selections were found to be better than the local groundnut. The strain from other states were not in any way better than all the local strains and their quality was decidedly poor.

(b) *Preliminary yield trials*.—Four bunch and nine spreading selections were put under preliminary yield trials in two separate series. In the bunch series the yield differences were not significant. In the spreading series seven selections were superior to the local.

(c) *Seed multiplication of selections*.—Six bunch and 49 spreading selections were multiplied in small plots and studied based on the performance and qualitative characters, five bunch and seventeen spreading selections have been selected for further trials.

(d) *Replicated row tests*.—Fourteen bunch and five spreading selections were compared with TMV. 2 and A.H. 1 respectively under replicated conditions. One bunch and twenty spreading selections gave significantly higher yields than the respective controls.

(e) *Row tests*.—Out of nine bunch and 36 spreading selections under row tests five bunch and nineteen spreading selections out yielded their adjacent controls.

(f) *Hybridization*.—Twenty-four new crosses were attempted between selected parents with the objections of (i) evolving a white seeded strain, (ii) improving the quality of TMV. 1 strain and (iii) evolving a dormant bunch strain. The F₁, F₂ and F₃ progenies of earlier crosses were raised along with their parents and studied in detail. Twenty-four single plants combining desirable characters were selected from them for further work.

(g) *Cultural experiment*.—The experiment started in 1948-49 to find out the optimum cultivation practices to be adopted for the groundnut crop was continued for the fourth time this year. The differences in yield between the nine tillage treatments tried were not statistically significant.

(h) *Rotation experiment*.—The rotation experiment was continued for the seventh successive year in the same yield. The difference in yield of groundnut following groundnut and groundnut following other cereals was not statistically significant. As in previous years the cereals following a crop of groundnut yield better than the cereals following cereals.

(i) *Manurial experiment*.—The manurial experiment was conducted for the fourth time this year with the object of determining the economic dose of potash and phosphoric acid required for the groundnut crop. The differences in yield between the treatments were statistically significant. Combination of cattle manure, potash and phosphoric acid has given higher yields, the beneficial effect of cattle manure has also been brought out.

(j) *Groundnut and cotton mixed cropping experiment*.—The cotton varieties, Co. 2, Co. 4, B. 40 and 881 F were tried and sowings of cotton were done at the time of sowing groundnut and at the time of first hoeing and weeding of the groundnut crop. It was found that cotton sown at the time of weeding did not come up well and in certain plots it was a complete failure. As the stand of cotton crop was very poor and uneven the data obtained were erratic.

(k) *New introductions*.—Fifty-four new varieties received during 1950-51 rained season and ten varieties received this year from the Head of the Division of Botany were raised in observation plots and studied in detail. One hundred and fifty-three single plants were selected from the promising varieties. Twenty-eight varieties received late in the year nine raised during the early summer season under irrigated conditions.

(l) *Mixed cropping of groundnut with cotton*.—The cotton crop that was sown on the day of sowing groundnut gave better yield than the cotton crop sown at the time of first hoeing and weeding of groundnut.

(m) *Mechanical cultivation of groundnut*.—(i) *Harvest*.—Mechanical harvest of groundnut was tried during the year with the object of reducing the time and labour involved in the operation. A curved guntaka blade six feet long switched behind a 'John Deere' tractor was utilised for lifting the plants. The working of the implement was satisfactory and it was found to be economical as it cost Rs. 3-12-6 against Rs. 5-13-0 for executing the same work with bullock drawn implements. The implement proved effective and efficient even when the soil was hard under which condition the local methods of harvest could not be of any use.

(ii) *Picking*.—The Ransomes Peanut Picker (Minor) worked with the oil engine was tried with a new set of closely pitched drum and concave sent by the manufactures for stripping pods from vines and cleaning. It was satisfactory and the percentages of unpicked pods was only eight. With this machine, it was observed that the vines from an area of 10 acres could be stripped in a working day of eight hours.

2. *Gingelly—1952—Summer*.—(a) *Preliminary yield trials*.—Two strains obtained from the States of Uttar Pradesh and Bombay were under preliminary yield trials along with local, TMV. 1 and TMV. 3 gingelly. The strains appeared to be more suited to cold weather season.

(b) *Seed multiplication of selections.*—Nineteen selections were multiplied in small plots during the season for getting sufficient seed material for further trials. One row in each of the selections was selfed to main purity.

(c) *Hybridization.*—Nine new crosses were effected this season with the objects of (i) evolving a white seeded type and (ii) combining all the desirable characters in one and the same type. F₁, F₂, progenies of earlier crosses were raised along with their parents and studied.

(d) *Spacing trial.*—Slight increase in growth and flowering was noticed in the wider spaced plants.

(e) *Maintenance of varieties and types.*—The entire collection of gingelly varieties and selfed types were raised in small plots and studied in detail. Off-types were removed and all the types were selfed to maintain purity.

3. *Castor*—(a) *Comparative yield trials.*—Eight selections from progenies of crosses were compared with TMV. 1 and TMV. 2 strains in two series of comparative yield trials. Three selections were found to be on a par with the TMV. 2 strain and better than TMV. 1. In a third series the South African variety of castor was compared with the three standard strains and was found to be a very poor yielder.

(b) *Preliminary yield trial.*—Fifteen selections from progenies of crosses were compared with TMV. 2 castor in three row plots. Four selections gave significantly higher yields than the control TMV. 2.

(c) *Replicated row test.*—Fourteen selections were put under replicated row tests along with TMV. 1 strain. The differences in yield between the selections were not significant.

(d) *Purity studies.*—Ninety-two selections were sown in single rows and studied for all characters. Thirty-seven selections with desirable characters were made.

(e) *Hybridization.*—Six new crosses were effected between selected parents with the following objects—

- (1) to reduce the duration of the strains;
- (2) to impart distinct colour to the strains; and
- (3) to study the inheritance of certain characters.

The F₁, F₂ and F₃ progenies were raised and studied. Thirty single plant selections were made.

(f) *Maintenance of vigour of strains.*—Nine selections from TMV. 1, ten from TMV. 2 and seven from TMV. 3 were put under progeny row tests. Out of them three selections from TMV. 1, one from TMV. 2 and 3 from TMV. 3 recorded increased yield. The produce of the selections was pooled to raise bulk crop next season. Outstanding plants were again selected for further trials.

4. *Seed distribution.*—The following seed materials were distributed during the year:—

Groundnut pods	...	...	...	...	33,609
Groundnut kernels	...	...	...	...	275
Gingelly seeds	...	...	...	...	1,325
Castor seeds	...	...	...	...	2,724

A. Agricultural Research Station, Pilicode.

1. *Coconut*—(i) *Methods of application of manures.*—The yield and leaf production data of 1951 did not show significant differences in the characters due to the application of manure in basins round the trees in linear trenches or by applying it broadcast over the entire area in the gravelly laterite soils.

(ii) *Cultural experiments.*—The experiments started in 1942 by digging the garden and ploughing it, did not yield conclusive results so far to indicate the usefulness of digging over ploughing the garden or the optimum number of ploughings required for a coconut garden.

(iii) *Subsidiary crop trials.*—Elephant yam when grown in the shade of coconut gave the maximum calculated gross return. Tapioca, pine-apple, turmeric and also paddy are the other crops which could be raised as subsidiary crops in the shade of coconut with advantage. As in the previous year tapioca and pine-apple were attacked by wild board and consequently then yields were reduced.

(iv) *Varieties of coconuts.*—Laccadive, Andaman and Phillippines are promising economic palms among the exotic varieties. Among the State varieties the performance of Tanjore variety was quite outstanding.

(v) *Coconut breeding.*—A total of 386 inflorescences of selected talknother parents were cross pollinated with Dwarf. About 2,000 pollinated nuts are expected to be available for harvest in 1953 season. Also 898 hybrid seed coconuts of the Tall x Dwarf pollinated during the previous year were harvested for raising seedlings.

II. *Miscellaneous crops*—(i) *Food crops.*—Dry paddy, sweet potato, redgram paddy, tapioca, groundnut, castor, new era, cowpea and vegetables were grown in 1951 as subsidiary crops in the shade of coconut with a view to increasing the revenue of the station.

(ii) *Fodder crops.*—During the year under report 3,500 lb. of hay and 8,530 lb. of silage were made at the station and fed to cattle.

(iii) *Seed supply.*—The following seeds and seed materials were distributed:—

					Nos.
Malta lemon	...	...	...	...	1,127
Thin Napier grass seeds	...	...	...	...	10 lb.
					Nos.
Thin Napier grass slips	...	...	...	...	16,300
Seed coconuts	...	...	...	...	1,093
Pollinated nuts	...	...	...	...	943
Coconut seedlings	...	...	...	...	4
Redgram seed	...	...	...	...	2 lb.
Cashew seeds	...	...	...	...	4

B. Agricultural Research Station, Nilesghwar II.

1. *Coconut*—(a) *Hybridization in coconut.*—(i) Study of the progenies of intra-varietal crosses among the fine character combinations were continued. The progenies of the following character combinations were found promising:—

- (1) High female flower production x high yield.
- (2) Large size x high female flower production.

(ii) The progenies of crosses between parents having characters-maximum setting percentage and high female flower production and *vice versa* were observed for their vegetative characters and yields. It was found that the progenies of high setting and high female flower production were better than the reciprocal courses.

(iii) The progenies of crosses between high yielding irregular bearers and regular bearers were found to be poor performers.

(iv) The performance of the progenies of the Tall x Dwarf cross was found to be good.

(b) *Method of pollination and vigour of progenies.*—The performance of the crossed progenies was found to be better than the natural and selfed progenies, the selfed progenies were the least vigorous.

(c) *Study of cross, self and natural progenies of parents of different yield groups.*—The progenies of six yield groups obtained by self, natural and cross pollination, planted in 1942 were observed for their vegetative characters and yields. As in the previous years the indications were that the seedlings obtained

from low-yielding parents, particularly those yielding 40 nuts and below per tree, per year were less vigorous than those from higher yielding parents. It was noticed that the seedlings obtained by self pollination were less vigorous than either crosses or naturals.

(d) *Progress of exotic variety crosses.*—(i) Progenies of inter-varietal crosses among exotic varieties were the cross between strait settlements x Andaman Dwarf was found to be promising.

(ii) *Production of improved seed material.*—During the year 38 inflorescences of the tall west coast were cross-pollinated with Dwarf pollen. Also 68 Tall x Dwarf pollinated nuts from last year's pollination were harvested.

(iii) *Watering experiment.*—It was observed that the watered trees yielded more nuts and produced more leaves.

(iv) *Crotalaria-seed rate trial.*—Twenty pounds seed-rate per acre was found to give good yields of green stuff in trial plots.

(v) *Crotalaria-viability test.*—The germination capacity of *Crotalaria striata* stored in screw-capped bottles and gunny bags was tested every month. The germination capacity was found to decline steadily in both cases but rapidly where stored in gunny bag. The initial germination capacity of 71 per cent in both came down to 36 per cent in screw-capped bottles and 2 per cent in gunny bags after 20 months storage.

(vi) *Spraying Guesarol 550 against rhinoceros beetle.*—The spraying was not found to defectively check the beetle attack, though the number of beetle attacks were less on sprayed trees.

II. *Other crops*—(i) *Sweet potato.*—Varieties B219 and B4004 were found to be promising and yielded more tubers than other varieties.

(ii) *Redgram.*—The local variety redgram was found to be more suitable under local conditions than the short duration Tenkasi variety.

(iii) *Green manure crops.*—*Pueraria phaseolides* and *Calopogonium mucunoides* were found to come up well. *Pueraria* remained green even during the summer months. Forty-two pounds and six ounces of seeds of *calopogonium* were collected and distributed during the year.

(iv) *Cashew.*—During the year 1957 of selected cashew seeds were distributed.

C. Agricultural Research Station, Nileshwar III.

1. *Watering experiment.*—Significant differences were obtained only with regard to the two characters mean number of functioning leaves and rate of leaf production but not the other two characters, namely, yield of nuts and the mean number of female flowers produced.

2. *Green manure trials.*—Of the four green manure crops tried, viz., *Pueraria faranica*, *Calopogonium muconoides*, *Cropalaria anagyroides* and *Centrosema pubescens*, *Pueraria lavenica* continues to be the best.

3. *Other crops*—(i) *Circumber trials.*—Of the five varieties tried, viz., Kasaragod, Nileshwar, Udipi, Hagari and Pithapuram, Kasaragod variety gave the highest yield.

(ii) *Vegetables and root crops.*—Vegetables like bendai cropea, bitter guard, snake guard, etc., were grown as usual and seeds were collected for distribution. Root crops like sweet potato were grown successfully in the shade of coconut trees.

(iii) *Cover crops and green manure crops.*—Trials of the following crops were started, viz., Agathi, *Sesbania Speciosa*, New Era, Cowpea, Velvet beans and *Pueraria* species.

4. *Filter point.*—A 3" filter point was successfully installed at the station in the office block near the well. This when worked with an oil engine pump set of 3" delivery pipe, gave a continuous discharge of 5,600 gallons of water per hour. Samples of water drawn from the filter point and the well were got analysed by the Government Agricultural Chemist and it is found that the water from the filter point was comparatively superior. Both the samples were found good for irrigation purposes.

5. *Seed supply.*—The following seed materials were distributed during the year:—

Selected coconut seedlings	...	...	...	48,420 numbers.
Malta lemon rooted cuttings	...	...	...	749 "
Papaga seedlings	...	...	...	606 "
<i>Crotalaria striata</i> seeds	...	...	...	50 lb.
Cashew seeds	...	...	...	499½ "
Vegetable seeds	...	...	...	26 "

APPENDIX III.

PROGRAMME OF WORK OF THE OILSEEDS SECTION FOR THE YEAR 1952-53.

A. Groundnut.

Agricultural Research Station, Tindivanam.

1. *Comparative yield trials*—(a) *Bunch.*—The bunch strains obtained and to be obtained from other States will be compared with TMV. 2 in one or more series.

(b) *Spreading.*—Twenty-one selections made from progenies of crosses and varieties will be tried under comparative yield trials along with TMV. 1, TMV. 3 and local groundnut.

Spreading strains and varieties received and to be received from other States will be compared with TMV. 1, TMV. 3 and local in separate series.

2. *Preliminary yield trials of bunch and spreading selections.*—Four bunch selections which have proved their superiority in quality will be tried under preliminary yield tests along with TMV. 2.

Seventeen spreading selections under seed multiplication to be better in qualitative characters and they will be tested with loose groundnut in preliminary yield trials.

3. *Seed multiplication of selections.*—Fifty-seven bunch and 18 spreading selections which showed great promise in the replicated row tests will be multiplied and their qualitative characters correctly assessed.

4. *Replicated row tests.*—Five bunch and nineteen spreading selections which have shown promise in the row tests will be put under replicated row tests along with TMV. 2 bunch and local spreading groundnut and tested for yield and purity.

5. *Row tests.*—Two hundred and seventeen single plant selections will be tried under row tests with a check row after every two selections.

6. *New varieties and types.*—The varieties and types obtained during previous years numbering 90 and fresh varieties which may be received from time to time will be shown in small plots for detailed study and further selections.

7. *Hybridization.*—The F1, F2 and F3 progenies of earlier crosses will be raised along with their parents and studied in detail. Single plants with the desired economic characters will be selected for further trial.

New crosses between selected purelines will be attempted with the following objectives:—

- (1) To evolve dormant bunch type.
- (2) To evolve white seeded strain.
- (3) To reduce the duration of A.H. 6481.

8. *Manurial experiments.*—The experiment will be repeated and the results of previous years confirmed. The optimum and economic doses of potash and phosphoric acid required to be applied to the groundnut crop will be determined. The treatments and experimental details will be the same as those adopted in previous years.

9. *Cultural experiments.*—The experiment will be repeated with the same treatments and lay out and in the same yield, as the results obtained in previous years have been inconclusive.

10. *Rotation experiment.*—The experiment will be conducted in the same field, for the eight times this year. Cultural operations, manuring and layout will be the same as those adopted in previous years.

11. *Mixed cropping of cotton.*—In order to find out the cotton strain that is suited to the tract of South Arcot district and to find out the proper time of sowing cotton with groundnut as a mixture in dry lands the experiment will be repeated for the second time this year.

12. *Groundnut harvesting and curing trials.*—To study the effect of the different methods of harvest and the quality of the produce the trials will be repeated with bunch and spreading types of groundnut adopting the same treatments as in the previous years.

13. *Study of the effect of sowing groundnut with shell on as opposed to sowing kernels.*—With a view to investigating into the advantages and the disadvantages of sowing groundnut with shell on the experiment will be repeated for the second time this year and the results obtained previously will be confirmed.

14. *Vegetative propagation.*—It was observed last year that the vegetative cuttings when planted, established very well and showed normal growth and pod formation. The economic possibilities of vegetative propagation will be studied during this year.

15. *Maintenance of varieties and types.*—The existing collection of groundnut varieties and types will be grown and maintained.

16. *Seed multiplication of strains and pure lines.*—All the available area will be sown to the following strains and purelines for multiplication of their seed:—

TMV. 1, TMV. 2, TMV. 3, TMV. 4, TMV. 5, A.H. 45, A.H. 477, A.H. 685, A.H. 3490, A.H. 4111, A.H. 4218/A.H. 6779 and A.H. 4515/A.H. 4534.

17. *Mechanical cultivation of groundnut.*—The cultivation of groundnut from sowing to harvest will be carried out with tractor drawn implements and the economics of mechanical cultivation as compared with local implements will be worked out. The Ransomes Peanut Picker (Minor) will also be tried for stripping and cleaning groundnuts and the economics of the process will also be determined.

18. *Large scale trial of insecticides for the control of Surul pest and of fungicides against 'Tikka' leaf spot diseases—Surul pest.*—Large-scale dusting of D.D.T. 5 per cent will be tried at different intervals and its efficiency and economics worked out in controlling the Surul pest and the results of last year confirmed.

As a preliminary study, lower strengths of D.D.T. and BHC. will be tried as spray and as dust for controlling Surul pest.

Tikka leaf spot disease.—Large-scale spraying of bordeaux mixture $\frac{1}{2}$ per cent and dusting of sulphur will be repeated and their effect and economics worked out.

19. *Comparative yield tests of selections.*—Bunch and spreading selections which showed promise during the previous summer under preliminary yield trials will be put under comparative yield tests this year along with TMV. 1, TMV. 4 and the local groundnut.

20. *Row tests.*—New selections made will be tried under row tests with local as check after every two selections.

21. *Groundnut, ragi and cotton mixture cropping experiment.*—Groundnut, ragi and cotton will be grown as a mixture and the economics of different mixtures will be compared with their pure crops.

22. *Groundnut irrigation experiment.*—To find out the optimum number of irrigations to be given to the groundnut crop during summer the irrigation experiment will be repeated for the second time this year.

(Agricultural Research Institute, Coimbatore.)

23. *Groundnut drying experiment.*—The moisture content of kernels and pods of a bunch and a spreading variety will be uniform and dried at 40°C, 60°C and 100°C. The effect of these treatments on germination and oil and free fatty acids contents will be determined.

24. *Breaking the dormancy of spreading groundnuts.*—The study of the effect of different chemicals in breaking the dormancy of spreading groundnut will be repeated.

25. *Control of earwig attack on groundnut.*—The pesticides such as D.D.T. 5 per cent and BHC. 5 per cent will be raked in at different intervals and the effect and economics of the pesticides in controlling the pest will be observed.

26. *Analysis of oil and free fatty acids contents.*—The cultures under different stages of trial and samples from different experiments will be analysed for their oil and free fatty acids contents.

27. *District trial.*—All the improved strains, namely, TMV. 1, TMV. 2, TMV. 3, TMV. 4 and TMV. 5 and the four bunch cultures will be tried in different parts of the State.

B. Gingelly.

Agricultural Research Station, Tindivanam.

1. *Cold weather, 1952-53—(1) Replicated row tests.*—Forty-one selections have been under replicated row tests during last year, were not a success on account of failure of rains and trial will be repeated. Forty-five single plants selected from progenies of crosses and varieties last year will also be tried in row tests.

(2) *Hybridization.*—Fresh crosses will be attempted to evolve cosmopolitan types.

(3) *Spacing trials.*—To find out the optimum spacing for cold weather crop of gingelly, spacing trial will be conducted with the following spacings, 6", 9" x 9", 1' x 1', 1½' x 1½' and 2' x 2'.

(4) *Maintenance of varieties and types.*—All the varieties and types available will be grown and type plants in each will be selfed for further propagation.

(5) *Seed multiplication of strains.*—The available area of the station will be sown to the three strains, namely, TMV. 1, TMV. 2 and TMV. 3 and their seeds multiplied for large-scale distribution.

(6) *District trial.*—Seeds of the improved strains will be sent to different parts of the State for trial and their performance will be observed.

II. *Summer crop, 1952-53.*—(1) *Comparative yield tests.*—The four selections isolated from TMV. 1 gingelly and strains from other States will be tried with TMV. 1 and TMV. 3 so to obtain conclusive data.

(2) *Preliminary yield test of selections.*—The selections which proved promising under replicated row tests will be tried with TMV. 1 and TMV. 3 under preliminary yield tests.

(3) *Replicated row tests.*—The selections which proved superior to their adjoining controls under row tests will be tried under replicated row tests with local gingelly.

(4) *Row tests.*—Single plant selections made from progenies of crosses and varieties will be tested under row tests with a check row after every two selections.

(5) *Seed multiplication of selections.*—Selections which proved to be heavy yielders in the previous years, two tests will be multiplied and pure seeds obtained for further rigid tests.

(6) *Hybridization.*—The F1, F2 and F3 progenies of crosses made earlier will be raised along with their parents and studied. Promising selections will be made to evolve strains with the following economic characters:—

- (1) White seed.
- (2) High oil content.
- (3) 6-8 loculed nature of capsules.
- (4) 1-3 flowers in an axil.
- (5) Suitability for all seasons.

(7) *Spacing trials.*—The results obtained in the previous years in determining the optimum spacing for summer gingelly were not quite conclusive and the experiment will be repeated with the same treatments and layout.

(8) *Maintenance of varieties and types.*—The existing collection of 107 varieties suited to summer conditions and 86 selfed types will be grown and selfed seeds obtained in each for further maintenance.

(9) *Seed multiplication of strains.*—The three standard strains will be multiplied in a large area and distributed in the various parts of the State.

(10) *District trials.*—The two strains, namely, TMV. 1 and TMV. 3 which are suitable for summer conditions will be tried in different parts of the State.

(Agricultural Research Institute, Coimbatore.)

(11) *Study on the deterioration of gingelly seeds under storage.*—The TMV. 3 gingelly seed will be stored in different containers and periodically tested for its deterioration as judged by its viability and oil and free fatty acids contents.

(12) *Time of sowing experiment.*—To determine the proper time of sowing of gingelly in the summer season under irrigated conditions, fortnightly sowings will be tried again this year as the experiment proved a failure last season.

(13) *Analysis of soil and free fatty acids.*—All the cultures under the different stages of yield tests and other experiments will be analysed for oil and free fatty acids contents.

C. Castor.

Agricultural Research Station, Tindivanam.

1. *Comparative yield tests.*—Eight selections from progenies of crosses will be tried under comparative yield tests along with the three standard strains.

2. *Preliminary yield tests of selections.*—Twelve selections made from progenies of crosses will be tried under preliminary yield tests along with the standard strains.

3. *Replicated row tests.*—Thirty-seven selections which proved their superiority under row tests, during the last season will be tested under replicated row tests with the standard strains.

4. *Purity studies.*—Single plants numbering 109 from progenies of crosses and varieties will be sown in single rows and their purity and yielding ability observed.

5. *Hybridization.*—The F1 and F2 progenies of crosses made earlier will be grown along with their parents and studied.

Fresh crosses will be attempted with the following objectives: (1) to reduce the duration of the existing strains, (2) to impart distinctive colours to the strains and (3) to study the inheritance of number of nodes on the main stem.

6. *Maintenance of purity and vigour of strains.*—The single plants selected from all the three strains will be tried in progeny row trials in isolated blocks and the best among them marked out for maintenance of purity and vigour.

7. *Maintenance of inbred and ornamental types.*—All the 135 inbred lines will be grown and selfed seeds from each type will be gathered for further maintenance.

The eight ornamental types will be grown and large quantities of selfed seeds obtained for distribution to the public.

8. *Insecticidal trial for the control of semi-looper pest.*—Insecticides such as lead arsenate, D.D.T. (wetttable), Gammexane, etc., will be tried against the castor semi-looper and their effectiveness and economics of application will be studied.

9. *Multiplication of strains.*—Seed of the three strains, TMV. 1, TMV. 2 and TMV. 3, will be multiplied for large-scale distribution.

10. *District trials.*—Seeds of the three strains will be sent to different parts of the State and their performances watched.

(Agricultural Research Institute, Coimbatore.)

11. *Spacing trials.*—To find out the optimum spacing for the short duration variety obtained from South Africa the spacing trial will be repeated for the second time this year as it was a failure during the last season.

12. *Analysis of oil and free fatty acids contents.*—All the cultures and varieties which are under various stages of trial and other experiments will be analysed for their oil and free fatty acids contents.

13. *Seed multiplication of strains.*—The seeds of the three strains will be multiplied for large-scale distribution.

D. Coconut.

Agricultural Research Station, Pilicode.

1. *Manurial experiments on adult coconut trees.*—(a) To find out the best method of applying manures in gravelly laterite soils.

(b) To find out a suitable substitute for ash for manuring the coconut.

2. *Cultural experiments.*—(a) To find out the effect of ploughing the coconut garden and digging with mamuti on the yield of nuts and to determine the minimum number of ploughings required to be given to get maximum yields.

(b) To find out the correct depth to which the coconut garden raised in gravelly laterite soils has to be ploughed or cultivated.

3. *Increasing the humus content of the soil.*—Trial of newly introduced green manure crops.

4. Trial of various subsidiary crops for coconut gardens, to spot out the most suitable and remunerative crops.

5. Trial of forms and varieties of coconut in low-lying areas to find out the best form or forms suitable for cultivation in such areas.

6. *Coconut breeding.*—(a) Comparative study of self, natural and cross pollinated seedlings.

(b) Study of progenies of crosses.

(c) Production of hybrid nuts of tall × dwarf by cross pollination.

(d) Study of F₂ progenies of tall × dwarf crosses.

7. Study of exotic and State varieties of coconut.

8. *Miscellaneous studies.*—(a) Study of the inheritance of characters in the coconut.

(b) *Incidence of rhinoceros beetle attack.*—To study the beetle attack in relation to variety and season.

(c) Assessing the loss due to beetle attack.

(d) Spraying trials with Geigy insecticides on adult coconut trees to control the beetle attack.

(Agricultural Research Station, Nileshwar II.)

1. *Increasing the humus content of the soil.*—(a) *Seed rate trial of crotalaria striata.*—To find out the best seed rate to obtain the maximum quantity of green stuff per acre.

(b) Trial of other newly introduced green manure crops.

2. *Coconut breeding.*—(a) Comparative study of self, natural and cross pollinated seedlings.

(b) Study of progenies of crosses.

(c) Production of hybrids nuts of tall × dwarf by cross pollination.

(d) Study of progenies of exotic variety crosses.

3. *Copra and oil studies of nuts from tall × dwarf progeny palms.*

4. *Watering experiments.*—To find out the effect of watering the coconut during the summer months on the yield of coconut in red loamy soils.

(a) Study of the germinating nut.

(b) Study of the inheritance of characters in the coconut.

(c) *Crotalaria striata* viability test.

(d) Spraying trials with Geigy insecticides to control rhinoceros beetle.

(Agricultural Research Station, Nileshwar III.)

1. *Cultural experiments.*—To find out the correct depth to which the soil in coconut garden in sandy soil has to be ploughed or cultivated.

2. (a) *Seed rate trial with crotalaria striata.*

(b) Trial of newly introduced green manure crops.

3. *Depth of planting experiment.*—Observations on the young palms will be continued.

4. *Watering experiments.*—To find out the effect of pot watering the coconut trees in sandy soils during summer months on the yield of nuts.

5. *Underplanting in poor surface planted coconut plantation in sandy soil.*—The observations on the young palms under planted in 2' and 3' deep pits will be continued.

6. Production of selected coconut seedlings for large-scale distribution.

7. Assessing the loss due to beetle attack.

(Oilseeds Station, Coimbatore.)

1. Copra and oil studies of nuts from tall × dwarf progeny palms will be continued.

2. Study of deterioration of coconut oil in storage.

E. Other Crops.

1. *Oil palm.*—Study on growth and yield of individual palms will be continued.

2. *Oysternut.*—Seeds of the oysternut will be sown and their performance observed.

3. *Sunflower.*—All the available varieties of sunflower will be tried and their relative yielding capacity assessed.

4. *Safflower.*—The varieties obtained from the different States will be sown and observed for their yield and quality.

5. *Linseed.*—The two varieties No. P. 68 and K. 2 Punjab will be sown along with the three varieties obtained from Indore.

6. *Vegetables.*—Indigenous vegetables like *bendai*, bitter gourd, snake-gourd, ash-gourd, pumpkin, cowpea, tomatoes, brinjals, colacasia and amaranthus will be sown and seeds obtained for distribution.

7. *Fruit plants.*—Newly introduced plants like banana varieties, Singapore jack, citrus, etc., will be observed and their performance noted.

8. *Pepper.*—The newly planted pepper plants will be under observation.

9. *Cotton varieties.*—Perennial and sea-island cottons will be tried.

APPENDIX IV.

STEPS TAKEN TO DISSEMINATE THE RESULTS OF RESEARCH—1. *Production of nucleus seeds of high yielding strains and good planting material.*—The results obtained by plant breeding are disseminated among the ryot public by making the seeds and seedlings of the improved strains and plants, available to them. Arrangements were made for large-scale multiplication of the improved strains of groundnut, gingelly and castor and supplying them to the ryots of the State and outside. Selected coconut seedlings were produced at nine centres and distributed in the State to meet the increasing demand for coconut seedlings of good quality. In view of the heavy demand for seeds of improved strains of

groundnut and castor in the State and from outside, their large-scale multiplication has been taken up at five more centres during the year. It is hoped that the produce of these centres will to a great extent meet the requirements of nucleus seeds. During the year the following quantities of seeds and planting material were distributed:—

Groundnut pods	...	...	...	...	...	35,000 lb.
Groundnut kernels	...	...	...	...	...	244 „
Gingelly	...	...	...	...	...	1,325 „
Castor	...	...	...	...	...	4,137 „
Cashew-nut seeds	...	...	...	...	...	1,751 „
Coconut seedlings	...	...	...	...	...	163,390 Nos.

2. *Propaganda*.—The officers and subordinate staff of the section, during their tours in the districts, contacted number of farmers and explained to them the results of practical value obtained from the research carried out in the section whenever opportunity occurred. The latest achievements of the section were also passed on to the District Officers and the officers in charge of the extension service in the department. Besides these, with the aid of the exhibits and other self-explanatory charts the activities of this section were made known to the several visitors who visited the Agricultural Research Stations, Tindivanam and Nileshtar and the Research Institute, Coimbatore.

3. *Exhibition*.—The oilseeds section took part in the various exhibitions organized in different parts of the State. The most important of the exhibitions in which the oilseeds section took part were the Madras Park Fair Exhibition held during December 1951 and January 1952 and the exhibition organized during the college day and conference in August 1951. Useful strains of oilseeds were exhibited at these exhibitions. Selected coconut seedlings were the most prominent among the exhibits put up by this section. These attracted much attention and as a result the demand for the seedlings for large-scale plantings has considerably increased. On account of the wide publicity given through these exhibitions the demand for the tall x dwarf coconut hybrid seedlings which are early bearers with economic yields has also increased considerably.

4. *Publicity*.—The results of practical importance achieved in the section were published in English and in other local languages in a popular form in the *Newsletter*, *Villagers' Calendar*, *Mezhichelvam*, *Padipantalu* and *Naveena Karshakan* for wider publicity and easy reach to all parts of the State. Reprints on coconut manuring and leaflets on coconut and groundnut cultivation were distributed among the interested cultivators in the State.

5. *Farmers' Day and quarterly exhibitions*.—Exhibitions were arranged at the Agricultural Research Stations, Tindivanam and Nileshtar and farmers of the tract were invited to take part in the exhibition. The best specimens of farm produce from the ryots' fields were also exhibited. The seeds of improved strains, manures, fodder grasses, compost, etc., were also put up. The special feature during these celebrations was the demonstration of the working of improved implements and mechanical cultivation of groundnut with tractor and with peanut picker (minor) for harvesting and stripping pods of groundnut respectively. The working of these machinery was greatly appreciated by the cultivators.

6. *Celebration of Vanamahotsava Week*.—The *Vanamahotsava Week* was celebrated by planting coconut and green manure seedlings at the Agricultural Research Stations, Tindivanam and Nileshtar and by supplying in large numbers seedlings of oil-bearing trees such as Neem, Pungam and Bassia. The supply of coconut seedlings at a concessional rate of Rs. 4 a seedling was a very great attraction. The announcement of the supply at the concessional rate increased the demand for the seedlings from the public all over the State to such a great extent that it was found difficult to meet the demand in full.

APPENDIX V.

STATEMENT SHOWING PARTICULARS OF TOTAL NUMBER OF SANCTIONED POSTS OF OFFICERS AND STAFF IN THE OILSEEDS SECTION AS ON 30TH JUNE 1952.

	Number of sanctioned posts.	
	Permanent.	Temporary.
I. Madras Agricultural Service —		
(1) Oilseeds Specialist	1	..
(2) Superintendents of Agricultural Research Stations ..	2	..
(3) Assistant Oilseeds Specialists	..	2
(4) Assistant Botanist (Cardamom Specialist)	..	1
(5) Pepper Specialist	..	1
II. Madras Agricultural Subordinate Service—		
(1) Upper Subordinates	11	24
(2) Fieldmen	7	28
Madras General Subordinate Service—		
(1) Laboratory Attender	1	..
(2) Maistries	..	15
III. Madras Ministerial Service—		
(1) Upper Division Clerk	..	1
(2) Lower Division Clerks	6	3
(3) Typists	1	2
IV. Madras Inferior Service —		
Peons	6	24

ADMINISTRATION REPORT OF THE PULSES SPECIALIST, COIMBATORE, FOR THE YEAR 1951-52.

I submit the Administration Report of the Pulses Specialist, Coimbatore, for the year 1951-52.

2. A scheme for the improvement of the pulses crops in the Madras State, partly financed by the Indian Council of Agricultural Research, was originally sanctioned for a period of five years from 1943-44, in G.O. Ms. No. 488, Development, dated 3rd April 1943. It was subsequently extended by one year, then by two years, and again by one more year up to 31st March 1952 in G.O. Ms. No. 579, Food and Agriculture, dated 27th March 1951. The continuance of the scheme from 1st April to 1st August 1952 has been sanctioned in Government Memorandum No. 62184-K/51-12, Food and Agriculture, dated 3rd April 1952.

3. *Venue of work.*—The work on the scheme was continued at Coimbatore, on an area of 25 acres of dry land allotted for it at the Central Farm, Coimbatore, and at two regional sub-stations, at Dharmapuri (Salem district) and Vizianagaram, on about 10 acres of leased lands at each centre.

4. *Staff.*—I continued to be in charge of the post of the Pulses Specialist during the year. The sub-station at Dharmapuri continued to be in the immediate charge of Sri A. K. Nagaratnam, Upper Subordinate, and that at Vizianagaram was in the immediate charge of Sri S. Sangameswara Sarma, Upper Subordinate, up to 9th October 1951, and subsequently of Sri B. Suryanarayanamurthy till the end of the period. The latter, who was deputed for post-graduate training to the Indian Agricultural Research Institute, New Delhi, in 1949, rejoined duty at Vizianagaram, after successfully completing his training, in October 1951, when Sri S. Sangameswara Sarma was relieved and transferred as Farm Manager, Sugarcane Research Station, Anakapalle. The three Upper Subordinates at Coimbatore continued for the whole year.

5. *Tours.*—I was on tour for 33 days when I inspected the sub-stations at Dharmapuri and Vizianagaram and visited the Agricultural Research Stations, Samalkota; Nandyal and Siruguppa and the Agricultural College, Bapatla. The five assistants and fieldmen, at headquarters and sub-stations, were on tour for 180 days for the collection of seed samples, sowing and harvest of experiment plots at Agricultural Research Stations in the districts, to conduct exhibition at Madras, and to give expert evidence on the variety of gram involved in anti-blackmarketing cases before Magistrates' Courts in various districts.

6. *Season and its effects.*—There was a total rainfall of 16.63 inches spread over 36 rainy days as against 21.69 inches recorded on 38 rainy days of the previous year and against a ten-year average of 23.70 inches, at Coimbatore. The break of the south-west monsoon was delayed till the third week of July, when light showers were received. The monsoon instead of gaining in intensity, weakened with the result that dry and hot weather prevailed in the months of August and September which had an adverse effect on the early sown crops. Again the uneven distribution of rainfall in the north-east monsoon and the early setting in of dry and hot weather in the month of December

were very detrimental both for the early and late-sown crops. The seasons were very abnormal with the result that no reliable results could be obtained. The seasonal conditions at Dharmapuri also were abnormal. The distribution of rainfall was uneven and lablab and horsegram crops were adversely affected by the continuous drought that prevailed due to the failure of the north-east monsoon rains. The seasonal conditions at Vizianagaram were favourable except for the cyclonic conditions that prevailed in winter which had an adverse effect on the pulses crops grown in wet lands at Samalkota. There was a total rainfall of 47.74 inches spread over 56 rainy days which is the normal for the tract. The distribution was even and favourable to the pulses crops.

7. *Collection of new seed samples.*—Twenty-two seed samples of redgram, 25 of greengram, 33 of blackgram, nine of bengalgram, 25 of cowpea, 60 of soyabean, one each of lablab and cluster bean and six of sword bean were obtained during the year, the main sources being supplies from the Indian Agricultural Research Institute, New Delhi, and collections from the different parts of the State by the staff of the section and through the departmental officers.

8. *Research.*—The main items of research were evolution of high-yielding strains of the important pulses grown in the State. All the varieties of pulses were studied at Coimbatore, while only redgram, horsegram and lablab were studied at Dharmapuri and redgram, greengram, blackgram and horsegram were studied at Vizianagaram.

(i) *Redgram (Cajanus Cajan Millsp.).*—Four cultures Nos. 37, 74, 1723 and 2900 were compared for yield for the fourth year at Coimbatore. Culture No. 37 gave the highest yield for the third year. This culture was under trial as well as multiplied in seed farms in the districts. Nucleus seed has again been distributed for seed farms in 1952-53. Fifty-two cultures of the second batch of selections were tested in preliminary yield trial plots. Though none was superior to the standard, No. 37, 24 of them have been strained for further tests. Twelve short-duration selections (4½ months) carried over from the previous year's trials were compared for yield against a bulk seed sample. But no results could be had from the trial as many plants dried up in the early stage of the crop due to the adverse seasonal conditions. Cultures Nos. 37 and 2900 were compared against a local bulk at Dharmapuri. No. 37 maintained its superiority by yielding 25 per cent more grain than the local variety. Out of 35 cultures of the second batch of selections tested for yield, three cultures Nos. 31, 114 and 206 yielded more grain than the local bulk. Two cultures, No. 72 (medium duration—6 months) and No. 97 (long duration—7 months) were compared against their respective local bulks at Vizianagaram. This year both the types matured and were fit for harvest about the same time, probably due to the early cessation of the north-east monsoon. Culture No. 72 yielded 25 per cent more grain than the local, while in the other set the yield differences were not significant. Out of 21 cultures tested for yield in preliminary yield trial plots, nine were superior to the control.

(ii) *Greengram (Phaseolus aureus Roxb.).*—Culture No. 62 of the first batch of selections was compared with the local bulk for the fourth year at Coimbatore. The culture maintained its superiority by yielding 34.7 per cent more grain than the standard. Seven cultures of the second batch of selections were tested for yield against No. 62. None of them excelled the standard.

Culture No. 62 was tried in the districts and it was reported to have yielded 15 to 20 per cent more than the local varieties. Cultures Nos. 166, 169, 188 and G.S. 11/105, along with the local wet-land type of Samalkota, were tested for yield as an after-paddy crop at Samalkota. The crop was damaged due to heavy rains soon after the sowing. At Vizianagaram station, culture No. 127 (dry-land variety) was grown as a bulk crop and 130 lb. of seed gathered. Culture No. 188 (wet-land variety) was supplied for trial to 19 centres in six districts and the strain gave an increased yield of 10 per cent over the local.

(iii) *Blackgram (Phaseolus mungo L.)*.—Two cultures, Nos. 212 and 216, of the first batch of selections were compared with the local bulk for the third year at Coimbatore. Both the cultures maintained their superiority by giving significantly higher yields than the standard for the third time, culture No. 212 being slightly superior. Thirty-six selections of the second batch were studied and 24 of them retained for further tests. Cultures Nos. 210, 221 and 239 of the second batch of selections were compared with culture No. 189 for the fourth year at Vizianagaram. The yield differences were not statistically significant. Fourteen wet-land types of Blackgram were tried at the Agricultural Research Stations, Pattambi and Mangalore, as an after-paddy crop. Due to the unfavourable season, the plants did not thrive well and no results could be obtained. Thirty-three cultures of wet-land type were tried for yield as an after-paddy crop at Samalkota. The crop failed due to heavy rains after sowing.

(iv) *Horsegram (Dolichos biflorus L.)*.—Culture No. 35 was compared with D.B. 7 at Coimbatore. No. 35 yielded 260 lb. of grain per acre which was double that of D.B. 7. Twenty-four cultures of the second batch of selections were compared for yield with D.B. 7. No results could be obtained as the plants in many plots withered away due to the failure of the north-east monsoon rains. At Vizianagaram, culture No. 98 (black-seeded variety) along with No. 4; another black-seeded culture of Coimbatore was compared with the local black variety. The results were not significant. Cultures Nos. 76, 86 and 106 (buff-seeded varieties), along with D.B. 7 of Coimbatore were compared with the local buff variety. Nos. 76 and 86 were on a par with the standard, while the rest were inferior in yield to them.

(v) *Benjalgram (Cicer arietinum L.)*.—Culture No. 94 along with No. 112 (Bellary) was compared with Nos. 468 and 482 at Coimbatore. Due to adverse seasonal conditions, the trial was a failure. The 22 cultures of the second batch of selections were compared in a preliminary yield trial which also failed.

(vi) *Lablab (Dolichos lablab L.)*.—Forty-eight black-seeded culture were tested against D.L. 1458 (black seed) at Coimbatore. None excelled the standard. Seventy-nine cultures of different shades of seed-coat colour, other than black, were tried against D.L. 231. Twenty-three cultures yielded more than the standard. Four cultures, Nos. 44; 92, D.L. 173 and D.L. 231, were compared for yield at Dharmapuri. Due to the abnormal seasonal conditions, the yields obtained were very low and the results also were not statistically significant.

(vii) *Cowpea (Vigna unguiculata Walp.)*.—Out of 120 cultures of the second batch of selections, 80 cultures were tested in preliminary yield trial plots and the other 40 were sown in non-replicated rows for study at Coimbatore. Due to the failure of the rains after sowing, no reliable results could be had from the trials.

(viii) *Vegetable pulses*.—Twenty-two types of lablab, 23 types of cowpea and 22 types of cluster bean were grown for study and seed multiplication. Eighteen pounds of seed of six high-yielding types of lablab and 105 pounds of two varieties of cowpea were obtained for distribution.

(ix) *Soyabean (Glycine max Merr.)*.—Thirty varieties of soyabean were grown as irrigated crop in the main season (July to December) and studied. Twenty-one of them, mostly of Chinese and Japanese origin, were of short duration, 100 to 120 days; the rest, mostly of Burmese origin, matured in 140 to 180 days. Four of the former group were tried as dry land crop in the north-east monsoon season. These matured within 90 days of sowing. Due to the failure of the monsoon, growth and development of pods were poor. But the trial indicated that they could be successfully grown on dry lands if the season is normal. Eighteen short-duration types, including a new edible type obtained from Canada were grown in the cold-weather season (December to March). Nine of them were observed to be promising. Their durations were slightly longer than in the 'main' season.

(x) *Other exotic pulses*.—A variety of greengram, 'Perennial mung' from Philippines, was tried at Coimbatore and Agricultural Research Stations in the districts. When it was sown in July and maintained under irrigation, it produced pods till the end of next March. Thereafter, the plants dried up in spite of frequent watering. At the agricultural stations also, though it grew up vigorously and produced profuse flowers and pods, it did not survive the long hot weather period. A systematic trial at Vizianagaram indicated that two short-duration crops—greengram or ragi followed by horsegram—could be grown with more profit within the growth period of this exotic type.

(xi) *Agronomic experiments*.—With the object of finding out the cereals and other crops with which pulses could be grown as agronomic mixtures, the two sets of mixed cropping trials, one for the south-west monsoon season and the other for the north-east monsoon season, started in 1946-47, with seven and eight treatments respectively, were continued this year at Coimbatore. Due to unfavourable seasonal conditions the first set sown in July 1951 proved a failure. In the second set, sown in September 1951, blackgram grown as mixture with cotton gave the highest monetary return per acre. At Dharmapuri also, the mixed cropping trial with redgram, cholam, samai, varagu, groundnut and horsegram started in 1946-47 and continued in the subsequent years was repeated during the year. Due to unfavourable seasonal conditions the trial failed. At Vizianagaram, the experiment with 15 treatments was continued this year as in the previous years. The results of the trial during the past six years indicated the following conclusions: Single crop of ragi followed by horsegram gave consistently highest monetary return, the next two in order being cumbu followed by horsegram and groundnut followed by horsegram. Mixed crops of redgram and cumbu followed by horsegram, and redgram and ragi followed by horsegram gave the best return particularly in years of sub-normal rainfall. The yields of horsegram were high when it succeeded crops like ragi, cumbu or korra, while it was low when it succeeded groundnut. Horsegram contributed a large share to the monetary values of every treatment in which it figured. Crops like dry paddy, cotton and redgram above were found to be not lucrative for cultivation in this tract.

9. *Seed multiplication*.—About 1,600 lb. of seed of improved cultures of pulses were produced at Coimbatore and 700 lb. of seed at Vizianagaram for distribution for seed farms and trials, while at Salem, due to adverse seasonal conditions only small quantities of seed just enough for sowing on the station could be obtained.

10. *District trials*.—Redgram cultures No. 37 of Salem sub-station and No. 2900 of Coimbatore, and No. 72 and No. 97 of Vizianagaram sub-station, greengram No. 62 of Coimbatore and No. 127 and No. 188 of Vizianagaram, blackgram No. 212 of Coimbatore and No. 189 of Vizianagaram, horsegram No. D.B.7 and No. 35 of Coimbatore and No. 76 and No. 93 of Vizianagaram Bengalgram No. 482 and lablab No. 231 and No. 1458 were under trial in the districts. The Coimbatore cultures were tried in the southern districts and the Vizianagaram cultures in the northern districts. Due to the adverse seasonal conditions the crops failed in many places and the trials could be successfully conducted only in a few centres. Redgram No. 37 was reported to have yielded more than the local in the Chingleput, Chittoor, Ramanathapuram and Tirunelveli districts, No. 97 in the Srikakulam and Chingleput districts, greengram No. 62 in the Tanjore, Tiruchirappalli and Madurai districts, blackgram No. 212 in the Tirunelveli district, No. 189 in the Srikakulam and East Godavari districts, horsegram No. D.B. 7 in the Chittoor, North Arcot, South Arcot, Ramanathapuram and Tirunelveli districts, No. 76 in the Visakhapatnam district and No. 93 in the Srikakulam district.

11. *Seed farms*.—Five hundred and seventy-five pounds of seed of redgram cultures Nos. 37 and 2900 and 2,720 lb. of seed of Bengalgram cultures, Nos. 468 and 482 were supplied for multiplication of seed in seed farms.

12. *Seed distribution*.—A total quantity of 5,150 lb. of seed of different cultures of pulses were distributed during the year.

13. *Inspection of offices*.—Number of offices which are required to be inspected or audited during the year—Nil.

14. The programme of work for 1952-53 is appended.

COIMBATORE,
LAWLEY ROAD,
12th August 1952.

M. A. SANKARA AYYAR,
Pulses Specialist.

APPENDIX I.

PROGRAMME OF WORK OF THE PULSES SPECIALIST FOR THE YEAR 1952-53.

A. Pulses Breeding Station, Coimbatore.

I. Redgram—

- (1) Study and maintenance of types and varieties.
- (2) Study of 24 selections of Tenkasi short-duration variety in non-replicated rows.
- (3) Preliminary yield trial of 24 cultures of the second batch of selections with No. 37 as standard, for the third year.
- (4) Multiplication of seed of culture No. 37.

II. Greengram—

- (1) Study and maintenance of varieties and types.
- (2) Multiplication of seed of 10 promising single-plant selections in the south-west monsoon season.
- (3) Multiplication of seed of culture No. 62.

III. Blackgram—

- (1) Study and maintenance of varieties and types.
- (2) Preliminary yield trial of 24 cultures of the second batch of selections with No. 212 as standard for the second year.
- (3) Multiplication of seed of culture No. 212.

IV. Horsegram—

- (1) Study and maintenance of varieties and types.
- (2) Multiplication of seed of 33 cultures selected for yield trial.
- (3) Preliminary yield trial of 24 cultures with D.B. 7 as standard.
- (4) Multiplication of seed of D.B. 7 and culture No. 35.

V. Bengalgram—

- (1) Study and maintenance of types and varieties.
- (2) Yield trial—(i) four cultures, No. 94, No. 112, No. 468 and No. 482 (fourth year), (ii) seven new cultures with No. 482 as standard (first year).
- (3) Multiplication of seed of No. 482.

VI. Lablab—(a) Dryland—(1) Study and maintenance of varieties and types.

- (2) Preliminary yield trials—
 - (i) 24 cultures against D.L. 231 (buff seed).
 - (ii) 24 cultures against D.L. 1458 (black seed).
 - (iii) 7 cultures against Tenkasi short-duration bulk.
 - (3) Multiplication of seed of D.L. 231 and D.L. 1458.
- (b) Garden land (for vegetable)—
- (1) Study and maintenance of types and varieties.
 - (2) Multiplication of seed of six high-yielding types for distribution.
 - (3) Multiplication of seed of D.L. 1428 (of hybrid origin).

VII. Cowpea—

- (a) Dry land—(1) Study and maintenance of types and varieties.
- (2) Preliminary yield trial—
 - (i) 35 short-duration cultures against No. C. 57.
 - (ii) 63 long-duration cultures against No. C. 521.
- (b) Garden land (for vegetable)—
 - (1) Study and maintenance of types and varieties.
 - (2) Multiplication of seed of C. 419, New Era, E.C. 455 and E.C. 778 (a).

VIII. Clusterbean (for vegetable)—

- (1) Study and maintenance of types.
- (2) Multiplication of seed of C.P. 5, C.P. 78, C.P. 380 and C.P. 387.

IX. Soyabean—

Study of varieties and types.

X. Miscellaneous—

Study and multiplication of seed of vegetable bean types—Lima bean, Canavalia, Velvet bean, etc.

B. Pulses Breeding Sub-station, Dharmapuri.

I. Redgram—

- (1) Yield trial of six cultures against No. 37.
- (2) Multiplication of seed of culture No. 37.
- (3) Study on the methods of preparation of dhal.

II. Horsegram—

- (1) Study of new collections for selection.
- (2) Multiplication of cultures No. 86, No. 122 and No. 153.

III. Lablab—

- (1) Study of new collections for selection.
- (2) Trial in non-replicated rows—
 - (i) Three white-seeded cultures with D.L. 173 as standard.
 - (ii) Three buff-seeded cultures with local buff type as standard.
- (3) Multiplication of culture No. 44.

C. Pulses Breeding Sub-station, Vizianagaram.

I. Redgram—

- (1) Study and maintenance of types and varieties.
- (2) Preliminary yield trial of nine cultures of the second batch of selections along with No. 72, No. 37, of Coimbatore and local (early).
- (3) Yield trial—
 - (i) Culture No. 72 with local bulk (early).
 - (ii) Culture No. 97 with local bulk (late).
- (4) Multiplication of seed of cultures No. 72 and No. 97.
- (5) Trial of cultures No. 72 and No. 97 in the northern districts.

II. Greengram—

- (a) Dry land—(1) Study of varieties and types, including new collections from the districts for selection.
- (2) Multiplication of seed of culture No. 127.
- (3) Trial of No. 127 in Srikakulam, Visakhapatnam and Godavari districts.
- (b) Wet land (at Agricultural Research Station, Samalkota)—
 - (1) Study of varieties in non-replicated plots for selection.
 - (2) Yield trial of cultures No. 166, No. 169, No. 188 and G.S. 11/105 against local wet-land variety.
 - (3) Multiplication of seed of culture No. 188.
 - (4) Trial of No. 188 in the northern districts.

III. Blackgram—

- (a) Dry land—(1) Study of varieties and types for selection.
- (2) Preliminary yield trial of N.P. 14 with culture No. 189.
- (3) Yield trial of three cultures of the second batch of selections with No. 189 as standard.
- (4) Multiplication of seed of No. 189.
- (5) Trial of No. 189 in Srikakulam, Visakhapatnam and East Godavari districts.
- (b) Wet land (at Agricultural Research Station, Samalkota)—
 - (1) Study of local varietal samples for selection.
 - (2) Study of 30 selections in non-replicated rows.
 - (3) Multiplication of seed of No. 189.

IV. Horsegram—

- (1) Yield trial of cultures No. 76, No. 86, No. 106, No. 35 and D.B. 7 with local bulk as standard.
- (2) Multiplication of seed of No. 76 (buff seed) and No. 93 (black seed).
- (3) Trial of No. 76 and No. 93 in the Srikakulam and East Godavari districts.

V. Miscellaneous—

Study and seed multiplication of vegetable legumes, lablab, cowpea, cluster-bean, lima bean, etc.

APPENDIX II.

STATEMENT SHOWING PARTICULARS OF TOTAL NUMBER OF SANCTIONED POSTS OF OFFICERS AND STAFF IN THE PULSES SECTION AS ON 30TH JUNE 1952.

Name of service and post.	Number of sanctioned posts.	
	Permanent.	Temporary.
I. Madras Agricultural Service—Pulses Specialist	..	1
II. Madras Agricultural Subordinate Service—		
(1) Upper subordinates	5	..
(2) Fieldmen	..	5
III. Madras General Subordinate Service—Maistris	..	3
IV. Madras Ministerial Service—		
(1) Lower division clerk	..	1
(2) Typist	..	1
V. Madras Inferior Service—Peons	..	3

ADMINISTRATION REPORT OF THE FRUIT SPECIALIST, COIMBATORE, FOR THE YEAR ENDING 30TH JUNE 1952 (FASLI 1361).

This forms the eleventh administration report of the Fruit Section.

2. *Charge.*—Sri U. Narasinga Rao, Fruit Specialist, continued to be in charge throughout. The posts of Superintendent, Fruit Research Station, Kodur, and the Assistant Fruit Specialist, Coonoor, were made permanent with effect from 20th March 1951 and Sri U. Narasinga Rao and Sri T. Gopalan Nayar were appointed substantively to the two posts from the same date.

3. *Administration and supervision.*—The Fruit Specialist was in technical and administrative control of the Fruit Stations at Kodur, Coonoor, Kallar and Burliar, College Orchard, Coimbatore, the Post-graduate Diploma Course in Horticulture, the fruit extension work on the Kodaikanal in charge of an Assistant specially appointed for the purpose, and the Model Orchards-cum-Nurseries Scheme which was newly put into operation in the year. The offices of the Superintendent, Fruit Research Station, Kodur, and the Assistant Fruit Specialist, Coonoor, as well as the stations in their charge were inspected by the Fruit Specialist once during the year. These Fruit Stations were visited on a separate occasion again during the inspections by the Headquarters Deputy Director of Agriculture of Research and the Director of Agriculture. The Model Orchard-cum-Nursery, newly established at Peddapuram in East Godavari district and the fruit development work on the Kodaikanals were also inspected once.

The technical control of the Fruit Centres at Araku, Anakapalle, Lam (Guntur), Taliparamba and Wynaad continued to be with the Fruit Specialist. The centres at Taliparamba, Araku and Anakapalle were inspected once in year under report.

4. *Staff.*—Janab K. Fazlullah Khan, Assistant Fruit Specialist, on his transfer to Coonoor was relieved on 6th December 1951 by Sri K. Sambamurthy, newly promoted. Sri V. S. Rangacharlu assumed charge of the post of the Assistant Fruit Specialist sanctioned under the scheme for the establishment of Model Orchards-cum-Nurseries on 17th December 1951.

Sri V. N. Madhava Rao, Assistant to Fruit Specialist, and Sri V. Ramalingam, Horticultural Assistant, availed of earned leave for 9 and 25 days respectively during the year. Sri C. Sankaran, head clerk, was also granted earned leave for 22 days. Sri S. Viswanathan, lower division clerk, employed under emergency provisions resigned with effect from 17th August 1951 and Sri P. Mayilswamy was appointed in his place on 27th August 1951. The ministerial staff sanctioned under the Model Orchards-cum-Nurseries Scheme was filled with the posting of Sri V. S. Hanumantha Rao and R. Janakiraman as upper division clerks and Sri N. Srinivasaragavan as typist.

At Fruit Research Station, Kodur, Sri C. Bhujanga Rao continued to officiate as Superintendent. Several changes in the posts of Assistants took place either to replace untrained assistants by those who had undergone the Horticultural Course or to fill vacancies caused by leave, etc.

At Coonoor, Janab K. Fazlullah Khan relieved Sri V. S. Rangacharlu from the post of Assistant Fruit Specialist in charge of the hill fruit stations on the Nilgiris on 12th December 1951 and continued to be in charge till the end of the year.

Under the Model Orchard Scheme the Assistants and Fieldmen to be in charge of the farms at Peddapuram, Periyakulam and Mangalore assumed charge of their respective posts on different dates between 9th December 1951 and 21st June 1952.

5. *Tours.*—The Fruit Specialist was on tour for 54 days in the year. Besides the normal tours in connexion with the inspection of the Fruit Stations and centres, special trips were undertaken for purposes of selection of a site for the Central Cashew Research Station at Mangalore and for advisory work to orchards in Madurai, Tirunelveli and Madras districts.

6. The activities of the section during the year are reported below under separate heads.

I. Advisory.

(1) *Enquiries.*—As many as 2,842 enquiries relating to advice on various aspects of horticulture and fruit plant supplies were attended to.

(2) *Inspection of private orchards and nurseries.*—Three hundred and seventy private orchards, nurseries and sites were inspected by the Fruit Specialist and his staff during the year for active assistance, advice and help to the owners.

(3) *Meetings and gatherings of growers for discussion of mutual problems.*—The Fruit Specialist attended specially convened conferences of the propaganda staff and the prominent fruit growers of the respective district at Salem, Cuddapah and Guindy (Chingleput). In addition, he addressed a fellowship meeting of the Kodaikanal public and gave a discourse on the potentialities and possible lines of horticultural development on the Palni Hills. A public meeting was also addressed by him at Kodur (Cuddapah district) detailing the diseases and maladies to which the citrus trees in the tract are subject and the lines along which preventive and control measures could be directed. An opportunity was also taken to meet the Honorary Secretary of the Shevroys' Planters' Association at Yercaud and discuss with him the possibilities for a planned development of horticulture on the Shevroys.

II. Teaching and training.

(1) *Horticultural Diploma Course.*—The third session of the one-year post-graduate course leading to the Diploma in Indian Horticulture was concluded on 12th August 1951, with the holding of a Convocation for the award of the diplomas under the presidency of Sri B. Gopal Reddi, Minister for Finance, Madras. All the 20 trainees admitted for the final examination were declared by a duly constituted panel of examiners to be qualified to receive the diploma with two securing first class and eight securing distinctions in one or more subjects. In addition to the above, two of the Certificate Course trainees who had failed in 1950 passed at the examination specially arranged for them and were awarded the certificates of Proficiency in Horticulture on the same occasion. Dr. L. S. Doraisami, Economic Botanist, Department of Agriculture, Mysore State, served as the External Examiner while Dr. K. C. Naik, Headquarters Deputy Director of Agriculture of Research, Madras, delivered the Convocation Address.

The fourth session of this course commenced at Coimbatore on the 14th August 1951, with 24 candidates of whom 19 were drawn from among departmental Upper Subordinates, 3 were non-stipendary science graduates and the remaining two, nominees of the Hyderabad and Bihar State Governments. The hours of theory classes held for this course totalled to 429 and for practical classes to 503. The students were sent on excursions to the Fruit Stations at Kodur, Coonoor, Kallar and Burliar, the Banana Research Station, Aduthurai, the Agricultural Research Stations at Taliparamba, Wynaad and Aduthurai, the Government Botanic Gardens, Ootacamund, Sim's Park, Coonoor, and to several other places of horticultural interest where either large-scale commercial orcharding is being done or where plantations crops such as tea, coffee and pepper are being grown. A programme of special lectures by the staff of the Government Mycologist, Government Entomologist, Government Agricultural Chemist, Bio-chemist, Cytogeneticist and Government Lecturing and Systematic Botanist was also gone through. The special feature of preparation, presentation and discussion by every one of the trainees of a symposium on an allotted subject from among a carefully selected set of current practical problems in horticulture was accorded special emphasis in the curriculum. The study and recording of detailed descriptions with sketches of as many as 69 specimens of fruits, vegetables, spices and beverage crops, etc., obtained from the several Fruit Stations and Centres was another important feature of the course.

As the existing sanction for operation of this course expires on 13th August 1952, proposals for continuation over a further period of two years were formulated and submitted. At the instance of the Vice-Chancellor of the Madras University, proposals to seek affiliation of the Course with the University were also formulated and are under consideration.

(2) *B.Sc. (Ag.) Courses at the Agricultural College, Coimbatore.*—Teaching in horticulture for the B.Sc. (Ag.) Course at Coimbatore was attended to personally by the Fruit Specialist, assisted in conducting the practical sessions by his staff. As many as 45 hours of theory classes and 76 hours of practical were held for the B.Sc. (Ag.) II year class. The Fruit Specialist also conducted the terminal examinations in horticulture for this course and served as the Internal Examiner for the University Examination held in April 1952.

(3) *Training of mazdoors at Agricultural Research Stations in vegetative propagation methods.*—In order that a nucleus of personnel trained in the methods of vegetative propagation may be provided at each Agricultural Research Station so as to be readily available for making grafts from the promising fruit trees at each station, as well as to assist private fruit growers in the neighbourhood in similar work in their orchards, a scheme of training was newly put under way. Skilled propagators from the several Fruit Stations and Centres were sent on deputation to the Agricultural Research Stations and as many as 104 mazdoors were given a course in the practice of the several commonly employed propagation methods such as planting of cuttings, layering, budding, grafting, etc.

III. Research.

Fruits—Mango.—The flowering in mango during the year was unusually heavy but due to subsequent drought and the generally adverse climatic features, the crop harvests 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 which were either not represented or inadequately represented in our collections were newly obtained and planted at the Fruit Research Station, Kodur. A total of 1,168 controlled pollinations using desirable parental combinations was freshly made during the year resulting ultimately in 13 'crossed' fruits. From among the previous crosses, 56 trees fruited, of which 16 did so for the first time and 4 of these exhibited superior fruit quality. For enriching the germ plasm material in mango which can be profitably used in breeding work, efforts were put under way to collect the seeds of the hardy wild seedling mango trees found to occur in the several regions of the State. Seeds of a few types have been collected and sown by the end of the year.

In the field trials, among the polyembryonic rootstocks employed, Pahutan for Baneshan and Olour for Neelum have proved superior to others with mean tree yields of 280 and 836 fruits, respectively. Two new trials, one for assessing the value of green manuring adult mango groves and another for propagation of clonal strains of standard performance, by distinguishing between the variability caused by environment, position, etc. and that due to bud variations, were formulated for pursuit at the Fruit Research Station, Kodur.

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 Vadlapudi orange registered a relatively satisfactory performance. At the Araku Valley Fruit Centre, the sweet orange varieties Malta Ruby, Sathgudi, Tenneriffe and Washington Navel, 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 budsports 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 a pink-fleshed Vadlapudi 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 Gajanimma 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 die-back.

At Wyanad, 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.

Banana.—As a comprehensive programme of research on this crop is now being pursued separately at the Central Banana Research Station, the work at the other Fruit Stations was confined to the maintenance of variety collections at Coimbatore and Kallar and of hybridization to combine desirable characters dispersed in the several cultivated varieties. Attempts made to utilise for male parents in crosses, such varieties which yield either fertile or viable pollen did not meet with success. Recourse is therefore being now taken to raise the seeded wild types for use as male parents.

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 Gaviota scions on plum seedling 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.

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 precocious 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.

The trials conducted at monthly intervals over the entire year to propagate the jack by cincturing of shoots gave no success. 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 Burhar. 'Crossed' fruits between selected trees as well as between the Singapore and Velipala varieties were harvested at the latter place towards the close of the period under report. At Coimbatore, four seeds from a jack fruit which developed by fertilisation with breadfruit pollen were obtained and sown.

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, cherimoyer 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 seedling 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 State 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 precocious bearing and prolific yields was a successful new introduction to the Nilgiris hill ranges. The progress of Cassimiroa and loquat Advance introduced from the U.S.A. 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 selections 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 Chatham, and Monarch being outstanding, with estimated acre yields ranging from ten to eleven thousand pounds. Among the 'indeterminates,' the yields of Ottawa To-5 and Carleton only were fair, being between 6,000 and 7,100 lb.

The performance of Black Eye soya bean variety from the same source was moderately good and the small quantity of seeds collected was kept for further trials.

Other economic crops.—The progress of Pejibaye and Malayan oil palms at the hill fruit stations was satisfactory.

In cacao nearly 12,000 seedlings of the Criollo 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 seedling 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.

IV. Horticulture.

1. *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 for a comparison:—

Fruit nursery or centre.	Number of plants supplied.		Quantity of seeds distributed.	
	1950-51.	1951-52.	1950-51.	1951-52.
(1)	(2)	(3)	LB.	LB.
(4)			(5)	
(1) Government Fruit Nursery, Kodur	4,410	12,029	..	..
(2) Pomological Station, Coonoor ..	15,039	11,733	8,451	6
(3) Kallar Fruit Station ..		3,745		24
(4) Burliar Fruit Station ..		4,850		18
(5) College Orchard, Coimbatore ..	8,153	7,095	49	78
(6) Fruit Centre, Anakapalle ..	18,867	16,007	1,106	979
(7) Fruit Centre, Wynaad ..	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 an adequate number of seedlings for grafting purposes and this scheme has, therefore, been put again into operation in the 1952 season.

2. *Scheme for establishment of five model orchards-cum-nurseries in Madras State.*—Although this scheme is deemed to have come into operation with the posting of an upper division clerk at the office of the Fruit Specialist on 24th April 1950, it actually commenced functioning with the acquisition of lands at Peddapuram (East Godavari district), and the posting of a Fruit Assistant at this Centre on 9th December 1951. Towards the close of the year under report, the work at two centres, viz., Peddapuram and Periyakulam (Madurai district) had been initiated and the lands at two others, Thimmapuram (Salem district) and Mangalore (South Kanara district) had just been acquired. The land for the fifth centre at Giddalore (Kurnool district) was yet to be acquired pending the completion of acquisition formalities.

At Peddapuram and Periyakulam the layout of the sites was completed including demarcation of boundaries, assignment of plots to planting of various fruits, establishment of the nursery, etc. Raising of live-hedges and windbreaks, and of rootstock plants in the nursery was also taken on hand.

3. *Survey of Agency tracts in the Circars with special reference to mandarin growing.*—A team of three trained Assistants surveyed the Rampachodavaram and Gudem agencies of the Circars to study the existing practices in the cultivation of mandarin oranges and suggest possible lines of improvement. Their report was condensed for publication and their findings communicated to the Agency Development Officer for implementing.

4. *Fruit extension work on the Kodaikanals.*—The sanction accorded by Government in G.O. Ms. No. 856, Food and Agriculture, dated 28th May 1951, for the appointment of special staff for horticultural extension work on the Kodaikanal was given effect to, with the posting of a Fruit Assistant on 11th July 1951. He completed a horticultural survey of the Palnis and located as many as 40 sites suitable for extension of fruit-growing. Two hundred and thirty individual holdings were visited for advisory purposes and 2,000 fruit plants arranged to be supplied to indentors from departmental nurseries. This scheme has been extended for another year in G.O. Ms. No. 678, Food and Agriculture, dated 17th April 1952.

V. Miscellaneous.

1. *New schemes.*—The scheme for the establishment of a Central Cashew Research Station at Mangalore with financial assistance of the Indian Council of Agricultural Research was sanctioned in G.O. Ms. No. 1579, Food and Agriculture, dated 7th August 1951. A suitable site extending a little over 30 acres was selected in Ullal, four miles from Mangalore and acquisition proceedings were under way.

2. A scheme for the horticultural development of the Shevroys (Salem district) submitted to Government was ordered to be deferred for the present.

3. A scheme for the establishment of a Fruit Research Station on the Lower Palnis was revised and has been submitted to Government for consideration.

4. A scheme for setting up an organization for Horticultural Extension Service in the State was drawn up for seeking sanction of the Government.

5. Proposals for the establishment of a Demonstration Orchard-cum-Nursery near Maradumalli in the Agency Tract of the Circars were formulated and submitted.

6. The scheme of research on plains vegetables was revised in the light of the directives of the Indian Council of Agricultural Research and resubmitted but has been deferred by Government for the present.

7. A scheme for economic research on cacao was prepared and submitted but has been deferred.

Exhibitions.—The section actively participated in putting up attractive displays at the Annual Flower Show at Ootacamund. Farmers' Days were held at quarterly intervals at the Fruit Stations when opportunity was taken to explain the research activities to the visiting ryots. In addition, seasonal exhibits were sent to over ten exhibitions different parts of the State.

Publications.—The following scientific papers, bulletins, popular articles, notes, newsletters, etc., were prepared and forwarded for publication during the year :—

(1) A note on the economic and cultural possibilities of cacao in Madras State.

(2) A paper on "Two new berry fruits—blackberry and raspberry—for the hill ranges of South India".

(3) A note on "A new type of quick-yielding jack tree".

(4) A popular article on "Passion fruit".

(5) A paper on "Blossom biology of guava".

(6) A note on "Fruit Development in Ceded Districts".

(7) A paper on "Studies on pollination and fruit set in Walnut".

(8) A paper on "Vegetative propagation trials with persimmon".

(9) A paper on "Effects of linseed oil spray on growth and cropping in Apples".

(10) A science note on "Bi-pistillate flower in pummelo".

(11) A report on "Mandarin growing in the Agency Tract".

(12) A bulletin on "Mangosteen and its culture in South India".

(13) A bulletin on "Tree spices of South India".

(14) A science note on "Vegetative propagation of durian by inarching".

(15) A note on "Vegetative propagation of tree tomato through shoot cuttings".

(16) News excerpt on "Hand-pollination increases fruit size of seedless breadfruit".

(17) Newsletter on "Culture of clove trees under South Indian conditions".

(18) A popular article on "Passion fruit—a quick-growing fruit-yielding vine".

(19) A newsletter on "New additions to the promising varieties of apple on the Nilgiris".

(20) News excerpt on "A new rootstock for nutmeg".

(21) News excerpt on "A promising lemon for the hills".

(22) News excerpt on "Insecticidal plants".

(23) A popular note on "Cashew".

(24) A popular article on "Role of quick-growing fruits in present food shortage".

(25) A popular article on "Top-working of unthrifty fruit trees on the Kodaikanal".

(26) A note on "Pests and diseases of fruit trees in Kodaikanal".

Committees.—The Fruit Specialist served as a member of the Research Council, College Estate Committee, College Board and Study Group Sessions, in addition to being the Convenor of the Perennial Crops Sub-Committee of the Research Council. In all these capacities, 72 meetings were attended during the year.

Miscellaneous.—(1) Three pictorial posters for propaganda purposes were finalised and completed. Photograph copies of nine completed posters were made for publicity at the Fruit Stations and Centres.

(2) Thirty-two specimens of fruits were examined and identified on behalf of private growers seeking the information.

AGRICULTURAL COLLEGE AND
RESEARCH INSTITUTE, COIMBATORE,
26th July 1952.

U. NARASINGA RAO,
Fruit Specialist.

ANNEXURE I.

PRACTICAL UTILITY OF THE YEAR'S ACHIEVEMENTS IN HORTICULTURAL RESEARCH. Four more promising mango hybrids have now become available for extension in the State. Pahutan and Olour, which are polyembryonic mangoes and therefore capable of producing seedlings of uniform growth and vigour, have been found to be good as rootstocks for the two superior varieties Baneshan and Neelum. Their use for this purpose would promote standardized performance of commercial groves. In Citrus, the cultivation of sweet orange varieties, such as Malta Ruby, Sathgudi, Tenneriffe, and Washington Navel and of the mandarin orange variety, Nagpur Santra has met with success in the Araku Valley and their extended cultivation in that tract can now be undertaken with some measure of assurance. The successful introduction of Seville lemon on the Nilgiris is another feature of promise. Sathgudi orange trees budded on their own seedling stocks are found to yield superior quality fruits and the larger use of this rootstock in commercial nurseries is therefore indicated. In apples spraying of linseed oil emulsion or Sandolin 'A' during the dormant period of the trees has been found to hasten the blossoming and promote yields and these sprays would prove to be a profitable orchard practice with this fruit crop. The successful propagation of the persimmon by grafting on *Diospyros lotus* has solved a longstanding problem and the extended cultivation of this fruit on the hills is now only a matter of time. In breadfruit significant increases in fruit size have been recorded by merely dusting the female spikes with its own or jack pollen. By this simple expedient therefore, larger crop harvests can be ensured in all seasons. Three promising varieties of tomato of 'determinate' habit which, in effect, eliminates the provision

of stakes to tie the plants, have been introduced from Canada and their extension in the tract would not only prove profitable but also attract a larger class of growers who are unable to invest large sums required normally for the cultivation of this crop.

ANNEXURE II.

STEPS TAKEN FOR THE DISSEMINATION OF THE RESULTS OF HORTICULTURAL RESEARCH.

1. *Through person and by post.*—As in the past years, the attention paid to as many as 2,842 enquiries, both personal and postal, in the period under report constitutes an effective step in meeting the difficulties experienced by growers in matters of selection of sites, choice of the kinds and varieties of fruits to grow, the cultural peculiarities of each crop, disposal of produce, etc. In addition to the above, the personal visits made to as many as 370 private orchards, nurseries and sites and the meetings held in several districts with representative growers and the district staff have met to an extent the need for personal contacts with the growers and appreciation of their problems as well as for transmitting results of research to the groves and plantations which form the backbone of horticultural development of the State. The participation in exhibitions and the holding of Farmers' Days in the several districts and at the different Fruit Stations are yet another means utilized to put the results of research across to the growers.

2. The training of personnel in scientific horticulture through the Horticultural Diploma Course and their subsequent posting to places where commercial horticulture is extensively practised form an integral feature in the dissemination of the results of research secured at departmental Fruit Stations and Centres.

3. The pictorial posters that have been prepared and the numerous scientific papers and notes, popular articles, bulletins, news excerpts, etc., which have been detailed in the report are yet another means availed of for publicising the results of research.

4. Nearly 89,500 fruit plants raised from tested parents, and adopted to the different regions have been distributed. These are expected to bring at least about 600 acres under improved plant material which can form secondary centres for further dissemination of desirable types in due course.

ANNEXURE III.

STATEMENT SHOWING THE SANCTIONED STRENGTH OF STAFF AS ON 30TH JUNE 1952 FOR FRUIT SECTION.

Name of service and post.				Permanent.	Temporary.
I. Madras Agricultural Service—					
Category 3—Fruit Specialist	..	..	..	1	..
Category 6—Assistant Research Officers	..	..	..	2	2
II. Madras Agricultural Subordinate Service—					
Upper Subordinates	..	..	..	11	7
Upper Subordinates undergoing training	..	..	..	..	20
Fieldmen	..	..	..	4	10
III. Madras General Subordinate Service—					
Store-keeper—II Grade	..	..	..	2	1
IV. Madras Ministerial Service—					
Upper Division Clerks	..	..	..	..	3
Lower Division Clerks	..	..	..	2	5
Typists	..	..	..	3	1
V. Madras Agricultural Engineering Subordinate Service—					
Station Wagon Driver	..	..	..	..	1
VI. Madras Inferior Service—					
Peons	..	..	..	6	9

ANNEXURE IV.

RESULTS ACHIEVED IN RESEARCH DURING 1951-52 AND ANNUAL PROGRAMME OF WORK FOR 1952-53 AT THE FRUIT STATIONS.

The Fruit Research Station, Kodur, Cuddapah district.

Results achieved in research during 1951-52—Citrus.—Among the varieties that yielded a crop, two of sweet orange, two of pummelo, one in each of lemon and marmalade orange and the *Vadlapudi* orange registered satisfactory performance. Five suspected budsports 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 a 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 has indicated that fruits on Sathgudi rootstock have ranked first while those on Cajanamma have been rated as the most inferior. In the acid lime rootstock trial, one tree on Gajanamma rootstock has given a record yield of 7,584 fruits though the yield differences between trees on the several rootstocks and the seedlings have not proved significant. In the newly established rootstock trial, Sathgudi and acid lime trees on Jamberi rootstocks have 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 for the first time. Four of these have exhibited superior fruit quality. In the field trials among the polyembryonic rootstocks, Pahutan for Baneshan and Olour for Neelam 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 introductions include one variety of custard apple, two of date and one of zizyphus.

Annual programme of work for 1952-53—(1) Variety collections.—The study of performance of the individual trees in the varietal collections in respect of growth, yields, fruit quality, etc., will be continued and promising types and trees will be perpetuated 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 Neelam and Bangalora varieties and the relationship between the nature of shoot and its yielding behaviour will be judged from the data being collected.

(6) *Top-working inferior trees in mango.*—A comparison of the economics of top-working unthrifty trees versus grubbing out and inter-planting will be sought.

(7) *Citrus rootstock trials*.—Observations in the existing plots under Sathgudi and acid lime rootstock trials will be continued. Similar observations will be made with 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 to study the merits of merely intercultivating in mango groves as compared to 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 diseases 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 ryots' 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 Pomological Station, Coonoor (the Nilgiris).

Results achieved in research during 1951-52.—The growth and yield performance of Rome Beauty apple on Merton 779 and 778 has been the best among the five rootstocks under trial. Grafts of six new apple varieties have been propagated from scion material obtained from New Zealand and brought under trial. 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 has 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 accretion of incompatibility between scions of plum varieties, Czar and Gaviota on plum seedling rootstocks has been evidenced 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 has met with success.

An yellow-fruited passion fruit variety introduced from Ceylon and Seville lemon from the plains have both proved promising for cultivation on the higher elevations as 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.

Annual programme of work for 1952-53.—Further work to extend the trials on hand and 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 Kallar and Burliar Fruit Stations (the Nilgiris).

Results achieved in research during 1951-52.—In the rootstock trials for the mandarin orange at Kallar, the growth of the trees on pumello and sweet lime has been the poorest. Though in two of the observation plots, Jamberi rootstock has proved to be vigorous, in a third plot with older trees (about seven years in age), the trees on this stock exhibit signs of gumming, distortion of bud joints and varying degrees of die-back. In jack, six selections of individual trees of merit have been made and their clonal progenies raised. In a monthly inarching trial with durian, a cent per cent success has been obtained in October operations with durian seedling 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 seedling stocks for inarching. Similarly with nutmeg, 90 to 100 per cent success has been obtained in approach grafting on its own and wild nutmeg, *Myristica beddomei* seedling stocks. An essential oil has been extracted from nutmeg leaves with possible weedicidal properties. I cacao, nearly 12,000 seedlings of the Criollo variety have been raised for extensive distribution and trial in different regions of the State.

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 introductions of varieties and kinds of plants of possible economic value to the State.

College Orchard, Coimbatore.

Results achieved in research during 1951-52.—With the shift of headquarters of the Fruit Specialist to Coimbatore, the College Orchard area was made an additional venue for the pursuit of research on some of the fruit and vegetable crops. During the year, hybridization work in banana, sapota, jack and breadfruit was commenced on planned lines. Hybrid seeds of crosses between jack trees characterized by superior quality fruit, and off-season bearing, as well as between jack and breadfruit, were obtained and sown. An interesting off-shoot of this work has been the significant increases in fruit size recorded in breadfruit by merely dusting the female spikes with its own or jack pollen. Breeding work for the improvement of papaya through 'sib-mating' is another line of work that has been newly put under way.

In vegetables, several types of brinjal and bhendi have been collected and single plant selections made for the isolation of pure lines and exploitation of hybrid vigour. Three promising varieties of tomato of 'determinate' habit, which in effect eliminates the provision of stakes to tie the plants, have been isolated from among several new varieties introduced from Canada and their seed multiplication has been taken on hand.

Annual programme of work for 1952-53.—The programme will consist mainly of a continuation of the items on hand and will include hybridization in banana, sapota and jack and breeding work in papaya, brinjal and bhendi. Hybrid seeds in brinjal and the seeds of the promising tomato varieties will be multiplied for distribution. A classification of brinjal varieties will also be undertaken by way of a fundamental item of research.

ADMINISTRATION REPORT OF THE SUGARCANE SPECIALIST, ANAKAPALLE, FOR THE YEAR 1951-52.

1. *Charge*.—I continued to hold additional charge of the post of the Sugarcane Specialist till 30th May 1952 when I assumed charge as the regular Sugarcane Specialist.

2. *Season*.—During the year under report, a total rainfall of 37.62 inches was received on 58 rainy days against 36.22 inches received on 56 rainy days of the previous year. The south-west monsoon was normal and it benefitted the standing crops to a great extent. Rainfall in the north-east monsoon was below the normal average by a little over 2 inches. The crops had to be maintained by lift irrigation frequently during this period. There was drought in the early stages but the crops were benefited by the summer rains received in May. But for the cyclonic winds in November which caused some damage to the well-grown cane crops, the season was more or less normal.

3. *Crop improvement—Salient features of programme of work for 1951-52*.—In the division of agronomy, the study of new varieties received from Coimbatore and elsewhere was continued for selecting promising varieties and put them for yield tests and final selection of the best ones suitable to the tract. Two varieties, Co. 419 and Co. 630, were planted in an experiment to study the performance of varieties under water-logged conditions. A manurial experiment to find out the optimum proportion of organic and inorganic nitrogen in the concentrated manure to be applied to cane was continued. A new experiment to study the effects of continuous application of ammonium sulphate to sugarcane and its rotational crops was laid out. In chemistry further studies on the nitrogen nutrition of sugarcane and foliar diagnosis were made. The study on the composition of cane juice in relation to the quality of jaggery and use of clarificants like lime, super phosphate, etc., was continued. In physiology, water requirement of cane in relation to manuring was studied in the field and pot experiments. Other investigations included study on weedcides, growth and maturity in relation to the time of planting. In mycology, the disease of smut was investigated with regard to its mode of carryover, varietal resistance, and loss sustained due to the incidence of smut. Red-rot and some minor diseases were also under study. In entomology, chemical control of borers and biological control of the early shoot borer by the release of the parasite *Trichogramma* were programmed to be studied besides varietal resistance to borer attack, and control of minor pests like *Pyrilla*.

In paddy and millets trial of promising cultures and selection of high-yielding paddy strains both for normal and late plantings, were conducted during 1952-53. Mixed cropping of ragi with yam or pillipesara and growing of fruits and vegetables were attended to besides distribution of various fruit plants.

4. *Progress of research*.—(a) *Sugarcane—Agronomy*.—One hundred and forty varieties were under study in the varietal study plots. Based on the juice quality, yield and other agronomic factors, the following varieties were found promising:—

Early group—Co. 719, Co. 727.

Mid-season group—Co. 750, Co. 785.

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

In the preliminary yield trials, only one variety, Co. 684, was found to be promising and promoted for trial in the main yield trial. In the main yield trials, for early, mid and late season varieties, none of the varieties tried were found to be better than the standard varieties, namely, Co. 527, Co. 449 and Co. 419, respectively. In the study of the performance of varieties under water-logged conditions, Co. 419 continued to give the highest yield.

In the study of optimum proportion of organic and inorganic nitrogen in the concentrated manure to be applied to cane, no significant difference in yield was observed among the different treatments. In the permanent manurial experiment to study the effects of continuous application of ammonium sulphate to sugarcane and its rotational crops, the plots receiving the concentrated manure recorded significantly better yields than 'No Manure' and 'Farm Yard Manure only'. In the yield maximisation plot, the yield of the plant crop was 63.87 tons of millable cane per acre while the ratoon from the previous plant crop of 1950-51 gave an acre yield of 52.44 tons per acre.

Chemistry.—Based upon the earlier studies on the nitrogen nutrition of cane, a fresh experiment was started to study if by proper time of application a more efficient utilization of nitrogen can be achieved and whether by increasing the population, the yield can be enhanced by the modified method of application. Studies on the availability of nitrogen disclosed that though the treatments manured at planting showed a higher initial peak of nitrate in the soil, the same was not reflected in the nitrogen uptake by the plant, while those manured 50 days after planting showed a higher nitrogen uptake. There were no significant differences in yield or juice quality between the different treatments though there were trends towards higher yields when the manuring was shifted to 50 days after planting. Foliar diagnosis studies indicated higher nitrogen in leaves with increased applications of nitrogen. There was also more nitrogen in leaf when ammonium sulphate or groundnut cake was applied as compared to no manure and farm-yard manure. Considering the final yields it was tentatively concluded that the leaf nitrogen under farm-yard manure and no manure indicated deficiency levels. Studies on the composting of cane trash confirmed the superiority of pig-dung over cow-dung in hastening the decomposition of cane trash. The manurial value of pig-dung compost was better with regard to nitrogen and phosphoric acid content. In the study on the composition of cane juice and the quality of the resultant jaggery, it was confirmed that high colloids, non-protein nitrogen and low phosphate are associated with bad juices. The study on the use of clarificants in the manufacture of jaggery revealed that pH 6.4 in juice is the optimum for good setting and colour of jaggery.

Physiology.—In the experiment to study the water requirement of sugarcane first ratoon crop, irrigation once in twelve days recorded significantly higher yields than the treatments in which the crop was irrigated once in 18 or 24 days. The study of the influence of form of manure in relation to the water requirement of Co. 419 indicated no significant differences in yield when the crop was irrigated once in 12 or 24 days and manured with ammonium sulphate, groundnut cake or a mixture of both. In the pot experiment to study the soil moisture with reference to form and dose of nitrogen, it was noted that under higher level of moisture, tillering was better in clayey soils and under higher levels of nitrogen more water was needed in both clayey and loamy soils. It was also found that utilization of ammonium sulphate was more efficient under higher levels of moisture and at such soil

moisture level, the form of manure did not affect the quality of the juice to any appreciable extent. In the study on weedicides spraying at opportune time, i.e., when the weeds just germinated but did not complete the emergence of first leaf was found to be most essential to get satisfactory results. Agroxone or Fernoxone at 4 lb. active principle per acre mixed in diesel oil emulsion was noted to be most effective on the pernicious weed *Trianthema decandra*. It was possible to prevent lodging fairly well in a crop giving an acre yield of about 45 tons of cane by the cheaper method of propping by trash twist with fewer bamboos, in spite of cyclonic winds.

Mycology.—Most of the agronomically promising varieties were found to be resistant to red rot. As in the previous years, it was noted that Co. 449 and Co. 527 were less susceptible, Co. 419 susceptible and Co. 475 and Co. 620 highly susceptible to smut infection. A smutted clump not only suffered loss in weight but also in the available number of millable canes per clump. When all the clumps in the field are affected to a greater or lesser extent, the loss in yield may go up to 39 per cent. Among the minor diseases, leaf spot caused by *Helminthosporium* was noted to be in endemic form in the Godavari Delta and it disappeared in November due to favourable weather conditions.

Entomology.—In the study on the methods of chemical control of borers, spraying 0.32 per cent D.D.T. was noted to have increased the cane yield appreciably. Plots sprayed with D.D.T. showed less borer infestation and the mortality of shoots was minimum in this treatment. Biological control of the early shoot borer by the release of *Trichogramma* was studied in three district centres and the incidence of the pest was noted to have been checked to a small extent. In the study to estimate the loss due to early shoot borer in three varieties, it was found that the loss was much more in Co. 527 than in Co. 419 or Co. 475.

(b) **Other crops—Paddy.**—Paddy was planted in an area of 31.80 acres during the year as against 35.50 acres planted during the previous season. The average acre yield of paddy in the non-experimental area was 2,373 pounds per acre as against 1,815 lb. of the previous year, and a ten-year average of 2,530 lb. The average acre yield of straw was 3,826 lb.

There were three series of yield trials. Culture No. 3948 of Gummasari was again outstanding in its performance. In the permanent green-manure experiment, an increased yield of 3.6 per cent was recorded in the manured plots when compared to the 'no manure plots' in the fifth year of the study of residual effects. In the trial to study the suitability of some of the promising strains for late planting conditions, it was found that A.D.T. 18 and Co. 18 among the short-duration strains and Co. 25 among the long-duration ones gave satisfactory yields.

Millets.—Ragi was grown on the station in the two seasons with average acre yields of 1,655 lb. of grain from AKP. 2 in the *punasa* season and 3,376 lb. from AKP. 6 in the *pyru* season. Strain AKP. 6 was found to be a remarkably high yielder and best suited for the *pyru* season.

AKP. 2, 'Ganti' recorded an acre yield of 603 lb. of grain per acre while in 'jonna' AKP. 1 gave a yield of 1,617 lb. of grain per acre.

Green-manure crops.—Sunnhemp grown in an area of 14.05 acres for green manuring paddy gave an acre yield of 10,036 lb. of green matter as against 13,800 lb. recorded in the previous year. Pillipesara and cowpea recorded 16,450 lb. and 18,483 lb. of green matter per acre.

Sesbania speciosa sown as a green-manure crop in rice fallows during the hot weather period yielded over 37,000 lb. of green matter per acre in 100 days. Four irrigations were given during the crop growth. A total quantity of 3,198 lb. of seed was collected from the plants of *Sesbania speciosa*.

Sixteen hundred *Gliricidea maculata* seedlings were planted along the fence line and road margins in addition to the 1,365 shrubs aged 2-3 years already existing. A quantity of 144 lb. of seed was collected during the year.

Fruits and vegetables.—Elephant yam raised as a mixed crop with ragi in the *punasa* season gave 20,520 lb. of yam per acre and 1,962 lb. of ragi grain per acre.

Cabbages grown over an area of 0.48 acre recorded an acre yield of 12,704 lb. of heads valued at Rs. 2,382.

Fourteen varieties of sweet potato were tried of which I.B. 22 and V. 12 gave the highest yields of over 10,000 lb. of tubers per acre. Seventy-three pounds of brinjal seed and 433 lb. of new era cowpea were produced in the orchard area.

The following are the details of the fruit plants supplied from this station:—

Mango grafts	..	..	..	..	..	617
Guava and sapota layers	..	..	..	..	..	317
Citrus grafts	..	..	..	..	..	3,667
Jack seedlings	..	..	..	..	..	337
Jack grafts	..	..	..	..	..	3
Custard apple seedlings	..	..	..	..	..	28
Rose apple layers	..	..	..	..	..	6
Cashewnut seedlings	..	..	..	..	..	16
Grapevine cuttings	..	..	..	..	..	44
Miscellaneous plants	..	..	..	..	..	34

Cropping in rice fallows.—Different types of short duration of cotton, *kasi gogu* (mestha) and groundnut were cultivated in the rice fallows after the harvest of the paddy crop. Groundnut alone was so far harvested. Strain No. T.M.V. 2 came up well and gave an acre yield of 950 lb. of pods per acre in about 4½ months.

5. **Poultry.**—The general condition of the poultry was satisfactory. At the close of the year, there were 47 birds of white leg-horn of which 26 were hens, 6 cocks and 15 chickens. Besides, there were three country hens also. The total number of eggs produced in the year was 1,858 of which 578 were kept for hatchling on the station and the rest sold to the public for hatching and table purposes. The total receipts from the poultry amounted to Rs. 792-5-6.

6. **Agricultural education.**—(1) There were 32 boys on rolls in the juvenile Labour School attached to the farm and 30 were promoted to the higher classes.

(2) The school was closed with effect from 7th April 1952 as per G.O. Ms. No. 606, dated 7th April 1952.

7. **Training of demonstration maistries.**—Two hillmen from Srikakulam agency underwent practical training as maistries. Thirteen maistri trainees and twenty-three fieldmen trainees were also trained for a period of six months.

8. *Exhibitions.*—The quarterly exhibitions and field days were celebrated on the station on four occasions. They proved highly popular and many ryots visited the station to witness the exhibitions and field demonstrations of the various improvements in the cultivation of crops.

The annual Farmers' Day that was celebrated on 2nd February 1952, was opened by Dr. C. Van Dillewijn, Sugarcane Expert of the F.A.O., and he demonstrated the propagation of sugarcane by the 'rayungan' method.

Salient features of practical results.—In the varietal trials, Co. 719 was found to keep juice quality late in the season. Variety Co. 419, though highest in yield, does not keep quality beyond April and the selection of a variety to keep up 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, 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 effects 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 from the manure at a stage when the crop is not yet in a condition to utilize it to the maximum. Application of the first dose of the fertiliser, 45 days after planting is recommended for better utilization. Study of manure in relation to water requirement of sugarcane crop, revealed an important indication that inorganic form of nitrogen is not to be preferred under low soil moisture conditions. While it is widely known that under conditions of heavy manuring more water is required, the comparative merits of the two forms of nitrogen in relation to availability of water were not so far studied. Indication were that organic form of nitrogen is to be preferred under low soil moisture under which conditions, the inorganic form led to lower yields. In relation to soil type, pot experiments revealed that when water was plentiful, both the soil types recorded high yields, while under reduced water-supply, the heavier soil types are not efficient in crop production. It is generally indicated that organic form of manure may be preferable under heavy soil type with limited water-supply. The experiments are still in progress. It was again confirmed that pig-dung is a better starter for composting can trash. The weedicide 2-4 D combined with diesel oil emulsion was effective against dicots and nut grass but it is found to be costly due to the high cost of the weedicide. The effectiveness of the weedicide is increased manifold by spraying at emergence of the 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 as also at the Sugarcane Liaison Farm, Samalkot, revealed that combined with planting in deep trenches the trash twist method of propping is efficient for a crop of 45 tons. Cost of cane by this cheap method of propping was found to be reduced by 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 rayungans (sprouted buds) in deep trenches one metre apart with a spacing of half metre between the buds in the row resulted in good stand with uniform canes in a clump. Combining this system of planting with the Anakapalle short crop system new varieties can be multiplied 600 to 900 times within a year as against the present rate of about 100 times by short cropping. Studies in liming indicated that pH 6.4 may be the optimum for immature and mature juice while even liming to higher pH did not improve the setting of 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 carryover 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 and quality and losses due to such factors may go up to thirty-nine per cent. There are indications that the smut is carried over by primary infections of buds at about ground level while the buds lower down may be comparatively less infected. Shaving of stubbles for ratooning the crop seems to lead to lower infestation and these results which are of practical importance are under further investigation. Varieties Co. 527 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 in 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.

In paddy it was found that culture No. 3948 of Gummasari was outstanding. In the late planting season for long duration, 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.) when raised during the hot weather period with four irrigations in the growth phase.

Programme of work, 1952-53.—Study of the varieties in the study plots and in the yield trials will be continued. Performance of varieties under conditions of water logging is programmed to be studied with the two varieties, Co. 630 and Co. 419. The effects of continuous application of ammonium sulphate are under investigation in the permanent manurial experiment. A new experiment on the efficacy of chilean nitrate as a source of nitrogenous manure has been laid out from 1952-53 season. Other miscellaneous studies 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. Other investigations include the study of the composition of the cane juice and its effect on quality of jaggery, use of clarificants like lime and super in jaggery making and composting of cane trash. In physiology, water requirements of the sugarcane crop in relation to the form of manure will be studied. Pot experiments to study the manurial requirements of Co. 419 with reference to loamy and clayey soils and their moisture contents are also programmed. Other miscellaneous studies include studies on the propping of cane, effect of weedcides and maturity of cane. In the mycology division the varietal resistance studies to smut and red-rot are continued. Mode of carryover of smut, and loss due to its incidence are also in the programme. Minor diseases also will be investigated. In Entomology, experiment on the chemical control of borders is laid out. Other studies 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 and jonna will be undertaken. In addition to propagation to important fruit plants like mango, jack and guava, hybridization work in brinjals and sapota is proposed to be commenced during the year.

Sugarcane Research Station, Gudiyattam—Season.—A rainfall of 23.34 inches distributed over 33 days was received as against 18.19 inches on 37 days in the previous fasli year. The rainfall recorded during the year fell short of the thirty-five years average of 33.64 inches by 9.70 inches due to the failure of the south-west monsoon and summer showers. This low precipitation during the year following a year of very poor rainfall, affected the timely agricultural operations as well as the cropping scheme. The water-table in the wells receded and irrigation flow from the Gudiyattam tank lasted for about a month only.

Outlines of programme of work for 1951-52.—Varietal study and trial of varieties for selecting the best ones for the tract was continued. Study of the possibility of extending the period of crushing for a longer period in the tract were made in a new experiment with different times of planting and harvest. In paddy, raising of three crops in one year and trial of new strains were also programmed.

Progress of research.—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 prominent: 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 varieties were 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 and its 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 crop and its ratoon yielded 59.21 tons as against 37.25 tons from the long duration May crop. It was concluded that a plant crop and its ratoon yielded almost double that of the long duration crop of 20 months during practically the same period and it was not practicable to keep the long duration crop on the field without damage.

In paddy G.E.B. 24 was grown over 2.06 acres, MTU. 19 over 0.25 acres, A.S.D. 5 over 5.56 acres and Co. 25 and Co. 26 over 0.60 acre during the samba season from July to February. An average yield of 2,592 lb. from G.E.B. 24 and 1,580 lb. from A.S.D. 5 were obtained. The new strain MTU. 19 which was compared with G.E.B. 24 in observation plots yielded 3,420 lb. as against 3,000 lb. from G.E.B. 24. Paddy Co. 25 and Co. 26 which were tried for the first time on the farm yielded 2,070 lb. and 1,874 lb. grain per acre respectively. Paddy MTU. 15 and TKM. 3 were grown during the navarai and swarnavari seasons over 0.45 acre and 0.75 acre respectively. The acre yields of grain were 2,413 lb. from MTU. 15 and 2,712 lb. from T.K.M. 3. Cotton p. 216 F was dibbled in sugarcane fallows along the existing ridges in December 1951. Picking commenced by April and was completed by end of June. An acre yield of 344 lb. kapas was obtained.

Sunn hemp was sown in 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 *Gliricidea maculata* was good, and 150 lb. of seed were collected.

Practical results achieved.—Variety Co. 449 was found to be suitable for late crushings also. When Co. 419 and Co. 449 were planted in January

maximum cane tonnage was recorded after 12 months. However Co. 419 continued to improve in juice quality till 14 months' age unlike Co. 449. Instead of a crop on the field for 20 months it was found to be economical to take a plant crop and a first ratoon during the same period.

Programme of work for 1952-53.—Study of varieties and yield trial with early maturing varieties will be continued. The time of planting and harvest experiment is in progress. Trial of 'Rayungans' as seed material and pit system of planting sugarcane and study of Chilean nitrate as a nitrogenous manure will be conducted.

Sugarcane development work—(a) Liaison farms.—In the varietal trials conducted in the four sugarcane liaison farms, Co. 527 and Co. 475 for Samalkot zone, Co. 449 and Co. 475 for Hospet zone, Co. 527 and Co. 471 for Nellikuppam and Kulittalai zones were found suitable for the early season. Of these Co. 475 was susceptible to smut and hence it is not programmed to be released. In respect of mid season Co. 449 was found to be good in all centres and Co. 475 which was also good had to be rejected on account of high susceptibility to smut. In Nellikuppam Co. 619 and in Kulittalai Co. 467 proved to be better than Co. 419 for late season. In ratoon trials first ratoon was inferior to plant crop in all the varieties and in all centres except at Kulittalai. Second ratoon was poorer than the first ratoon. In the manurial trials 250 lb. nitrogen per acre was found to be optimum for Hospet and in Samalkot and Hospet zones there were indications that higher proportion of ammonium sulphate in the manure mixture put up the yields while there was depression in quality of juice. In Nellikuppam zone higher proportion of organic form of nitrogen seems to be beneficial even in respect of yield. In the Samalkot zone application of manure in one or two doses before June, and in Nellikuppam zone, before 120 days after planting is to be recommended. In Hospet application of bulk of nitrogen in the form of green manure did not prove to be as good as applying the entire dose as mixture of cake and ammonium sulphate. In Samalkot zone where heavy expenditure is incurred in propping sugarcane, trials during this and the previous season indicated that by adopting cheaper methods of propping the net profit per acre increased by nearly Rs. 100 and the cost of production per ton of cane was reduced from Rs. 39-15-0 to Rs. 35-6-10. In Hospet cane after paddy yielded better than cane after cane. In this area adsali crop was found to be uneconomical due to heavy lodging and breakage while at Nellikuppam Co. 527 was found to be suited for adsali cropping with about 8 tons of increased yield over the normal crop. In Kulittalai, trials with the three standard varieties indicated the immediate possibility of raising sugar recovery by proper planning of planting and harvest for these varieties. For the special season crush Co. 471 was found to be the best for early crushing. In general, yield was significantly superior in special season harvest as compared to the main season harvest. The sucrose content of a crop of 9 to 10 months' age was found to be higher in the special season plantings than in the main season plantings.

(b) Extension work.—The development staff were mainly engaged in rendering technical advice to cane growers and assisting them in securing implements, manures, etc. In respect of important items demonstration plots were laid down to assess the value of the improvements. The achievements recorded in respect of important items are summarised below:—

- | | |
|--|---------------|
| (1) Area worked with improvement implements for thorough preparatory tillage | 24,561 acres. |
| (2) Area worked with ridge plough | 19,677 .. |

(3) Area brought under green manuring ..	6,349 acres.
(4) Area brought under green leaf manuring ..	7,844 „
(5) Area manured with optimum quantity of concentrated manures.	35,343 „
(6) Area worked with bullock drawn implements for inter-cultivation.	25,853 „
(7) Area wrapped and propped	10,328 „
(8) Area brought under proper drainage ..	19,917 „
(9) Area harvested at proper time	18,924 „
(10) Demonstration of better preparation of jaggery.	6,397 (numbers).
(11) Construction of improved furnaces ..	2,751 „
(12) Composting cane trash	3,660 „

ANAKAPALLE,
6th August 1952.

S. V. PARTHASARATHY,
Sugarcane Specialist.

ADMINISTRATION REPORT OF THE GOVERNMENT AGRICULTURAL CHEMIST, COIMBATORE, FOR THE YEAR 1951-52.

I submit herewith the administration report of the section of the Government Agricultural Chemist for the year 1951-52.

(1) *Charge*.—I was in charge of the section throughout the year.

(2) *Deputation*.—Sri D. V. Krishna Rao was on deputation to United Kingdom and Palestine for higher studies. He rejoined duty on 7th March 1952.

Sri S. Varadarajan was deputed for training in the Regional Course in Nutrition held at Calcutta sponsored by the World Health Organization, Food and Agricultural Organization and Government of India during September-December 1951.

The work of the section may be reported under three heads, viz., (I) teaching, (II) analytical and advisory and (III) research.

I. Teaching.—As in previous years members of the chemistry section with experience in the particular branches of Agricultural Chemistry were deputed to take lecture classes. The number of lectures delivered and the practical classes held during the year were 257 and 650 respectively.

Award of M.Sc. degree.—Sri D. John Durairaj, Assistant in Chemistry, was awarded the M.Sc. Degree of the Madras University. The following Assistants registered themselves for M.Sc. degree of Madras University under my guidance :—

- (1) Sri S. Varadarajan.
- (2) Sri C. R. Venkataraman.
- (3) Sri C. K. Rajagopal.
- (4) Sri T. Seshagiri Rao.
- (5) Sri R. Soundararajan.

II. Analytical and advisory.—The analytical and advisory work constituted one of the largest and important phases of the activities of the section. Another important function was in answering numerous queries received on matters pertaining to improvement of soil fertility, manuring, feeding of livestock, on saline and alkaline land reclamation, suitability of waters for irrigation, etc.

Two thousand six hundred and seventy-nine samples of various kinds were received during the year as against 1,887 in the previous year, i.e., 42 per cent more than in the preceding year. The receipts by way of analysis fees amounted to Rs. 4,953 as against Rs. 3,649 in the previous year.

III. Research—A. Soils.—(1) *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 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.

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

(3) *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 series. It was spectacular under the irrigated condition.

(4) *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 phosphates 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; however, 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 yields of grain and straw were 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. and 60 lb. 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 phosphate with consequent availability of the added soluble phosphates to plants.

(5) *Reclamation of alkaline lands in Cauvery-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 ameliorants 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 alkali resistant variety of paddy showed that the short duration variety, S.R. 26. B, 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.

(6) *Soil survey for the fruit development in the Ceded Districts.*—The field survey was completed and in all 38 profiles were examined and 140 soil samples and 10 rock samples were taken. About 490 soil samples including those of the previous year have been analysed during the year and the analysis of the remaining samples is in progress.

(7) *Soil conservation and run off studies.*—The soils of Ketty Valley were poor in nitrogen and very poor in lime. The data collected for 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.

(8) *Irrigation of black soils of the Tungabadra 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 3-foot layer than the pre-irrigation level, and is 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 salt, (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 amount of salts was being washed down.

Other findings in these studies are (1) the effect of continued light irrigation on the exchangeable bases shows that there is a decrease in exchangeable sodium in all the three foot layers, (2) 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 salinised showed that in both red and black soils desalinisation of saline soil resulted in the increase of alkalisation. Leaching black soils as such with good water has caused a decrease in the degree of alkalisation.

The presence of gypsum layer in the black soil has very little effect on the alkalisation of the soils due to desalinisation since the gypsum is of low solubility.

B. Manuring and plant nutrition—(1) *Permanent manurial experiments.*—In O.P.M. Periyamanjal cholam was grown under rainfed conditions. There was poor rainfall during the growing period. As usual the N.P.K. treatment gave the highest yield of grain followed by N. P. and cattle manure respectively.

In the N.P.M. usually two crops are raised yearly but owing to removal of hariali only one crop of panivaragu was raised during the year. 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 O.P.M. soils was more 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—Experiments at the A.R.S. 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 as per orders of the Director this year.

(3) Determination of nitrogen and phosphorous requirements of the soil types of the paddy areas in Tanjore district (I.C.A.R. Scheme).—This work which is an I.C.A.R. Scheme 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 with variants such as ammonium sulphate and superphosphate to give 30 lb. each of nitrogen and phosphoric acid.

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

	Am. Sulphate + 5,000 lb. green leaf.	Am. Sulphate + Superphosphate + 5,000 lb. green leaf.
(1)	(2)	(3)
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 could 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 phosphorus 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 night soil compost and farm waste compost were conducted at a number of Agricultural Research Stations to compare their manurial values with farm yard manure. The effects of these manures were also compared with no manure on different crops.

Night soil compost was tried at the Rice Research Station, Tirukuppam, Central Farm, Coimbatore, and Lam Farm, Guntur. The experiments at A.R.S. Anakapalle and Samalkota were discontinued. Farm waste compost was tried in the following Agricultural Research Stations, namely, Pattambi, Aduthurai, Palur and Maruteru. In some of the stations compost 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 in the cotton manurial experiment.—This investigation was taken up to study, whether the nitrogen applied in increased dosage in the form of ammonium

sulphate or 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 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 farmyard manure. A preliminary analysis was completed and it was found that the bacterial population was higher in the manured than in the no manure series.

(2) Biological and biochemical studies of pig and cow dung treated cane trash compost.

In this connexion pig and cow dung treated cane trash composts from Anakapalle were analysed to verify the reported superiority of pig dung compost over the cow dung compost. From the analyses it is not possible to claim any special advantage for the pig dung in bringing about a speedy decomposition of the raw cane trash.

(3) Hydrogen production from molasses by biological fermentation.—The amount of hydrogen including methane that could be obtained from a minimum quantity of molasses by anerobic fermentation was determined. Pure culture of B. coli was isolated and used. It was found that 761.2 c.c. of hydrogen besides methane could be obtained from 100 gm. of molasses diluted to 2.5 per cent strength. Methane was in small amount and hence not estimated.

D. Green manures—(1) Green manuring of 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 for grain and straw showed that green manure (Phillipesara 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 50 and 75 days growth stage.

The yields of daincha and sunnhemp in D block experiment were 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) In the studies of the effect of green manures on the Physico-chemical properties of soils during the growth period of the paddy crop in A block of two maxima and two minima were noted in the pH value. The trend of results of D block experiment was in agreement with that of A block. There was evidence that the pH of the soil was influenced by the growing crop. All the treated plots had more organic carbon than the control plots but the differences among the manured plots were not pronounced. 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 of A block soils was maximum in the surface soil of cowpea series and highest in the sub-soil of sunnhemp series. The organic carbon content of green manure plots was higher than those of "no-manure" plots both in the surface and sub-soils. In both the blocks cowpea gave the highest values for organic carbon.

(3) *Experiment on the associated growth of cereals and legumes.*—The yield of ragi grown in association with different pulses in varying proportion, 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 to 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 study of 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 of salt concentration.

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

E. Agro industries—(a) Improvement of cane jaggery by antioxidants.—Studies on improving the colour and keeping quality of jaggery were 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 butta 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 conducted. 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 which was only next to that of curry leaf in aroma.

(c) *Studies on fungal diastase.*—Further studies on growth characteristics were made. Effect of metallic ions of trace metals on the diastase production by the fungus was also 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 conducted 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 maximum. No harmful effect was seen due to the feeding of these green leaves.

Publication.—The following papers were published during the year:—

- (1) Four popular articles in the Grow More Food Journal.
- (2) Irrigability of blacksoils of Tungabhadra Project.
- (3) Soil survey in Madras State by M. Sanyasi Raju and P. Kunhirama Menon.

A number of popular notes on the various activities of the section were submitted to the Director of Agriculture.

Visitors.—The following were some of the distinguished visitors to the section during the year:—

- (1) Sir A. Lakshmanaswami Mudaliar, M.D., Vice-Chancellor of Madras University.
- (2) Hon. Sri B. Gopala Reddi, Minister for Finance, Government of Madras.
- (3) Prof. Paul, C., Mangaldore of Rock Feller Foundation.
- (4) Mr. G. L. Oliver of Shaw Wallace & Co., Ltd.
- (5) Dr. Norris E. Dodd, Director-General of F.A.O., Rome.
- (6) Sri V. Satagopan, Special D.D. for crop sampling.
- (7) Sri Saptharishi, Superintendent, Agricultural Research Station, Nanjanad.
- (8) Sri M. R. Balakrishnan, Lecturer in Chemistry, Bapatla.
- (9) Janab Wajir, Organic Chemist, Industrial Laboratory, Hyderabad.
- (10) A batch of students of Bacteriology Course, Sri G. D. Naidu's Institute.
- (11) Dr. R. Nagan Gowda, Minister for Agriculture.
- (12) Sri G. Govindaswami, Honorary visitor.
- (13) Sri R. K. Kandaswami, Honorary visitor.
- (14) Dr. P. Satyanarayana, Gazetted Assistant Lecturer in Chemistry, Agricultural College, Bapatla.

Strength of the staff as on 30th June 1952.—The strength of the staff, permanent and temporary as on 30th June 1952 is given as an appendix as required in Director of Agriculture's circular No. X. 3. 1222/48, dated 24th January 1949.

Acknowledgment.—I have great pleasure in placing on record the unstinted and loyal co-operation of my officers and subordinate staff.

LAWLEY ROAD, P.O., COIMBATORE,
12th August 1952.

M. SANYASI RAJU,
Government Agricultural Chemist.

APPENDIX.

STRENGTH OF STAFF AS ON 30TH JUNE 1952.

Name of service and post.	Number of sanctioned posts	
	Permanent.	Temporary.
I. Madras Agricultural Service—		
Government Agricultural Chemist	1	..
Assistant Agriculture Chemist	3	..
Agricultural Bacteriologist	1	..
Soil Physicist	1	..
Gazetted Assistant in Chemistry	1	..
Soil Survey Officer (Bellary)	..	1
	7	1
II. Madras Agricultural Subordinate Service—Upper Subordinates—		
Main Section	19	..
Tungabhadra Project	1	..
Compost Scheme	..	2
Increased Staff to clear off arrears of samples	..	4
Soil Survey Scheme	2	2
Control of price and quality of manures	..	3
Laterite Soil Scheme	..	1
Agricultural Research Station, Satyamangalam	..	1
	20	14
III. Madras General Subordinate Service—		
Laboratory Attenders to Main Section	7	..
Do. Teaching Section	..	2
Do. Compost	..	1
Do. Manure Scheme	..	2
Do. Soil Survey Scheme	..	1
Do. Increased staff to clear off arrears of samples	..	2
Do. Laterite soil	..	1
Do. Agricultural Research Station, Satyamangalam	..	1
	7	10
IV. Madras Ministerial Service—		
Upper Division Clerk	..	1
Lower Division Clerk, Main Section	3	..
Do. Manure Scheme	..	1
Do. Soil Survey Scheme (Bellary)	..	1
	3	3
V. Madras Inferior Service—		
Peons—Main Section	7	..
„ Compost Scheme	..	1
„ Soil Survey Scheme (Bellary)	..	2
	7	3

ADMINISTRATION REPORT OF THE GOVERNMENT
ENTOMOLOGIST, COIMBATORE, FOR THE YEAR 1951-52.

ABRIDGED REPORT.

I. Charge.—I was on leave on average pay from 31st May to 4th July 1952, both days inclusive, during which period Sri V. Tirumala Rao officiated as Government Entomologist. I continued to be in charge of the Section for the rest of the period under report.

II. Staff.—There were a number of transfers and postings in the personnel of the gazetted officers and subordinates of the Section.

III. Leave.—Myself, the gazetted officers as well as the subordinates were on leave for varying periods.

IV. Tours.—I attended the meeting of the Entomological Committee of the Indian Council of Agricultural Research during November 1951 and the Plant Protection Conference during April 1952 at New Delhi. I also attended the special conference convened by the Deputy Director of Plant Protection, Government of India, at Madras during November 1951. The gazetted officers and the staff were on camp for varying periods in connexion with investigation of crop pests, etc.

V. Advisory.—A number of enquiries on crop pests, their identification and control, bee-keeping, etc., were received and necessary action taken.

VI. Exhibition.—The section took part in the following exhibitions:—

(i) College Day and Rice and Wheat Research Workers Conference, Coimbatore.

(ii) Tamilnad Agricultural Conference, Vellakinar.

(iii) S.I.A.A. Exhibition, Madras.

(iv) Forty-second Educational Conference, Peelamedu.

VII. Research—A. Investigation on crop pests.—Intensive research was pursued on the adaptability of a number of synthetic chemicals like BHC, DDT, HETP, Parathion, etc., against a number of crop pests. An interesting feature was the trial of the systemic 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. Intensive research on bees constituted another item. A gist of the work done on the various aspects is furnished below:—

(a) *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 a major emergence of the moths, were continued at the Agricultural Research Station, Aduthurai. The results show that the incidence is more severe on the Thaladi 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 oryzae 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, Parathion, HETP and the systemic chemicals used, only the higher concentrations like BHC 0.4 per cent, Parathion 0.2 per cent and Schradan 0.75 per cent have yielded interesting results as judged by the reduction of the bug population and the arresting of the further spread of the patches. The results are promising and further trials are likely to yield fruitful results.

Confirmatory tests on the rice case worm (*Nymphula depunctalis Gr.*), the white jassid (*Tettigonia 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*.—Investigations 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 & 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 the 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 trial of newer rodenticides have been chalked out.

(b) *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 of 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 time-honoured method of a thicker seed rate was found to give higher yields.

(c) *Pests of fruits—(i) The fruit-sucking moth (Othreis sp.)*.—Exploratory trials with BHC 0.05 and DDT 0.1 per cent sprays showed a respective fruit fall of 2 per cent and 3.5 per cent 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. Further experiments envisaging the elimination of the above hazard are contemplated.

(i) *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, though taken up, 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 mango hopper (*Idiocerus sp.*) and of BHC spray against the castor plug (*Parasa lepida G.*) and the Red tree ant (*Oecophylla smaragdina Fb.*) were conducted. Against the San Jose scale (*Quadraspidotus perniciosus C.*), the approved method is 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 Avocado pear were recorded for the first time.

(d) *Pests of oilseeds—(i) The black-headed caterpillar (Nephantis serinopa M.)*.—Besides the routine biological measures followed for the control of these caterpillars with the help of their specific parasites, tests with BHC sprays were repeated. The insecticide was 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 Parathion 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 G.*—the castor jassid—*Empoasca sp.*—and the groundnut “surul poochi”—*Stomopteryx nerteria M.*—was established by further experiments.

(e) *Pests of cotton—(i) The cotton jassid (Empoasca devastans D.)*.—Experiments with Kilex, HETP, Rothane, 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 are that the mixtures of BHC, DDT and sulphur and BHC 0.1 per cent spray are more effective. The experiments are still in progress.

(f) *Insecticidal trials*.—A number of synthetic insecticides like BHC, DDT, Benexide, 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—*Thevetia nerifolia Juss.*—was found effective against hairy caterpillars like *Euproctis sp.*, *Eupterote sp.* and aphids. But the experiments could not be continued for the reason that these vegetable poisons could not at any time, stand comparison either in their efficacy or in cost with the 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 as irrigation. 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 insecticide. Certain preparations like Pestox, Isopestox, etc., have also been fairly effective against the cochid—*Pseudococcus virgatus* Ckl.—the cotton Jassid—*Empoasca devastans* D Psyllids on curry leaf, and the lab lab bug—*Coptosoma cribraria* F. The advent of these chemicals has practically revolutionized 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.

(g) *Coccids*.—A number of species like *Pseudococcus virgatus* Ckl.—on *Gliricidia*, *Pseudococcus corymbatus* Var—*Filamentosus* Var—on cotton *Lecanium sp.*—on coffee and guava, etc., were experimented with a number of insecticides like DDT, BHC, HETP, Parathion, etc. Of the numerous variants, Parathion spray at 0.025 per cent appears to be a specific against this family of troublesome insects. But a word of caution appears to be necessary in this connexion, since the use of this insecticide is fraught with certain serious consequences. 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.

(h) *Aphids*.—Adequate attention was paid for the control of this group of crop 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.

(i) *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.

(j) *Insecticidal and adverse effects of DDT & 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 Bhendi, 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 Bhendi, 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 so 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 by tainting was persistent in 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 deodorized even when the bulbs were mixed with charcoal and kept for about four months. DDT, though it did not impart any undesirable flavour, neutralized the natural flavour in all these cases. The findings go to show that the use of these chemicals should be avoided on most vegetables.

(k) *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 hazard by way of 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 lanigera* H).—An assiduous colonization of the specific parasite—*Aphelinus mali*—has successfully kept this aphid under control, at the Pomological Station. 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 Bethyid—*Perisierola nephantidis* M—the Braconid—*Bracon serinopae* W and the Eulophid—*Trichospilus pupivora* F.

C. *Bee-keeping*.—The outstanding lines of research under this head in the section are (i) selective breeding, (ii) artificial pollen substitute, (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 consistently better than the others all these years. The original stock and its progenies were transferred to the Indian Council of Agricultural Research Scheme initiated in the current year for further observations. 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. The work is being continued under the aegis of the Indian Council of Agricultural Research scheme. A few minor sources of pollen and nectar were recorded. Under propaganda, 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.

VIII. Review of work done under schemes.—(i) *The orange borer.*—The identity of the borer, which was till now in doubt, was confirmed as *Chelidonium argentatum*, Dalman. Confirmatory tests regarding the inefficacy of the insecticidal washes and the infallibility of clipping the wilted twigs along with the young borers and syringing in 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.

(ii) *Biological control scheme.*—The control of the cotton boll worms (*Earias* sp and *Platyedra* sp), the cholam stem borer (*Chilo zonellus* S) and the castor semi-looper (*Achoea janata* L) was contemplated under a special scheme sanctioned by the Madras Government. The control being diverted against the egg stage, the Chalcid—*Trichogramma minutum* R—was employed in all these cases. A gist of the findings is epitomised below.

(a) *The cotton boll worms (Earias sp and Platyedra sp).*—Weekly releases, at the rate 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 the progressive infestation. It was found to commence with a modest beginning of 2.1 per cent and ascend up to 58.4 per cent in the controls, while it ranged between 1.6 per cent and 15 per cent in the colonized plots.

(b) *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 colonized plots.

(c) *The castor semi-looper (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 colonized 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 within the precincts of the Central Farm. As it was considered that no useful purpose would be served by continuing the work under such limitations, the work was closed during the year.

(iii) *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 microclimatic factors on the borer population, 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 years.

(iv) *Bee-keeping scheme.*—The items of work regarding selective breeding and pollen substitutes, as discussed under the work of the section were continued. 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 scheme was commenced only by December and the revised technical programme submitted is being followed.

Grow More Food Schemes.—(i) *Rodolia breeding schemes.*—The incidence of the cottony cushion scale—*Icerya purchasi*, Mask.—on the Nilgiris and Kodaikanals was effectively kept under check by the assiduous colonization of the predator—*Rodolia cardinalis*, Muls. Observations on the distribution of the scale, its alternative hosts, influence of weather factors on the pest and its predator and the incidence of the indigenous natural enemies were continued. The two plant Quarantine Stations at Mettupalayam and Shembaganur were functioning satisfactorily by intercepting the transport of all the notified host plants of *Icerya purchasi*, Mask., and thus preventing its inadvertent spread to newer localities. Among the consignments fumigated, about 1,000 tons of wattle bark constitute the major item. Besides these, a very large number of seedlings of hill fruits, cuttings and seedlings of ornamental plants, etc., were either fumigated and passed or confiscated.

(ii) *Civil Supplies Scheme.*—The organization continued to render useful service by way of giving advice towards the proper conservation and storages of the enormous reserve stocks of food material.

(iii) *Plant Protection Scheme.*—The Plant Protection staff (Entomology) comprising of the two gazetted officers and 26 assistants contributed their mite towards the successful control of the numerous pests, affecting various crops. The work of these two organizations have been commendable and has contributed not a little to relieve the present food shortage. Adequate attention was also paid to the popularizing of bee-keeping, as a cottage industry in favourable localities.

IX. Teaching and propaganda.—Necessary knowledge on Agricultural Zoology and Entomology was imparted to the students of I and II year B.Sc. (Ag.) degree course. The terminal and University examinations were conducted as usual. Besides this, special lectures were delivered to the horticultural trainees and Plant Protection Assistants.

X. Miscellaneous—Fumigations.—Over 1,000 bags of grains and 34 smaller consignments from the various Specialists were fumigated and phytosanitary certificates issued, whenever necessary. About 500 bags of dunnets were also treated with HCN and rendered free of the Scolytid beetle—*Coccotrypes dactyliperda*, F.

XI. Visitors.—The distinguished visitors during the period under report are—The Rajapramukh of Mysore, Sri A. B. Shetty and Dr. Nagan Gowd, Hon'ble Ministers for Agriculture, Madras, Sri Gopalakrishnan, I.C.S., Joint Secretary, Ministry of Agriculture, some officers of the Food and Agricultural Organization, Sri Govindarajulu Naidu and Sri R. K. Kandaswami (Honorary visitors), Coimbatore. Batches of students from various educational institutions also visited the section.

XII. Publications.—Fifteen papers, on the various activities of the section, economic and systematic, were prepared and sent up for publication.

LAWLEY ROAD P.O., COIMBATORE,
1st August 1952.

S. RAMACHANDRAN,
Government Entomologist.

ADMINISTRATION REPORT OF THE GOVERNMENT MYCOLOGIST COIMBATORE, FOR THE FASLI YEAR 1361 (1951-52).

ABRIDGED REPORT.

Charge.—I took charge as the Government Mycologist from Sri D. Marudarajan on the afternoon of the 14th July 1951. I was in additional charge of the post of Gazetted Assistant in Mycology from 15th July to 1st November 1951. During the year an area of 41.5 acres near Ootacamund was temporarily transferred to this department for starting a farm for ergot production. A new scheme for the investigation of stem-breaking disease of arecanuts was sanctioned and an experimental station is to be opened at Vittal, South Kanara.

Staff.—Sri M. Kandaswami, Assistant Mycologist, Ergot Scheme, Ootacamund, was transferred as Gazetted Assistant in Mycology, Coimbatore, and he took charge on 1st November 1951. Sri K. V. Srinivasan was posted as Assistant Mycologist, Ergot Scheme, Ootacamund. Sri C. V. Govindaswami who had returned after completion of his post-graduate training at the Indian Agricultural Research Institute, New Delhi, was appointed as the Lecturer in Mycology, Bapatla. There were several changes in the subordinate staff also during the period.

The activities of the section for the year 1951-52 are presented under the following heads:—

- 1 Investigations of diseases of food crops.
- 2 Investigations of diseases of commercial crops.
- 3 Investigations of diseases of fruits and vegetables.
- 4 Ergot production.
- 5 Miscellaneous investigations.
- 6 Teaching.
- 7 Grow more food.
- 8 Propaganda.
- 9 Advisory and legislation.

1. *Investigations of diseases of food crops*—(i) *Diseases 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, Buchireddipalem. Four hundred and two cultures were included in these trials. At Buchireddipalem the early sown crop escaped infection and the later sown crop could not be maintained till harvest owing to the failure of water-supply. Heavy leaf infection was however prevalent. At Coimbatore and Aduthurai the disease occurred in a severe form and was helpful in eliminating the susceptible cultures. The selected resistant cultures are being carried forward for further tests. Three cultures are to be specially mentioned, viz., 1560, 6538 and TKM 1. These were highly resistant; the last one is of short duration.

Effect of varying doses of N 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 N 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.—To determine whether the adverse effects of higher doses of nitrogen can be balanced by application of potash or phosphorus, field experiments were laid out with a susceptible culture. Varying levels of potassium sulphate and superphosphate 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 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. The isolate from *Brachiaria mutica* infected rice and 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 Millets Breeding Station, Coimbatore, were examined in detail and found to exhibit low infection in the field and 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 germinability of urediospores produced in different months, the lowest germination 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 effective. But these treatments did not confer any protection against headsmut or downy mildew.

Long smut—Tolyposporium ehrenbergii.—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 Millets 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* X *P. purpureum* hybrids. One hybrid allotetraploid IV X cumbu was not infected. The others exhibited varying degrees of infection ranging from 15 per cent to 65 per cent plant infection. The rust did not pass on to *P. pedicellatum*, *P. orientalis* and *P. clandestinum*. Aeciospores from naturally infected brinjal plants readily infected cumbu and three susceptible hybrids of *P. typhoides* X *P. Purpureum*. An accidium found on *Solanum pubescens* was found to infect cumbu. This has to be confirmed by further tests.

Cumbu—Green ear Scelerospora 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 Millets 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 8 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 organ-mercury 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 tenai grown at the Millets Breeding Station numbering about 210 in all were periodically examined to observe the intensity of infection in each. No culture was free and the intensity of infection ranged from 30 to 100 per cent. Several promising cultures supplied by the Millets Specialist were artificially infected to note their reaction. All of them were susceptible exhibiting 30 to 80 per cent plant infection. The rust occurring on *Korali* (*S. glauca*) though belonging to the same species 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.

In miniature plots of wheat grown at Coimbatore black rust was noticed from September to April. By successive infection a culture of black rust has been maintained at Coimbatore for over 18 months. The inoculated plants were grown under shade.

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. They were affected by brown rust and to a slight extent by black rust. There was demand for the seeds of these varieties. The District Agricultural Officer has distributed the seeds to a number of ryots.

2. *Investigations of diseases of commercial crops*—(i) *Cotton—Black arm—Xanthomonas malvoearum.*—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. The bacterium was capable of infecting the leaves of *Jatropha curcas*. Comparative studies of the isolates of the pathogen obtained from different localities were made.

(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 the diseases of this crop is carried out in collaboration with this section. 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. Cheshunt 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 trees 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—Fusarium spp. and Pythium aphanidermatum.*—Several isolates of *Fusarium* were obtained from the affected plants. These exhibited differences in pathogenicity some of

them being innocuous. The cultural studies of these isolates were made. Besides *Fusarium*, *P. aphanidermatum* was also found to cause wilt of this host. The fungus isolated from this host was pathogenic to chillies also.

(b) *Root rots of cluster beans, bhendi, brinjal, cowpea and others caused by Macrophomina phaseoli (Rhizoctonia bataticola).*—Pathogenicity studies of these isolates were continued. The pycnidial stage of the isolates developed readily on infected legumes. On other hosts pycnidia were formed occasionally. Isolates from single pycnidiospores produced sclerotia in agar cultures. Among the soya beans two varieties showed least infection.

(c) *Wilt of chillies—Sclerotium rolfsii.*—This fungus caused widespread wilt of this crop in Coimbatore. The organism was isolated and its pathogenicity proved. Application of cheshunt compound to the soil round the plants controlled the spread of infection.

(d) *Mosaic of bhendi.*—This disease was widespread on the central farm. The transmission of the disease could be effected by grafting or by the vector *Bemisia tabaci*. The incubation period varied from 22 to 28 days. Seeds of five varieties of Bhendi reported to exhibit resistance to mosaic in Bombay State were obtained and grown. But under field conditions they were found to be infected to some extent. Bhendi mosaic did not pass on to *Malvastrum coromandelianum* which is itself affected by a similar virus disease. The disease in the latter host is also transmitted from one plant to another by *Bemisia tabaci* or by grafting. But it does not pass on to bhendi.

4. *Ergot production.*—During the year a farm for ergot production was opened on the Nilgiris, near Ootacamund. A block of 41.5 acres has been transferred from the Forest Department and was taken over on 31st March 1952. This was ploughed up 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. *Miscellaneous investigations*—(a) *Fungicidal trials.*—The comparative efficacy of several proprietary preparations and Bordeaux mixture was tested by using these on potato, groundnut, chillies, areca, peach and orange. The incidence of disease was of medium intensity in potato and groundnut. The results showed that the treated plants were better but the differences were not statistically significant. The treatments are being repeated.

(b) *Bacterial leaf spot of sugarcane.*—Further studies on this disease were carried out. Six varieties of sugarcane exhibited natural infection in the field. The pathogen was able to infect besides sugarcane, *S. spontaneum*, *S. sinense* and cowpea. It did not pass on to sorghum, cumbu, wheat or barley.

(c) *Betelvine—Bacterial spot.*—A leaf spot disease was prevalent in Tanjore district. The pathogen was isolated and identified. It was able to infect betelvine only.

(d) *Betelvine wilt—Phytophthora palmivora.*—This disease is prevalent in Tiruchirappalli and Tanjore districts. The demonstration of the method of control is being carried out in a private garden at Thottiam. Four treatments are under trial. The disease is not yet recorded in the experimental plots.

(e) *Anthracnose of bananas—Gloeosporium musarum.*—Isolates of *Gloeosporium musarum* was obtained from three varieties. Infection experiments conducted so far have shown that the variety 'Kullan' is very susceptible.

(f) *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. *Teaching.*—Fifty-two lectures were delivered to the students of the final year B.Sc. (Ag.) class in mycology and plant pathology. Fifty-two practical classes were conducted. Twelve lectures on diseases of horticultural crops were delivered to the students of the Diploma course in horticulture. Practical demonstration of the symptoms of diseases and methods of control was given. Three plant protection assistants underwent training. Specimens and cultures of fungi were supplied to different educational institutions.

7. *Grow More Food.*—The plant protection scheme was extended for one year from 1st April 1952. The sale of fungicides was continued at concessional rates to protect food crops and cotton. The cultivation of the two blast resistant strains of rice Co. 25 and Co. 26 was extended further. The pre-treatment of rice for the control of foot rot was carried out on an extensive scale. Over 55,000 acres were planted with treated seed. Seed dressing with sulphur for the prevention of grain smut of sorghum was adopted in all districts, where this crop is grown. An area of 386,100 acres was sown to treated seed. Paddy nurseries were sprayed in several districts to keep down blast infection. The transplanted crop also had to be sprayed in several districts to restrict the spread of infection. The methods adopted for the control of orange diseases were intensified in several districts. In the districts of Tiruchirappalli, Madurai and Tirunelveli all the vineyards were sprayed to control mildews. In all the districts prompt help was given for combating diseases affecting vegetables.

8. *Propaganda.*—The section participated in agricultural exhibitions. Several new posters on the control of diseases of crops have been prepared.

9. *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.

The Madras Agricultural Pests and Diseases Act was in operation in respect of the following diseases:—

- (1) Bud rot of palms (palmyra and coconut) in East and West Godavari and Krishna districts and three taluks of Malabar.
- (2) Sugarcane smut in Hospet taluk.
- (3) Cardamom mosaic—Nelliampathis in Palghat taluk.
- (4) Broom rape of tobacco—Guntur district.
- (5) Sandal spike disease—Salem district.

One hundred and six calls for advice were received and suitable recommendations were given. One hundred and three gallons of agri-tree killer solution were distributed to various parties. Forty-nine bottles of mushroom spawn were sold.

LAWLEY ROAD P.O., COIMBATORE,
30th July 1952.

T. S. RAMAKRISHNAN,
Government Mycologist.

ADMINISTRATION REPORT OF THE GOVERNMENT LECTURING AND SYSTEMATIC BOTANIST, COIMBATORE, FOR THE FASLI YEAR 1951-52.

I submit herewith the report of the work of the Government Lecturing and Systematic Botanist's Section during the fasli year 1951-52.

Staff.—I continued to be in charge of the Section throughout the year. In connection with the work of revision of 'Hand-Book of South Indian Weeds', Sri J. Sakham Rao, Assistant in Botany, was posted to work in this scheme for a period of four months from 15th October 1951; an Artist was appointed for a period of four months from 2nd November 1951; a clerk-cum-typist was appointed for eight months from 1st November 1951. Sri T. Venkatapathi was posted in the vacancy of Sri J. Sakham Rao. When Sri J. Sakham Rao reverted back to his original post on 14th February 1952 in the section as Assistant in Botany, consequent on the closure of the scheme, Sri T. Venkatapathi was transferred to Kollegal as Agricultural Demonstrator and was relieved on 14th February 1952 afternoon.

The activities of the section can be brought about in the following heads:—

I. Teaching.

II. Systematic Work carried on in the Madras Herbarium—

(i) Identification.

(ii) Survey of floras and compilation.

(iii) Taxonomical research.

(iv) General research.

(v) Economic information.

(vi) Revision of 'Hand-Book of South Indian Weeds'.

III. Economic botany and acclimatization trials—

(i) Fodder grasses and forage plants.

(ii) Green manure and cover crops.

(iii) Medicinal plants.

(iv) Essential oil yielding plants.

(v) Introduction and trial of other economic plants.

(vi) Seed supply.

IV. Visitors.

V. Propaganda and Publications.

VI. Visitors.

VII. Botanical Garden.—This forms an adjunct to the Herbarium and for teaching of Botany and for the trial of plant introductions. Report on this is dealt with as Appendix I.

I. Teaching.—The number of lectures delivered and the practical classes conducted are given below:—

(1)	Theory hours.	Number of hours—Practice	
		Classes.	Hours.
(2)		(3)	(4)
B.Sc. (Ag.) I year	64	50	144
B.Sc. (Ag.) II year	62	56	112
B.Sc. (Ag.) III year	23	22	66

The lectures were delivered by the Government Lecturing and Systematic Botanist, Sri D. Daniel Sundararaj, Assistant Lecturing and Systematic Botanist and Sri J. Sakham Rao, Assistant in Botany.

University Examinations.—I functioned as Internal Examiner for the first year B.Sc. (Ag.) and Sri D. Daniel Sundararaj, Assistant Lecturing and Systematic Botanist, for the III year B.Sc. (Ag.) paper I.

II. Systematic Work—Work done in the Madras Herbarium—

(i) **Identification and incorporation.**—Total number of specimens identified during the year under report came to 1,742, the majority being the specimens from the Agricultural College, Bapatla, and from the Agricultural College, Hebbal, Bangalore. Among the private enthusiasts, Sri N. S. Mooss, an Ayurvedic Doctor from Kottayam was a constant correspondent who was sending specimens quite frequently with the idea of having authentic identification for his proposed edition on medicinal plants. Among the rest; the Head of the Department of Botany, Andhra University, Waltair, Sri R. M. Savur of Nileshtar and the Botanist, Tea Experimental Station, U.P.A.S.I., Devarshola, were the important correspondents sending specimens for identification. Identification for officers from different Departments such as Forest, Judicial, Veterinary, Irrigation and Agriculture were also attended to.

During the year the following 10 specimens which were not represented in our Herbarium and were *deciderata* were incorporated anew:—

- (1) *Rauwolfia micrantha*, Hk. f.
- (2) *Lolium temulentum*.
- (3) *Pollinidium binatum*, C. E. Hubbard.
- (4) *Capillipedium glaucopsis*, Stapf.
- (5) *Smithea racemosa*, Heyne.
- (6) *Abutilon ramosum*, Guill & P.
- (7) *Almus napalensis*.
- (8) *Asparagus laevissimus*, Steud.
- (9) *Chloris wightiana*, Nees.
- (10) *Ocimum basilicum* var *thyrsiflorum*, Benth.

Two hundred and forty specimens which were new distributions for the various districts in our Herbarium collections were incorporated. St. Joseph's College, Tiruchirappalli, and Agricultural College, Hebbal, Bangalore, presented a collection of 40 and 10 specimens respectively for the Herbarium. On the whole 487 specimens were incorporated during the year.

The following tours were conducted for Herbarium collection and surveys:—

Government Lecturing and Systematic Botanist.	The Nilgiris, Anamalai, Pichavaram back-waters' (East Coast).
Assistant Lecturing and Systematic Botanist.	The Nilgiris, Wynaad, South Kanara and Araku valley.
Sri J. Sakham Rao, Assistant in Botany.	South Kanara, Pattambi, Koilpatti, Ambasamudram, Guntur, Samalkot and Nilgiris.
Kumari H. Sunanda Kamath, Assistant in Botany.	South Kanara district.
Sri K. Ramanujam, Assistant in Botany.	Singampatti, Pattambi and Taliparamba.

(ii) *Surveys of floras and compilation*—(1) *Flora of Ramanathapuram and Tirunelveli*.—During the year a single survey tour was conducted by Sri K. Ramanujam, Assistant in Botany in Singampatti Range in Tirunelveli district. A collection of 125 specimens was made from which 25 specimens were found to be new distributions for the district.

The writing up of the flora of Ramanathapuram and Tirunelveli was continued. From the collection available in the Herbarium the species were listed in the order followed by Gamble. Details as to the place of collection, the month in which the species is in flower or fruits and collector's name are recorded for each species. A brief note on the characteristics of each species and their economic importance wherever available are also recorded. The compilation work has progressed up to Compositae in dicotyledons besides the compilation of the monocotyledonous collections.

(2) 'Back-water' Flora.—Two tours were conducted; one along the West Coast and another along the East Coast (Pichavaram 'back-waters'.) The plants collected were identified and listed. A paper on "The Distribution of *Rhizophora mucronata* and its economic importance" was read at the Indian Science Congress held at Calcutta in January 1952. The above paper has been forwarded to the Editor, Madras Agricultural Journal, Lawley Road Post for favour of publication. The 'Back-water' flora of the West Coast has also been compiled giving details of economic uses, short descriptions, vernacular names, distribution, etc. This awaits final scrutiny before sending it for publication.

(3) *Coimbatore Flora*.—There was a rapid progress in the compilation of the above flora. In Dicotyledonous collections up to *Apocynaceae* have been covered including 90 families represented by 1,195 species. The places of collection, flowering and fruiting time, economic uses and other relevant details were recorded for these species. In Monocotyledons grasses of Coimbatore district have been compiled and a paper on the "Grass Flora of Coimbatore district with special reference to fodder grasses" awaits scrutiny before sending it for publication.

(iii) *Taxonomical research*—(1) *A contribution to the taxonomy of the genus Turnera, L.*—The solitary species of *Turnera, L.*, viz., *Turnera ulmifolia, L.* and the two varieties occurring in South India, namely, *T. ulmifolia* var *aungustifolia, Willd* and *T. ulmifolia, L.* var *elegans, Urb* were studied and described with suitable sketches and keys. This was published as a small note in the Madras Agricultural Journal.

(2) *Studies in Jatropha sp.*—A species of *Jatropha L.* collected from Aduthurai and other places in Tanjore district was found to have characters more or less intermediate between *Jatropha gossypifolia, L.* and *Jatropha curcas, L.* This was studied in detail. It is interesting to note that this type is completely female sterile and the fertility of pollen also is very low, besides being of varying sizes. The chromosome number as determined by the Cytogeneticist, Bapatla, is same as that of *Jatropha curcas* and *J. gossypifolia, L.* It is probable that this is a natural hybrid between *Jatropha curcas* and *Jatropha gossypifolia, L.*

(3) *Cenchrus ciliaris, L.* var. *bangalorensis, C.R.M.*—A grass ('Blou-buffel') collected from the Indian Diary Institute, Bangalore, which though resembled *Cenchrus ciliaris, L.* was found to vary in vegetative as well as floral characters. There was perceptible difference between this and *Cenchrus ciliaris, L.* and it was felt that the grass deserved a variety status. Hence this was described in full with suitable diagrams and has been sent for publication as a variety of *Cenchrus ciliaris, L.* viz. *Cenchrus ciliaris, L.* var. *bangalorensis, C.R.M.*

(4) *Other taxonomic studies*.—Eleven species of plant specimens were studied during the year for fixing up their taxonomical position. Of these, *Desmodium velutinum, D.C.* of Java, *Barleria vestita* of Ceylon, *Solanum elaeagnifolia* of South America were worked out, identified and recorded for the first time in India. The North Indian species of *Vanda parviflora* var. *albiflora* an orchid was collected at Nilambur and this is the first record of its occurrence in South India. Studies on a species of *Lippia* locally found in Coimbatore, a *Stachytarpheta* from Arakuvalley and a *Vernonia* from Kannikattai Forests in Tirunelveli were also carried out during the year and it is felt that these are new species.

(iv) *General research*—(1) *studies in Artocarpus, Forst.*—Floral morphology in Jack was studied in detail. The individual flowers in the female inflorescence showed three regions; the basal free region of the tubular perianth enclosing the ovary, the middle fused region and a terminal free region. A paper on the morphology of the flower and the fruit of Jack has been presented for the Second Scientific Workers' Conference to be held in August 1952.

(2) *Phyllotaxy in Thevetia nerifolia, Juss.*—Peculiar irregular phyllotaxy is observed in *Thevetia—nerifolia, A. Juss.*, a common garden plant. More than five kinds of phyllotaxy were observed and the occurrence of such phenomenon was recorded in Madras Agricultural Journal as it was against the normal phyllotaxy.

(3) *Phenomenon of poly and schizocotily in dicotyledons.*—Tricotyledonous condition in *Crotalaria juncea* was observed and it was interesting to note that it was not an inherited character. Schizocotily and tricotily in *Coriandrum sativum, L.* and *Cordia subcordata* were also recorded for the first time in the families *Umbelliferae* and *Boraginaceae*, respectively. This was published in "Science and Culture".

(4) *Morphology of the normal and abnormal coconut.*—An abnormal coconut fruit with 3 seeds was studied in detail and the morphology of this with that of the normal coconut fruit was written up in the form of a paper and sent for publication.

(v) *Economic Information*.—About 70 economic enquiries were attended to during the year on various subjects, such as fodder grasses, hedge plants, green manure, medicinal and the essential oil yielding plants, soil conservation plants, weeds and their eradication, etc.

(vi) *Revision of "Hand-Book on South Indian Weeds"*.—The revision of the above book was undertaken by me and for a period of four months an Assistant, an Artist and for a period of eight months a clerk-cum-typist were appointed for helping me in the work. Most of the districts of the State were surveyed by the Assistant. The new predominant introductions were noted and the important ones were drawn out accompanied by complete descriptions. Sixty-five species have been added to the revised edition and out of these 50 weeds were described with plates. A chapter on the recent developments on weedicides has also been included reviewing the up-to-date methods adopted in foreign countries and the success so far achieved in India.

III. *Economic botany and acclimatization trials*—(i) *Fodder grasses and forage plants*—(1) *Cenchrus ciliaris* var *bangalorensis, C.R.M.* ('Blou-buffel').—This grass has performed exceedingly well in several Research Stations. At Koilpatti, under garden-land conditions it has done well and

has been found to be better than even *Cenchrus ciliaris* and Guinea grass. It gives very high yield and is being relished well by cattle. At Palayakottai, in spite of continued drought it has stood green, though it was tried in small plots. In the Millet Breeding Station at Coimbatore also it has shown good growth under irrigation and had attained a height of 4 feet with bushy growth and plenty of foliage. This seems to be very promising and efforts are made to raise it in larger areas so that sufficient slips can be made available for distribution, since it is found to be good both as a drought resistant grass and a high yielding one under garden-land conditions.

(2) *Brachiaria mutica*, stapf. (Water grass).—Water grass has been found to perform very well under irrigation and has recorded good yields in several places. In Koilpatti it has yielded 96,000 lb. in one acre in one year and in Central Farm it continues to yield over one lakh of lb. per acre per year. Slips are being supplied regularly to Departmental officers and private parties. It has been observed during this year that this grass stands drought considerably well without completely dying out in summer.

(3) *Indigofera endecaphylla*.—This leguminous plant appears to be very promising and possesses a spreading habit. It has done well both in pots and as well as in the field. It roots at the nodes and as such it will be of use as a good soil binder; it has been observed to be a good fodder and cover crop in the Anamallais. Seeds were supplied to several Research Stations for trial. The plant has done exceedingly well at Coimbatore, Aduthurai and Tirurkuppam. There is a great future for this as a fodder-cum-soil conservation plant. Natural growth of this in excellent conditions was noted both in the Anamallais and Arakuvalley; arrangements have been made for the collection of seeds and multiplication.

(4) *Desmodium canum*.—This is an erect and a much branched plant which has done well at Coimbatore and Pattambi though it did not do very well at Aduthurai. This will also serve as a good forage plant in suitable areas in pastures.

(5) *Kudzu and Tropical Kudzu*.—Five layered plants of Kudzu (*Pueraria thunbergiana*) were received from New Delhi for trial at Coimbatore. Of these two died out and the rest are being just maintained. Tropical Kudzu (*Pueraria phaseoloides*) has also failed at Coimbatore. However, it has done well in Paddy Breeding Station, Kankanady, Mangalore and also at Anakapalle. Seeds of the Tropical kudzu obtained from different sources have been distributed for multiplication.

(6) *Glycine javanica*.—This continues to do well at Coimbatore and stands drought well. It also shows rapid growth and is found to cover extensive areas in a short period. The seeds have been supplied to different Research Stations for trial.

(7) *Aeschynomene americana* (Thornless mimosa from Peradenya).—Few plants have come up well and are very healthy. The plants possess a spreading habit and are rapid growers.

(8) *Stizolobium aterimum* (Velvet beans) Peradenya.—This vine has been found to be very promising and has attained 6 to 8 feet in a period of 4 months. The plants produce plenty of foliage and have the capacity to grow rapidly. Trials in the field are programmed with the next rains.

(9) *Desmodium limense* (Peradenya).—The species has done well in pots under Coimbatore conditions. It has an erect habit and produces good amount of leaves said to be useful both as fodder and cover crop.

(10) *Cassia sp. Cassia hirsuta*.—*Cassia hirsuta* under field trial in wet-lands has done satisfactorily.

Cassia didymobotya obtained from an Estate in Madurai district appears to be very promising from pot trials. It is quick growing and is much branched. It is proposed to carry it further for observational plot trials.

(11) *Indigofera teysmanii* (Ceylon).—The seeds of this quick growing tree were obtained from Peradenya, Ceylon. At Coimbatore, the growth has been rather slow and germination very poor. The seeds were supplied to about 45 different Research Stations and centres for trial and among these, the species has performed satisfactorily at Pattukottai, Palur, Anakapalle and at Pattambi. It is reported to have attained an average height of 8 feet in about 4 months.

(ii) *Green manures and cover crops*—(1) *Crotalaria sp.*—Several species of *Crotalaria* such as *Crotalaria usaramoensis*, *Crotalaria quinquefolia*, L., *Crotalaria agathifolia*, *C. striata*, *C. striata* var. *longifolia* and *C. verrucosa*, L. were tried under wet land conditions. Among these *Crotalaria usaramoensis* has shown very good growth and branching. Trials in large areas are programmed.

(2) *Sesbania sp.*—*Sesbania macrocarpa* from New Delhi, though it showed good germination growth was rather poor.

Sesbania cinerescens also from New Delhi is showing satisfactory growth in pots.

(3) *Centrosema pubescens*.—This cover crop is gaining merit by its good performance. In Coimbatore it has been found to spread well, flower profusely and to set seeds in abundance. The plants are able to stand drought also satisfactorily. The seeds have been distributed to different Research Stations for trial and multiplication purposes.

(4) *Calopogonium mucunoides*.—This has been found to be a failure in Coimbatore. This species requires heavy rainfall. Though this plant shows high germination, it failed to establish in pots as well as in the field. The seeds obtained from Wynaad have been despatched to several Research Stations for trial.

(iii) *Medicinal plants*.—A collection of common medicinal plants is being maintained in the Botanical Garden and a few additions were made during the year under report. As a scheme on medicinal plants is pending sanction no further work has been taken up.

(iv) *Essential oil yielding grasses*.—The possibilities of trial and improvement of essential oil yielding grasses were recorded in an article on the "Essential oil yielding grasses and their possibilities in Madras State" presented for the College Day and Conference held in August 1951.

(v) *Manurial trials* with eight treatments have been started with *Vetivaria zizanoides* at Pattambi and Wynaad, with a view to estimate the response of yield of oil to the treatments. The trial will continue till about January 1953.

(vi) *Seed supply*.—The following seeds were brought to stock and supplied during the year under report:—

Seeds.	Quantity brought to stock.	Quantity distributed and sold.
(1)	(2)	(3)
1 <i>Panicum antidotale</i>	57½	66 lb. old and new stock.
2 <i>Cenchrus ciliaris</i>	46	90 „
3 <i>Cenchrus setigerus</i>	..	24 „
4 <i>Chloris boumaei</i>	27½	34 „
5 <i>Calopogonium mucunoides</i> ..	50	40½ „
6 <i>Pueraria phaseoloides</i>	21½	14 „
7 <i>Centrosema pubescens</i>	51½	43 „
8 <i>Brachiaria mutica</i> slips	..	1,000 slips.
9 <i>Cynodon plectostachyum</i>	..	2,450 „

IV. *Germination studies in green manures and grasses*.—(1) Twenty-two samples of seeds received from the Departmental officers were tested for their germination and results communicated.

(2) *Dormancy and viability of grass seeds*.—Seeds of (1) *Panicum antidotale*, (2) *Cenchrus ciliaris*, (3) *Cenchrus setigerus* and (4) 'Blou-buffel' have been tested fortnightly for their germination immediately after harvest for ten fortnights. The study will be pursued for five years.

(3) *Germination studies in legumes*.—To study the dormancy and storage of a few leguminous seeds, four legumes, viz., *Phaseolus aconitifolius*, *Phaseolus trilobus*, *Crotalaria juncea* and *Sesbania aculeata* were taken. Fresh seeds were sun-dried and stored in double-gunnies and air-tight bottles in April 1952. Fortnightly germination tests are being carried out and the results are being recorded.

(5) *Hot-water treatments for hastening germination in Sesbania speciosa*.—With a view to standardize some treatments for increasing viability in *Sesbania speciosa*, the seeds were soaked for a period of 15 and 30 minutes in water ranging from 60° C, 70° C, 80° C, the tested seeds were then soaked in cold water overnight and tested for germination. From these preliminary tests there are indications that fresh seeds when treated with hot water 70° C to 80° C for 15 to 30 minutes show higher percentage of germination. It has been observed that treatment in lemon juice (4 per cent and 8 per cent) has not improved the germination of freshly harvested seeds.

V. *Propaganda and publications*.—(1) *Exhibitions*.—Two exhibitions were held during the year, viz., at Madras in December 1951 and during College Day Conference in July 1951. On both these occasions exhibits of grasses, green manures, forage plants, cover crops, avenue trees, etc., were put up. The exhibits and the arrangement during the College Day and Conference were very much appreciated by the Hon'ble Minister for Agriculture, Government of India, Shri K. M. Munshi, during his visit here. Small-scale exhibits were also put up when the Rajapramukh of Mysore and the Hon'ble Minister for Agriculture, Government of Madras, Hon'ble Sri R. Nagan Gowda visited the section during the year.

(2) *Popular bulletins and leaflets*.—The following popular bulletins and leaflets were published or sent for publication during the year, in a non-technical language:—

(i) Avenue Trees—Departmental Bulletin.

(ii) Hill Fruits and Plains fruits—Departmental Leaflets.

(iii) Green manure plants—Departmental leaflets for the Annual number of the Grow More Food journal.

(iv) Cultivation of Fodder grasses in South India—Departmental leaflets for the Annual number of the Grow More Food journal.

(3) *Scientific publications*.—The following papers were published in the respective journals during the year:—

1. Contribution to the Taxonomy of the genus *Turnera*, L.

By Sri C. Rajasekhara Mudaliar, M.A., Government Lecturing and Systematic Botanist, and Sri J. Saktharam Rao, Assistant, Madras Agricultural Journal, Vol. XXXIX, February 1952.

2. A sonnet on Solanaceae.

By Sri J. Saktharam Rao, Assistant in Botany.

3. A Note on the phyllotaxy in *Thevetia nerifolia*, A. Juss.

By Sri C. Rajasekhara Mudaliar, M.A., Government Lecturing and Systematic Botanist, and Sri J. Saktharam Rao, Assistant, Madras Agricultural Journal, Vol. XXXIX, February 1952.

4. Essential oil yielding grasses and their possibilities in Madras State.

By Sri C. Rajasekhara Mudaliar, Government Lecturing and Systematic Botanist, and Sri J. Saktharam Rao, Assistant, Madras Agricultural Journal, Vol. XXXIX, March 1952.

5. Stinging Hairs in *Tragia cannabina*, L. f.

By Sri J. Saktharam Rao, Assistant in Botany and Sri D. Daniel Sundararaj, Assistant Lecturing and Systematic Botanist.

6. Phenomenon of Poly and Schizocotely in discotyledons.

By Sri D. Daniel Sundararaj, Kumari Girija Lakshman and V. Ramakrishnan.

Science and Culture, 17 : 480-482, (1952).

VI. *Visitors*.—Members of Educational institutions as well as outsiders, private persons, Officers of Government and private departments visited the Herbarium and the prominent among them being the Rajapramukh of Mysore, the Hon'ble Shri K. M. Munshi, Union Minister for Food and Agriculture, New Delhi, the Hon'ble Sri Nagan Gowda, Minister for Agriculture, Government of Madras, Dr. Dion, Prof. Vermaat of the Food and Agriculture Organization and Prof. Mangles of the Rockefeller Foundation, New York. Many of the visitors evinced great interest in the trials of leguminous plants for fodder, soil conservation and green manure purposes and also on the essential oil yielding plants.

COIMBATORE,
LAWLEY ROAD P.O.,
1st August 1952.

C. RAJASEKHARA MUDALIAR,
Government Lecturing and Systematic Botanist.

APPENDIX I.

BOTANICAL GARDEN.

Charge.—Sri V. Ramakrishnan was in charge of the Garden throughout the fasli year.

Tours.—The Assistant in charge of the Garden has been on tour to Bangalore, Madras and Ootacamund to collect and purchase ornamental plants and to attend the flower show. He was also deputed to Avanashi for site selection in connexion with the laying-out of the public park.

Season and rainfall.—The weather in general was almost dry for the most part of the year. The minimum temperature ranged from 55.1° F. to 73.6° F. while the maximum temperature ranged from 86.2° F. to 102.3° F. The summer this year was very severe and the yield of water from the wells was considerably reduced. A total rainfall of 15.84" was received during the year under report of which 13.94" of rain alone was received during July to November. This period was followed by very dry weather with isolated showers about 1.85" in all occurring in January to June. The days were extremely hot during this period. This has been the fifth consecutive year of drought and the plants were severely affected by it. Huge and aged rain trees *Enterolobium saman* had dried up.

Garden operations.—Routine cultural operations like sowing seeds of annuals and avenue trees, manuring, hoeing, weeding, pruning, planting, propagating ornamental plants by cuttings, layers and gootees and putting and repotting of plants, etc., were attended to. The roads all over the garden were cleanly maintained by spreading sand over them and rolling whenever necessary. The incidence of insect pests and fungal diseases were kept in check by taking preventive and curative measures.

Improvements and additions.—Three more trophies and a rockery were constructed during the year under review. An attempt to grow water lilies in tubs proved to be very successful with *Nymphaea stellata* (blue stellata) and *Nymphaea rosea* (rose pink). The year under report is well marked with the introduction and trial of large number of plants of ornamental, fodder, and green manure value representing more than 15 natural orders, the details of which are appended at the end.

Nursery.—The demand from the public and the Agricultural Research Stations for plants and seed has been great and incessant, and every attempt has been made to propagate them in large numbers in spite of the meagre water-supply. The total amount realized from cash sales of plants and seeds was Rs. 1,465-8-0.

Vanamahotsavam.—As usual the second National Tree Planting was celebrated on 7th July 1951, by planting *Delonix elata*, *Jacaranda mimosaeifolia* and *Caryota urens*. About 876 seedlings of common avenue trees like *Delonix regia*, *Delonix elata*, *Peltophorum ferrugineum*, *Polyalthia longifolia*, *Tamarindus indica*, *Azadirachta indica*, etc., were distributed free to the local public and institutions.

Studies.—The viviparous *Brassica juncea* was under study for two more seasons to find out whether the phenomenon of vivipary expressed in the successive generations also. During both the seasons and generations it did express. It is being pursued for one more generation. A local collection of *Lippia*, which happens to be a new species is being described.

Visitors.—The garden as usual continued to be a place of absorbing interest to the students of botany and a pleasant spot of visit and recreation for the public on evenings and on festive occasions. Students belonging to the various colleges and schools of the State had very often been visiting the garden to study the

plants of diverse habits belonging to several important natural orders. Of the students who visited the garden, mention may be made of the following institutions:—

- (1) Dr. Alagappa Chettiar's College, Karaikudi.
- (2) Pachaiyappa's College, Madras.
- (3) Agricultural College, Bapatla.
- (4) Government Arts College, Coimbatore.
- (5) Nirmala College, Coimbatore.
- (6) St. Mary's College, Travancore.
- (7) Ramakrishna Vidyalaya, Periyanaickenpalayam.
- (8) Government Training School, Mettur.
- (9) Municipal High School, Pollachi.
- (10) Fatima Girls' High School, Fort, Cochin.
- (11) Town High School, Kumbakonam.
- (12) Bettiletem Secondary Training School, Ootacamund.
- (13) Board Moyan Girls' High School, Palghat.
- (14) Nanjappa High School, Tiruppur.
- (15) Y.W.C.A. members and students, Ernakulam.

Apart from the students of the above-mentioned institutions students of a number of local schools had also visited the garden frequently. The number of visitors for the year was about 14,591.

Propagation, potting, etc.—Gooteeing crotons with pure sand and moss pot mixture and moss and moss alone proved that sand and moss to be desirable medium for quick and better rooting at the gooteed region.

Plants layered.			
Bougainvillea	502	Bignonia sp.	30
Hibiscus rosa-sinensis	131	Jasmine	30
Jacquemontia violacea	10	Rose	32
Porana volubilis	44	Bignonia incarnata	28
Ipomoea	55		
		Total ..	862

Rooted cuttings.			
Ornamental Tapioca	16	Byophyllum	20
Hibiscus	50	Stapelia gigantea	10
Bougainvillea	150	Opuntia microcalyx	10
Pothos	7	Phyllocactus	10
Kalanchoe sp.	30		
		Total ..	303

Croton Gootees separated 101

Sales—

The following are the details of sales effected during the period under review:—

Potted plants	1,788	Cut flowers	35 clumps.
Avenue tree seeds	14 lb. 6 oz.	Button holes	216 Nos.
Flower seeds	21½ oz.	Wood apple fruits	177 Nos.
Plant cuttings	586 Nos.	Sapota fruits	17 lb.
Jasmine flowers	55 oz.	Coconuts	26 Nos.
Flower seedlings	82 Doz.	Caena bulbs	64 Nos.
Tree loppings	5 Tons and 2½ cwt.	Brush wood	7 lots.

	RS.	A.	P.
Total value realized	1,465	8	0
Miscellaneous receipts by cart hire, etc.	39	10	0

						RS.	A.	P.
Free transfer—						907	0	0
Total number of plants						487	3	0
Value						25	8	0
Avenue tree seeds						5	5	0
Th-vetia seeds						10	12	0
Flower seeds						32	0	0
Miscellaneous								
Total value by free transfer						560	12	0
Inter-Departmental adjustment :						20	7	0
Value of seeds and plants								

Works.—A new lavatory and three re-inforced concrete seats were constructed for the use of visitors this year. The pump-set room was made permanent by cement plastering the walls.

Boring work in the garden well was taken up by a power-borer on 20th September 1951 and finished on 23rd March 1952. During this period a total depth of 105 feet from the bottom of the well was reached and the yield as reported by the Assistant Agricultural Engineer (Research) was about 575 gallons per hour. As the official year came to a close further boring work was stopped.

Introduction.—The following is a list of new introductions in the Botanical garden :—

Name of plants.	From where obtained.
1 Musa superba	Wynaad and Aduthurai.
2 Tamarindus sp. (Sweet Tamarind from Siam)	Indian Agricultural Research Institute, New Delhi.
3 Codiaeum disraeli	Coimbatore.
4 Caladium sp.	Do.
5 Spathoglottis plicata	Do.
6 Jatropha peltata	Do.
7 Gnaphalium sp.	Ootacamund.
8 Cynopogon sp.	Do.
9 Cassia sp.	Do.
10 Salvia leucantha	Burlar Station, Mettupalayam.
11 Hibiscus sp. (Blue-flowering)	Kozhikode.
12 Hameanthus multiflorus	Do.
13 Plumeria rubra	Do.
14 Iridium sp.	Do.
15 Gliricidia sp. (Blue-flowering)	Annamallais.
16 Hamerocallis fulva	Do.
17 Canna (variegated)	Visakhapatnam.
18 Microstylis versicolor	Do.
19 Alocasia	Do.
20 Equisetum sp.	Do.
21 Heliconia braziliensis	Burlar Station, Mettupalayam.
22 Talinum sp.	Coimbatore.
23 Ipomoea obscura	Do.
24 Clerodendron frons minutiflorum	Vellore.
25 Drynaria sp. (Staghornfern)	Wynaad.
26 Coleus Hybrids	Ootacamund.
27 Yucca aloefolia variegata	Do.
28 Vinca elegantissima	Do.
29 Euonymus radicans aureus	Do.
30 Copresma Baueri variegata	Do.
31 Ligustrum ovalifolium variegata	Do.
32 Ancoba Japonica	Do.
33 Asystasia variegata	Do.
34 Abutasia variegata	Do.
35 Giuko biloba	Do.
36 Maranta zebrina	Madras.
37 Maranta bicolor	Do.
38 Maranta rubra	Do.

Name of plants.	From where obtained.
39 Maranta sp.	Madras.
40 Taraxacum sp.	Do.
41 Diffenbachia sp.	Do.
42 Tillandia	Do.
43 Angelonia grandiflora	Outstanding purchases from Madras.
44 Tabernaemontana coronaria (Double)	Do.
45 Vernonia sp.	Do.
46 Pentas sp.	Do.
47 Kopsia fruticosa	Do.
48 Acainea congesta	Do.
49 Hibiscus ros-sinensis-yellow (Double)	Do.
50 Lantana depressa	Do.
51 Holmkioldia sanguinea	Do.
52 Amaranthus tricolor	Madras.
53 Amaranthus saicifolius	Do.
54 Musa coccinea	Aduthurai.
55 Musa rosacea	Arakuvalley.

Apart from the above mentioned plants there are quite a large number of plants yet to be identified. For want of adequate irrigation facilities almost all the plants are being maintained in pots only.

APPENDIX II.

THE STATEMENT OF SANCTIONED STRENGTH OF OFFICERS AND STAFF IN THE GOVERNMENT LECTURING AND SYSTEMATIC BOTANIST'S SECTION.

Name of service and post.	Number of sanctioned post.	
	Permanent.	Temporary.
I. Madras Agricultural Service—		
(1) Government Lecturing and Systematic Botanist	1	..
(2) Assistant Lecturing and Systematic Botanist	1	..
II. (a) Madras Agricultural Subordinate Service—		
(Upper subordinate).		
Assistant in Botany	5	..
(b) Fieldman (Lower subordinates)	1	1
III. Madras Ministerial Service—		
Lower Division Clerk	1	..
IV. Madras General Subordinate Service—		
Attenders	1	2
V. Madras Inferior Service—		
Peon		*

ADMINISTRATION REPORT OF THE BIO-CHEMIST, FRUIT-CANNING AND PRESERVATION WORK (MADRAS), KODUR, FOR 1951-52 (FROM 1st JULY 1951 TO 30th JUNE 1952).

I submit herewith the above report.

2. *Staff*.—I was in full additional charge of the post Biochemist from 1st to 22nd July. Dr. R. Ramamurti Reddi, selected by the Madras Public Service Commission for the post of Biochemist, took over charge of the post from me on 23rd July. He proceeded on leave on 31st May from which date I once again remained in additional charge of the duties of the Biochemist till the end of the year under report.

(i) *Fruit-canning and preservation work*.—Sri S. Balakrishnamurthi continued as Canning Assistant till 17th August when he proceeded on leave. Janab S. Abdul Khader was transferred from the post of Inspector, Fruit Products, and posted as Canning Assistant with effect from 15th September. He continued in this post till 12th March when he was transferred as Agricultural Demonstrator, Srikakulam district. He was succeeded by Sri P. V. Suryaprakasarao from 13th March, consequent on the disbandment of the post of Technical Assistant, he was holding in the Scheme for the administration of the Fruit Products Order. There was no change since then till the end of the period under report. Sri P. V. Suryaprakasarao was on earned leave for sixteen days from 5th to 20th May. The posts of Clerk and Store Clerk (both of Lower Division) were made permanent during the year with the result the only temporary posts still carried on the scheme are that of a mechanic and a peon.

(ii) *Scheme for the Administration of the Fruit Products Order*.—The administration of the Order was recentralized with effect from 1st January 1952. Consequently, all the staff employed under the scheme was disbanded. The disbandment was completed by the 15th March with the relieving of the Analytical Chemist. Sri P. V. Suryaprakasarao, Technical Assistant, was transferred and posted as Canning Assistant from 15th March. Sri G. Rajarao, Analytical Chemist, was granted earned leave for two months and was relieved on 15th March. Sri R. Narayanamurthi, Inspector was transferred as Chillies Assistant, Agricultural Research Station, Guntur, and relieved on 28th February. Sri E. Lakshminarayana, who came in the place of Janab S. Abdul Khader posted as Canning Assistant, was transferred as Agricultural Demonstrator, Sugarcane Liaison, Hindupur, and was relieved on 28th February. The Typist was absorbed by the Central Government into their establishment for the administration of the Fruit Products Order and was relieved on 27th January. Sri D. Lakshmappa, Upper Division Clerk (Accountant), was transferred to the Director of Agriculture's Office, Madras, and was relieved on 28th February.

Sri R. Narayanamurthi, Inspector, was on earned leave for ten days from 1st to 10th July.

(iii) *Scheme for the Demonstration of Fruit Products and Fruit Preservation*.—The scheme was extended for one year from 1st June 1951 to 31st May 1952 and again for another year from 1st June 1952 to 31st May 1953

providing, however, for only one post of Woman Demonstrator. Srimathi Rajam Kalyanasundar (previously Srimathi Rajam, C. K.) continued as Woman Demonstrator, Tiruchirappalli, till 31st January. Her headquarters was shifted to Cuddalore in response to a representation made by her and she opened her headquarters at Cuddalore on 1st February. Her jurisdiction was, however, enlarged from two to five districts simultaneously with the shifting of her headquarters. Her enlarged jurisdiction consists of South Arcot, Chingleput, North Arcot, Madras and Chittoor districts. Srimathi Rajam Kalyanasundar was on earned leave for sixteen days from 14th to 29th September, inclusive, and again for ten days from 25th February to 5th March, inclusive. She was on leave on half average pay on medical certificate for three months nineteen days from 6th March to 23rd June and was on extraordinary leave on medical certificate for seven days from 24th to 30th June.

A statement showing the sanctioned posts as on 30th June 1952 is appended.

3. *Tours*.—Dr. R. Ramamurti Reddi, the regular Biochemist, did the following tours during the year for the purpose noted against each:—

Place visited.	Number of times.	Purpose.
Madras	7	For contacting the Government Pleader in connection with a suit filed against the Biochemist in the High Court; for inspecting the firms and factories licensed under the Fruit Products Order; for contacting the State Marketing Officer for consultation regarding production and utilisation of fruits and vegetables in Madras State; for contacting the Madras University authorities and the University Biochemical Laboratory for consultations regarding the availability of facilities for shifting the fruit preservation research work to that laboratory; for contacting the headquarters Deputy Director of Agriculture.
Coimbatore	3	For attending the College Day and Conference; for visiting the College orchards; for inspecting the Fruit Products Order licence holders and for delivering lectures to D. I. H. students.
Bapatla	1	To meet the Principal for consultations regarding the availability of facilities at Bapatla for research in fruit products.
Coonoor; Ootacamund; Wynad; Taliparamba; Kodaikanal; Araku Valley; Vijayavada; Rajahmundry; Kadium; Tiruchirappalli and Tuticorin.	Once to each place.	To visit the important fruit stations and fruit preservation firms and acquaint himself with the fruit and vegetable growing and preserving industry in the State.

Besides the above, he was on tour to Cuddapah on two occasions to attend the Instructional Classes in Election work and two other places in Cuddapah district on election duty.

Altogether, he was on tour for 98 days during the year.

In addition to the above, a number of tours were undertaken in connection with the administration of the Fruit Products Order, exhibitions, etc., by the staff.

4. *Training*.—One candidate from Malabar, a student of the Kozhikode Polytechnic in Food Technology, was trained in the three-months Certificate Course in Fruit Preservation at the Laboratory.

Students of the Diploma Class in Horticulture, Coimbatore, were delivered a series of lectures in fruit and vegetable preservation at Kodur in November 1951 and at Coimbatore in April 1952. The lectures at Kodur were followed by practical demonstrations. Brief talks and demonstrations were also arranged during the visit to the Laboratory of the final year students of the Bapatla Agricultural College and of the second year students of the Coimbatore Agricultural College.

5. *Exhibitions and demonstrations.*—Fruit Products were supplied for display and sale at the following fifteen exhibitions and fairs in various parts of Madras State:—

- (1) Khadi, Swadeshi, etc., Exhibition at Salem.
- (2) District Economic Development Committee's exhibition at Cuddapah.
- (3) Tuticorin Indian Industrial and Agricultural Exhibition, Tirunelveli.
- (4) United Planters' Association of Southern India Annual Exhibition, Coonoor.
- (5) Agricultural Exhibition at Gopannapalem, Eluru (Rural Firka Development).
- (6) Madras Park Fair and Exhibition, Madras.
- (7) Agri-Horticultural Society's Flower and Fruit Show at Madras.
- (8) Rayalaseema Agricultural and Industrial Exhibition at Bellary.
- (9) Industrial Exhibition and Cattle Show, Nellore.
- (10) Exhibition at High School, Tellicherry.
- (11) Exhibition in connection with the visit of Dr. Norris E. Dodd, Director-General, Food and Agricultural Organization, to Coimbatore.
- (12) Agricultural Exhibition and Cattle Show, Chennur, Cuddapah.
- (13) Zannabandi Exhibition, Jammalamadugu, Cuddapah.
- (14) District Agricultural Exhibition and Fruit Show, Srikakulam.
- (15) Thiruchi Seva Sangham Arts Exhibition, Thiruchirappalli.

The Section also directly participated in the Park Fair and Exhibition, Madras, Fruit and Flower Show of the Agri-Horticultural Society, Madras, the exhibition conducted by the United Planters' Association of Southern India at Coonoor and the exhibition organized by the Thiruchi Seva Sangham at Thiruchirappalli, besides the Farmers' Day Exhibition conducted twice during the year at the Fruit Research Station, Anantharajpet. Separate stalls were put up at these exhibitions where samples of fruit products, small-scale equipment used in fruit preservation, etc., were displayed and actual preparation and preservation demonstrated throughout the duration of the exhibition. The demonstrations were very popular. A large number of enquiries were received and replied during the course of and after these exhibitions and demonstrations.

6. *Advisory work.*—Thirty-one enquiries were received and replied to during the year including those regarding supply of fruit products and excluding those connected with the administration of the Fruit Products Order. The enquiries mainly covered the following aspects of fruit and vegetable preservation:—Apparatus and equipment, preservation methods and recipes used, and addresses of suppliers of the first two; utilization of fruit and vegetable wastes; training in and literature on fruit and vegetable preservation.

7. *Publications.*—An article on the salient features of the work done and results achieved by the Section during the period from July 1950 to June 1951 was submitted for publication in the Villagers' Guide and Calendar for 1952. A note on the development of fruit preservation in Rayalaseema

was submitted for the brochure proposed to be brought out by the Rayalaseema Development Board as a supplement to the Madras Information. An article entitled "Home Canning and Preservation of Fruits and Vegetables—Its place in the South Indian Domestic Economy" was submitted for publication in the Special annual numbers of the Grow More Food journals. An article under the title "Quality in Fruit Products" by Sri G. Raja Rao, Analytical Chemist, Fruit Products Order, was published in the Madras Agricultural Journal.

Twenty-eight articles on fruit technology and allied subjects were abstracted by the Biochemist and his staff and the abstracts were supplied to the Principal, Agricultural College, Coimbatore, for being included in the monthly abstracts journal circulated by him to the various heads of offices in the department.

8. *Visitors.*—Among the visitors to the laboratory during the year, the following merit special mention:—

- (1) Their Excellencies the Maharaja and Maharani of Bhavnagar.
- (2) His Excellency the Governor of Madras, Sri Prakasa.
- (3) Honourable Minister for Agriculture, A. B. Shetty.
- (4) Dr. Oppenheimer.
- (5) V. S. Hejmadi, I.C.S. Famine Commissioner.
- (6) Ramakrishnan, I.C.S., Deputy Famine Commissioner.

An exhibition of representative samples of fruit products prepared at the laboratory, equipment and apparatus used in fruit preservation, etc., was arranged in a specially erected pandal on two occasions for the inspection of their Excellencies and His Excellency Sri Prakasa. They and the other distinguished visitors who accompanied them were shown round the exhibition and the activities of the laboratory explained. Some of the fruit products prepared were also served to them. The Maharaja of Bhavnagar was pleased to record his appreciation of the work being done in the following manner:—

"The advance made in Canning is also gratifying. This trade is full of possibilities, especially in this economically backward area."

Sri Sri Prakasa was pleased to write:—

"I also tasted the preserved fruits and found them good. I wish the venture all success."

Dr. Oppenheimer observed that he has "no doubt that its (Laboratory's) activities and facilities have to be enlarged for the benefit of the State's Fruit Industry."

9. *General.*—Sale of the more important and popular products of the laboratory was continued through the Central Industrial Museum, Madras. Necessary engineering tools for the installation of the Canning plant, boilers, water tank, etc., were obtained and the work of erection taken on hand in February with the appointment of the Engineering Supervisor temporarily sanctioned for a period of four months for the purpose. Before the close of the year under report, the erection of the canning unit and the ancillary units and the fly-proofing of the M.B. shed had been completed. Putting up the overhead water tank on staging and erection of boiler were still in progress at the end of the year. As the generator proposed to be transferred from the Bapatla Agricultural College for the canning factory here was later learnt to be giving very unsatisfactory service, proposals were submitted for the

purchase of a new generator for the factory to ensure efficient, trouble-free service. Steps were taken to speed up the shipment of Citrus juice unit ordered earlier from the United Kingdom. There was, however, some delay because of the need to obtain sanction for the increase in the cost of the unit announced by the firm from time to time and to communicate the same to the India Stores Department, London. One item of the unit, namely, the filter press was received during the year. Rest of the items are expected to be shipped and delivered here during 1952-53 without fail.

10. *Conclusion.*—In spite of the severe limitations and handicaps under which the Laboratory has been functioning, the interest shown by the public in its work and activities has been well sustained as evidenced by the number and nature of enquiries received, demand for the products prepared at the Laboratory, remarks made by the visitors, invitations received for participation in the exhibitions and fairs in various parts of the State, etc.

II. RESEARCH WORK.

Introduction.—Efforts were made during the year to modify the technique of processing fruits and vegetables with a view to obtain canned products of better texture and organoleptic quality. Attempts were also made to simplify the canning and processing methods through the use of latest type of containers and through the regulation of the pH of the canned or bottled fruit or vegetable itself, or the covering syrup or brine, as the case may be. Canning of mangoes, musk melons, palmyra kernels and bottling of vegetables received special attention. Work in the utilization of passion fruit was also intensified during the year, with special reference to the suitability of its juice for blending with other mild-flavoured fruit juices like orange, lemon, and cashew apple. A laboratory carbonation unit was obtained and preliminary studies in the carbonation of genuine fruit juices were initiated. Trials on preparation of mixed fruit squashes and mixed jams, fruit cocktails and fruit salads were continued with a view to develop more popular products. Exploratory trials were carried out on the utilization of sapota, *Garcinia tinctoria*, breadfruit and ber fruit. The refractometric solids of 106 samples of Neelum and Bangalora varieties of mango from exposed and shaded regions of trees at the Fruit Research Station were determined at the instance of the Superintendent of the Station.

Canning.

1. *Mango.*—Canning of different varieties of mango was continued during the year. Jehangir, Alampur Baneshan, Malgoa, Himayuddin, Khader, Alfonso, Janardhanapasand, Baneshan and Neelum were the eight varieties packed, the last mentioned two having been canned in fair-sized bulk lots backed by satisfactory results obtained in earlier years.

The procedure adopted for canning was modified in some of the batches of Baneshan and Neelum varieties with a view to improve the organoleptic quality and the texture of the canned product. The modification consisted in (i) presoaking the mango slices in a solution of Calcium Chloride, a "firming agent", (ii) presoaking them in sugar syrup, (iii) replacing the exhaustion of filled cans by the use of boiling hot covering syrup, and (iv) using a much less rigorous processing (sterilization) characterized by a very short duration of only 10 minutes.

Details of the pre-treatment of mango slices (prior to canning) are as follows:—

In one series, mango slices, blanched and unblanched lots, were kept immersed in one per cent./two per cent. Calcium Chloride solution of 50°C for 10, 20 and 30 minutes, respectively, prior to packing and processing in 45 Deg. Brix. sugar syrup. In another, the blanched and unblanched lots of slices were each soaked in sugar syrup of 10, 20 and 30 Deg. Brix, respectively, maintained at 50°C, for a period of three hours, before packing and processing in 45 Deg. Brix. sugar syrup.

Pretreatment of slices with Calcium Chloride improved the texture of the canned slices. However, as the concentration of the firming agent increased, the slices tended to become bitter and the syrup cloudy. Pre-soaking blanched slices in syrup yielded a product satisfactory in texture, taste and flavour while the same treatment of unblanched slices brought about mushiness and cooked taste and flavour.

Janardhanapasand variety proved unsuitable for canning as the flesh of the fruit was not firm enough to withstand handling in preparing the fruit for canning and processing.

2. *Muskmelon.*—Muskmelon pulp, considered as a good dessert and an ideal dressing for ice creams, custards and like preparations, was canned in the following six different ways:—

(i) Pulp was mixed with half its weight of sugar (in solid form), heated to 190°F before filling in cans and the filled cans processed for 15 minutes under 15 lb. pressure. Exhaust was dispensed with.

(ii) The pH of the pulp was adjusted to 3.2 by adding lemon juice. Pulp was mixed with equal weight of 60 per cent. sugar syrup, heated to 200°F before filling in cans and the cans processed for 15 minutes in boiling water. Exhaust was dispensed with.

(iii) As in (ii) but adding 60 per cent. sugar syrup equal to only a third of the weight of melon pulp.

(iv) The pH of the pulp was adjusted to nearly 3.3 by adding lemon juice and the pulp mixed with equal weight of 60 per cent. sugar syrup. The pulp-sugar mixture was rapidly raised to a boil, immediately filled into cans and the cans sealed quickly. The sealed cans were inverted at once and kept inverted from five to ten minutes before cooling in cold water. Exhaust was dispensed with.

(v) As in (iv) but adding 60 per cent. sugar syrup equal to half the weight of pulp.

(vi) As in (iv) but adding solid sugar equal to half the weight of pulp.

Samples of (i) and (ii) were cut out and examined a few days after canning and were found very satisfactory from the standpoint of organoleptic quality.

3. *Palmyra kernels.*—Canned palmyrah kernels in various juice-syrups, in combination with mango slices, and in acidified sugar syrup were cut out and inspected nearly six months after packing. The product canned in 45 Deg. Brix sugar syrup acidified with citric acid to 0.5 per cent. was found to be the best among the lot possessing very nearly all the qualities of the freshly extracted kernels. Combinations with mango slices and tomato juice-syrup and passion fruit juice syrup were the next best. More cans of these kernels were packed during the year on the lines found most promising, viz., in combination with mango slices and in sugar syrup of 50 Deg. Brix. containing 0.5 per cent added citric acid.

4. *Country pears*.—Samples of these canned on 7th October 1949 were opened and examined with the following results:—

(i) Pear halves in 55 Deg. Brix. syrup in plain tins processed for 50 minutes in boiling water. Age at opening was 1 year 10 months nearly. Can developed hydrogen swell with one end only bulged; feathering was pronounced all over; corrosion markedly evident along the side seam and the ends. Syrup was very clear but brownish yellow; mild bubbling noticed (due to evolution of hydrogen); flavour of tin perceptible; had a strength of 28.5 Deg. Brix.

(ii) Pear slices/segments packed in 55 Deg. Brix syrup in plain tins and processed for 35 minutes in boiling water. Age at opening was nearly 1 year 10 months. Can was feathered badly and corrosion of tin plate had just started. Syrup was of 32.75 Deg. Brix, pale yellow in colour, clear and quite normal in taste and flavour. The second method has obviously given a much superior product and more satisfactory shelf-life.

5. *Pineapple*.—Kew variety pineapple was found to can very satisfactorily as reported in the previous year. Bulk lots of this were canned during the year in 50 Deg. Brix syrup and adopting an exhaust of 10 minutes around 190°F and process of 15/20 minutes in boiling water.

6. *Vegetables in "clamp-on" glass jars*.—A series of trials was put under way on canning of vegetables in a cheap, tidy and simple but efficient manner, ideal for being adopted in home-preservation of these valuable protective foods. Glass "clamp-on" jars, which are universally popular in U.S.A. and other advanced countries for home-canning and preservation and which were till recently not available in our country, were used as containers. These jars are very sturdily built to withstand breakage from high processing temperatures and even considerable rough handling and can be sealed air-tight in a wink without the use of any costly sealing machine but by means of a simple yet ingenious clamping device. Another important economic advantage of this type of containers is that they can be used over and over again any number of times and are therefore very cheap in the long run in contrast with tin cans. Home-preservation of fruits and vegetables, without which utilization of our surplus and prevention of waste in perishable foodstuffs can never be complete, can be given a great impetus in our country by introducing a remarkable container like this which is, perhaps, ideal for the purpose. Many English and Indian vegetables like beets, carrots, green peas, lady's fingers, potatoes, green tomatoes and greens were canned using these jars with highly satisfactory results. The procedure adopted is almost similar to the one applied to tin cans except that processing is done for a few more minutes to allow for the slower rate of heat penetration in glass. Pressure-processing of vegetables was dispensed with by the use of acidified brine containing 0.5 per cent. added citric acid or by combining a more sour vegetable with a less sour one so as to achieve a resultant pH value well below the critical limit of 4.5 for pressure-processing.

7. *"Badaga" beans*.—These beans from Nilgiris, canned on 16th September 1949 giving a process of 35 minutes under 15 lb. pressure, were opened and examined during the year, nearly one year nine months after packing. The can was sound and normal except for small black dots noticed on the inner side of the can. Brine was clear and normal. The beans had turned slightly brown and had fairly marked characteristic flavour. The texture was rather soft and the beans left a slightly bitter after taste. The canned product was fairly good on the whole.

Fruit juices, squashes cordials and syrups.

8. *Grapefruit juice, plain* was canned by the improved method of processing which consisted in preheating the juice rapidly to 190°F, filling and processing the filled cans for just 10 minutes in boiling water against the conventional duration of 25 to 30 minutes at around 190°F.

9. *Pomegranate cordial*.—Pomegranates with the rind were cut into slices and basket-pressed. The extraction was very satisfactory and a brilliantly clear, sparkling red juice was obtained. A cordial was made out of this clear juice having 25 per cent. juice content, 0.75 per cent. added citric acid and 55 Deg. Brix. The product possessed very attractive appearance and good taste and flavour. A simple recipe which emerged from the above method of preparation is as under—

Clear juice	.. .. .	1 part by weight.
Sugar	.. .. .	2 parts.
Water	.. .. .	1 part.
Citric acid	.. .. .	0.75 per cent. of the weight of finished cordial.
Sodium benzoate (preservative)		At 0.1 per cent. of the weight of finished cordial.

10. *Passionfruit cordial*.—Passionfruit juice, when stored and preserved as such, was observed to clear up briskly, i.e., within about ten days, depositing a heavy sediment at the bottom and leaving a sparkling, pale yellow-coloured juice above. A cordial was, therefore, attempted making use of the clear supernatant juice in two sugar strengths, i.e., 55 and 45 Deg. Brix but having the same juice content, i.e., 30 per cent. The product was very attractive in appearance but rather weak in flavour—the juice was subsequently found to deteriorate quickly in point of flavour on storage. The cordial prepared out of relatively fresh juice about 10 days old, however, possessed about adequate characteristic flavour. Weaker sugar concentration was also found to smother the flavour of the passionfruit to a much less degree. Further study of the product has been contemplated.

11. *Mixed squashes and fruit juice cocktails*.—Blending of different fruit juices and squashes with a view to develop products with greater "popularity potential" was extended during the year.

(i) *Passionfruit—Lemon squash*.—Two lots of this were prepared, one containing the two juices blended in the ratio of 2:1 (20 per cent. and 10 per cent.) and other having them in the proportion of 3:1 (22.5 per cent. and 7.5 per cent.). The Brix value was maintained at 55 Deg. and the total fruit juice content at 30.0 per cent. in both batches. The blending proved very satisfactory in either case and also helped to mellow the strong flavour of the passionfruit which is not liked by some.

(ii) *Multi-vitamin fruit cocktail*.—A mixed squash was prepared of passionfruit, tomato, Amla, orange and grapes so as to obtain a product rich in four of the most important vitamins, viz., A, B, C and G possessing at the same time good organoleptic qualities also such as good taste, flavour, colour and appearance. Passionfruit was chosen particularly for its richness

in pro-vitamin A, Amla and orange for their vitamin C, tomato for its vitamin G and Amla, orange, tomato and grape for their valuable micro-nutrients and health-promoting factors. The blending (done as below) produced a cocktail satisfactory in all respects.

	PER CENT.
Juice of passionfruit, Amla, orange, tomato and grape at 5 per cent. each	25.0
Sugar	45.3
Water	29.7
Acidity	1.0
Brix value	55 Deg.

(iii) *Malted multi-vitamin cocktail*.—To the same product as made above Cholam malt extract of 80 Deg. Brix. (approximate) was added at the rate of 5 per cent. of the weight of squash in order to produce a beverage in the nature of a tonic. Addition of sugar was suitably adjusted inasmuch as the malt extract is a concentrated solution of maltose sugar.

12. *Malted fruit beverage*.—Prior to preparing the above malted cocktail, malted fruit beverages prepared earlier were opened and examined for guidance. Particulars regarding the manner of preparation of these cut-out products together with the observations made are set out below—

(i) *Grape or Draksha malt*.—This was prepared with 30.0 per cent. grapejuice, 2.5 per cent. malt extract, 1.3 per cent. total acid as citric and 45 Deg. Brix. Age at opening was 3 years 8 months nearly. The product was satisfactory in respect of taste and appearance and was akin to proprietary tonics in general.

(ii) *Pineapple malt*.—This was made with 40 per cent pineapple-lime (2 : 1) mixed juice, 10 per cent. malt extract, 1.2 per cent. total acid and as citric and 45 Deg. Brix. Age at opening was 3 years 10 months nearly. The product was dark brown because of high content of malt extract and a little too sour for a tonic-like product. Otherwise, it was satisfactory and sound.

(iii) *Orange malt*.—This was prepared with 30.0 per cent. Chinese orange juice, 15.0 per cent. lime juice, 5.0 per cent. malt extract, 1.2 to 1.3 per cent. total acid as citric and 55 Deg. Brix. It was nearly 3 years 6 months old at opening. The product was dark brown with a strong and pleasant aroma of orange-lime malt. It was sound and satisfactory.

(iv) *Tomato malt*.—This was prepared by incorporating 5.0 per cent. malt extract into plain tomato juice which was subsequently pasteurized in bottles for 30 minutes at 180° F. The product had undergone fermentation.

13. *Carbonated real-fruit beverages*.—A laboratory size single-bottle carbonating unit was obtained during the year with the help of which preliminary trials in the carbonation of real-fruit beverages were initiated. Passionfruit-lemon mixed squash, cashewapple cordial, Amla syrup, tamarind syrup and unset roselle jelly, which were previously prepared, were carbonated after being diluted to consumer's brix level. Carbonic acid gas was bubbled through the beverages at nearly 80 lb. pressure per square inch. Cashewapple cordial and passionfruit-lemon squash, carbonated as above, were found to be very good while the rest were poor in flavour though not so in taste.

Jaman juice beverage carbonated, bottled and stored for nearly eleven months kept free from spoilage or deterioration. Results obtained from

preliminary trials and observations made are thus encouraging and further study on a systematic footing of this method of preparation and preservation of fruit beverages is really worthwhile.

Jams, jellies, marmalades, etc.

14. *Muskmelon jam*.—A high class jam was prepared from Sidhout muskmelons after bringing down the pH of the melon pulp to nearly 3.3 by adding lemon juice. Sugar was added at the rate of three for every four parts of pulp used by weight. Shreds of lemon peel were also added for securing better crispness in the finished product. The product was attractive with golden yellow colour, very good in taste with fairly strong characteristic flavour.

15. *Roselle jelly*.—The sepals of roselle or red sorrel flowers (*Hibiscus subdariffa*) were found to yield a jelly of excellent quality by all standards. The product possessed very attractive crimson red colour, sparkling clarity, delightful taste and appearance and a satisfactory set. The sepals were found to possess just the requisite degree of acidity making it unnecessary to add any acid to the jelly. A quality product from waste, it has remarkable economic advantages over other products of its kind.

16. *Ber jelly*.—Ber fruits were obtained from Nandyal (where they are grown in abundance) and used for making a jelly. The fruit was highly mucilaginous and so was the jelly obtained. Indications were that the fruit was very poor in pectin content.

17. *Orange marmalade*.—The "Marmalade" variety of bitter orange grown on the Fruit Research Station, Kodur, was found to yield a fruit with high pectin and acid content. While the former quality is conducive to the formation of a good jelly, the latter is not. Trials were, therefore, conducted to lower the acidity of its extract to 3.1 pH by (i) adding extract from sweet oranges (Chinese) in different proportions and (ii) by adding sodium bicarbonate, an acid-neutralizing agent. A marmalade was obtained in both the cases possessing a satisfactory sugar-acid blend and good gelling properties.

18. *Guava cheese*, which is something like a hard-set jam, was made from fully ripe guavas. Seed-free pulp and sugar were mixed in the ratio of 4 : 5 and just a pinch of citric acid (one gram per pound of sugar added) was added to impart a little tartness to the product. This is a product of much economic advantage as it can be prepared from even the residue left over after making jelly, cut into cakes of any desired shape or size and readily sold loose as a sweetmeat wrapped in cheese or butter paper.

19. *Banana cheese*.—Trials were conducted to produce a "cheese" from bananas similar to the one obtained from guavas. Four different proportions of sugar to pulp were used, viz., 1:3; 1:1; 1:1½ and 1:1½. In none of the combinations the resulting product gave the correct "set of cheese." The fruit, therefore, appears suitable only for jams and jam-like products.

20. *Sapota paste*.—Since sapota does not figure at all among preserved fruits and as it is found in cheap abundance in certain areas in this State, efforts were continued to find suitable avenues for its utilization. Sapota paste was a product attempted during the year by boiling sapota pulp with three-fourths its weight of sugar and a quantity of paste of cashewnuts or groundnuts. Citric acid was added in small doses to give the requisite tartness. The resulting products were fairly good but indicated the need for further work.

2. *Exhibitions and demonstrations.*—Fruit products were supplied for display and sale to fifteen exhibitions conducted in various parts of the State. Separate stalls were put up and daily demonstrations arranged during two exhibitions at Madras, one at Coonoor and another at Tiruchirappalli. Exhibition of fruit products was also arranged at the Fruit Research Station on the Farmers' Day organized on two occasions during the year.

3. *Advisory work.*—Thirty-one enquiries about fruit preservation and allied matters were received and replied to besides the numerous letters received in connexion with the administration of the Fruit Products Order.

4. *Publications.*—Three popular articles were contributed by the Section for publication in the Villagers' Guide and Calendar, Grow More Food Journal and Madras Information. One article by Sri G. Rajarao, Analytical Chemist, Fruit Product Order, was published in the Madras Agricultural Journal.

Twenty-eight articles were abstracted from scientific and technical periodicals and supplied to the Principal, Agricultural College, Coimbatore, for circulation through the Abstract Journal

RESEARCH.

1. *Canning.*—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. The simplification of the processing procedures was also attempted through the use of a latest type of 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 techniques were particularly encouraging in the case of palmyra kernels, musk melon pulp and a number of English and Indian vegetables. Country pears and "Badaga" beans (from Nilgiris) canned earlier were found to be satisfactory on cut-out and examination.

2. *Fruit juices, squashes and cordials.*—A pomegranate cordial of high quality was produced while a cordial from passionfruit juice was attempted with only limited success. A multi-vitamin fruit juice cocktail (sweetened) with and without added malt extract was prepared with satisfying results. The cocktail was made up of five different fruit juices each of which is rich in one or more of the important vitamins—A, B, C and G. Malted fruit beverages prepared in earlier years from orange, pineapple and grape yielded useful results. Preliminary carbonation trials were successful in the case of Jaman, Cashewapple and "Passionfruit—lemon" beverages. A satisfactory mixed squash was obtained by blending passionfruit 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 or red sorrel flowers. Exploratory trials on making fig jelly, bael jelly, ber jelly, banana cheese and breadfruit jam were attended with varying degrees of success.

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

ADMINISTRATION OF FRUIT PRODUCTS ORDER.

This was in charge of the Section only 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 recentralization of the work under the Order.

DEMONSTRATION OF FRUIT PRODUCTS AND PRESERVATION.

There was only one Lady Demonstrator working during the year, the other four posts having been discontinued. She conducted 101 demonstrations in the preparation of 18 different fruit and vegetable products at 25 different institutions and three exhibitions besides 25 private residences. Propaganda on nutrition and subsidiary foods, advice and information and sale of preservatives and citric acid in small quantities at cost price to interested public formed part of her activities.

KODUR,
31st July 1952.

C. BHUJANGA RAO,
Bio-chemist-in-charge.

STATEMENT I.—Statement showing number of sanctioned posts as on 30th June 1952.

Name of service and post.	Number of sanctioned posts.		Number of sanctioned posts.		Number of sanctioned posts.		Number of sanctioned posts.		Number of sanctioned posts.		Total	
I Madras Agricultural Service—	(1)	Permanent.	(2)	Temporary.	(3)	Permanent.	(4)	Temporary.	(5)	(6)	(7)	(8)
Bio-chemist												
II Madras Agricultural Subordinate Service—												
Upper subordinates												
Mechanics												
III Madras General Subordinate Service—												
Laboratory attendant												
Fitters												
IV Madras Ministerial Service—												
V Madras Inferior Service—												
Peons												
Messengers												
Total												

Fruit canning and preservation work, Madras at Kodur—G.O. Ms. No. 517, dated 21st March 1950, communicated in Director of Agriculture's Endorsement No. D. Ms. No. 1294, Food and Agriculture, dated 22nd June 1950, G.O. Ms. No. 1294, Food and Agriculture, dated 22nd June 1951, communicated in Director of Agriculture's R. Ms. No. V. 2599/0, dated 1st August 1951, G.O. Ms. No. 2375, Food and Agriculture, dated 21st October 1950, communicated in Director of Agriculture's R. Ms. No. V. 73/51, dated 12th January 1951, and G.O. Ms. No. 807, Food and Agriculture, dated 3rd June 1952, communicated in Director of Agriculture's Endorsement No. D. Ms. No. 153/52, dated 9th June 1952.

Scheme for the demonstration of fruit products sanctioned in G.O. Ms. No. 1039, Food and Agriculture, dated 30th May 1950, communicated in Director of Agriculture's Endorsement No. D. Ms. No. 136/50, dated 2nd June 1950 and G.O. Ms. No. 725, Food and Agriculture, dated 26th April 1952, communicated in Director of Agriculture's Endorsement No. D. Ms. No. 259/52, dated 5th May 1952.

Fruit and fruit products development—Fruit Canning Factory—Engineers' staff—G.O. Ms. No. 895, Food and Agriculture, dated 31st May 1952, communicated in Director of Agriculture's Endorsement No. D. Ms. No. 164/52, dated 4th June 1952.

Total number of sanctioned posts.

STATEMENT II.—Statement showing products manufactured during the year 1951-52 and value thereof.

Serial number and name of the product.	Size and type of container.	Quantity manufactured.	Price.			Value of products manufactured.		
			(4)			(5)		
(1)	(2)	(3)	RS.	A.	P.	RS.	A.	P.
I. Juices.								
1 Passion fruit juice	24 oz.	103	1	0	0	103	0	0
2 Canned grapefruit juice (unsweetened).	A. 2½ can.	7	1	0	0	7	0	0
II. Cordials.								
1 Passion fruit cordial	24 oz.	10	2	4	0	22	8	0
III. Squashes and mixed squashes.								
1 Lime squash	24 oz.	60	1	12	0	105	0	0
2 Lemon squash	"	168	1	12	0	294	0	0
3 Orange squash	"	424	2	4	0	954	0	0
4 Orange-passion fruit squash	"	72	2	4	0	162	0	0
5 Passion fruit squash	"	363	2	4	0	816	12	0
6 Cashew-passion fruit squash	"	16	1	12	0	28	0	0
7 Lemon-passion fruit squash	"	16	2	4	0	36	0	0
8 Pineapple squash	"	68	1	12	0	119	0	0
9 Do.	12 oz.	1	1	4	0	1	4	0
10 Jaman squash	24 "	3	1	12	0	5	4	0
11 Orange-pineapple squash	"	23	2	4	0	51	12	0
12 Pomegranate cordial	12 oz.	3	1	4	0	3	12	0
13 Water melon squash	24 "	21	2	0	0	42	0	0
IV. Cocktails.								
1 Fruit juice cocktail	24 oz.	12	1	12	0	21	0	0
2 Malted fruit juice cocktail	"	2	2	4	0	4	8	0
V. Canned fruits.								
1 Canned mangoes	A. 2½ can.	183	1	8	0	274	8	0
2 Canned pine apples	"	44	1	8	0	66	0	0
3 Canned grape fruit	"	10	1	8	0	15	0	0
4 Canned plums	"	8	1	8	0	12	0	0
5 Canned mango pulp (unsweetened).	"	2	1	0	0	2	0	0
6 Apple slices	2 lb. Atlas jar.	1	..	..	..	..	..	*
7 Canned pears	A. 2½ can.	32	1	8	0	48	0	0
8 Pear slices	2 lb. clamp on jars.	1	..	..	..	..	..	*
9 Canned pineapples	1 lb. clamp on jars.	3	..	..	..	..	..	*
10 Canned musk melon pulp (sweetened).	A. 2½ can.	47	1	8	0	70	8	0
11 Canned palmyra kernels	"	24	1	8	0	32	0	0

* Purely experimental. Price not fixed.

STATEMENT II—Statement showing products manufactured during the year 1951-52 and value thereof—cont.

Serial number and name of the product.	Size and type of container.	Quantity manu- factured.	Price.			Value of products manufactured.		
(1)	(2)	(3)	(4)			(5)		
			RS.	A.	P.	RS.	A.	P.
VI Bottled vegetables.								
1 Carrots (slices and cubes) ..	1 lb. clamp on jars.	6	..	..	..	..	*	
2 Beets (cubes)	"	5	..	..	..	..	*	
3 Carrot and beets mixed (cubes).	"	2	..	..	..	..	*	
4 Radish (rod like slices) ..	"	2	..	..	..	..	*	
5 Potatoes	2 lb. clamp on jars.	4	..	..	..	..	*	
6 Okra	"	1	..	..	..	..	*	
7 Okra	1 lb. clamp on jars.	2	..	..	..	..	*	
8 Potatoes and 'gogu' ..	"	2	..	..	..	..	*	
9 Potatoes and spinach (sour) ..	"	4	..	..	..	..	*	
10 Potatoes and green tomatoes.	"	5	..	..	..	..	*	
11 Assorted vegetables	A. 2½ can.	1	1	0	0	1	0	0

VII. Candied products.

1 Ginger candy	ozs.	24 oz.	0	2	0	3	0	0
			(per oz.)					

VIII. Chutneys and pickles.

1 Sweet mango chutney ..	M.F. jars.	4	2	0	0	8	0	0
2 "	1 lb. Spencer jar.	1				*		

IX. Jams, jellies, marmalades, cheeses and pastes.

1 Mango jam	A. 2½ Can.	59	2	0	0	118	0	0
2 Plum jam	"	77	2	0	0	154	0	0
3 Jack jam	"	10	2	0	0	20	0	0
4 Bread fruit jam	M.F. jars	2	2	0	0	4	0	0
5 Apple sauce	2 lb. Atlas jar.	1				*		
6 Pear-banana mixed jam ..	1 lb. Spencer jar.	2				*		
7 Do.	A. 2½ cans.	14	2	0	0	28	0	0
8 Mango jam	1 lb. Spencer jar.	1				*		
9 Banana and <i>Garcinia tinctoria</i> mixed jam.	A. 2½ can.	14	2	0	0	28	0	0
10 Sapota paste	M.F. jar	8	2	0	0	16	0	0
11 Pineapple jam	A. 2½ can.	23	2	0	0	46	0	0
12 Musk melon jam	"	10	2	0	0	20	0	0
13 Guava cheese	1 lb. clamp on jar.	4				*		
14 Guava jelly	M.F. jar.	1	2	0	0	2	0	0
15 Do.	1 lb. Spencer jar.	1				*		
16 Roselle jelly	M.F. jar	12	2	0	0	24	0	0
17 Do.	1 lb. Spencer jar.	1				*		
18 Orange marmalade	M.F. jar	18	2	0	0	36	0	0
19 Do.	1 lb. Spencer jar.	4				*		
20 Do.	A. 2½ can.	4	2	0	0	8	0	0
						3,812	12	0

* Purely experimental. Price not fixed.

STATEMENT III—Statement of expenditure and receipts for the period from 1st July 1951 to 30th June 1952 under 40. Agriculture—c. Experimental farms—A. Agricultural stations.

Fruit canning and preservation work (Madras), Kodur.

Head of Account.	(A) Expenditure.			Amount spent.		
	RS.	A.	P.	RS.	A.	P.
I Pay						
(a) for officers	..	..	..	2,355	5	0
(b) for establishment ..	..	..	..	3,634	4	0
II Dearness allowance ..	..	..	..	2,178	10	0
III Travelling Allowance ..	..	..	..	1,955	1	0
IV Contingencies—						
(1) Dearness allowance to menials ..	..	..	..	426	0	0
(2) Service postage and telegram charges ..	..	..	..	250	0	0
(3) Freight charges	..	..	..	361	11	9
(4) Other contingencies	..	..	..	10	4	9
(5) Petty constructions and repairs ..	..	..	..	..	..	..
(6) Purchase of deadstock	..	..	..	1,531	9	3
(7) Working expenses	..	..	..	5,811	14	0
(8) Apparatus and materials	..	..	..	146	6	0
Total of (1) to (8)—				8,537	13	9
Grand total, Items I to IV ..				18,661	1	9

(B) Receipts.					
Sale-proceeds	..	..	..	..	..
Sales tax	..	..	..	..	..
Total ..				2,788	13 9

STATEMENT IV—Statement of expenditure and receipts for the period from 1st July 1951 to 30th June 1952 under "40 Agriculture—m. Other charges—Administration of Fruit Products Order, 1948".

Head of Account.	(A) Expenditure.						Amount spent.		
							RS.	A.	P.
I Pay—									
(1) Pay of officers	..	..	..	..	..	..			
(2) Pay of establishment	..	..	..	..	..	..	6,706	14	0
II Dearness allowance	..	..	..	..	..	..	1,881	4	0
III Travelling and other compensatory allowances	..	..					798	0	0
IV Contingencies—									
(1) Dearness allowance to menials	..	..	..	..					
(2) Service postage and telegrams	..	..	..	..	..	..	150	0	0
(3) Freight charges	..	..	..	..	..	..	46	15	9
(4) Other contingencies	..	..	..	..	..	..			
(5) Petty constructions and repairs			..	..	..	..			
(6) Purchase of deadstock	..	..	..	..	..	..	7	13	0
(7) Working expenses	..	..	..	..	..	..	124	5	6
(8) Apparatus and materials	..	..	..	..	..	..			
Total of (1) to (8)							329	2	3
Grand total of items I to IV							9,715	4	3
(B) Receipts.									
Licence fees and fines under the Fruit Products Order							1,050	0	0

STATEMENT V—Statement of expenditure and receipts for the period from 1st July 1951 to 30th June 1952 under "40.—Agriculture—D. Agricultural Demonstrations and Propaganda including Public Exhibitions and Fairs—*I. Ordinary areas—(i) Excluding Post-war Reconstruction.*"

Head of Account. (A) Expenditure.	Amount spent.		
	RS.	A.	P.
I Pay—			
(a) for officers			
(b) for establishment	1,008	1	0
II Dearness allowance	260	5	0
III Travelling and other compensatory allowances	460	3	0
IV Contingencies—			
(a) Demonstration charges	1,165	7	6
(b) Dearness allowance to menials	140	8	0
(c) Service postage and telegram charges	100	0	0
Total of (a) to (c) ..	1,405	15	6
Grand total of items I to IV ..	3,134	8	6

(B) Receipts—Nil.

ADMINISTRATION REPORT OF THE RESEARCH ENGINEERING SECTION FOR THE FASLI YEAR 1951-52.

Charge.—During the year under report, Sri C. P. Raju, B.A., B.Sc. (Engineering), was in charge of the section till 20th August 1951 on which date Sri R. G. Menon, B.A., B.Sc. (Engineering), took charge and relieved Sri C. P. Raju to join the Central Sugarcane Committee as Agricultural Engineer. Sri R. G. Menon held additional charge of the post of Assistant Agricultural Engineer (Research) until 20th December 1951 and I took over charge of the section on 20th December 1951 and continued to be in charge throughout the rest of the period.

1. *Staff.*—At the commencement of the year, the strength of the section consisted of 2 gazetted officers, 1 draughtsman, 3 supervisors, 1 tractor foreman, 1 upper division clerk, 4 lower division clerks, 1 typist, 1 store-keeper, 1 stores attender, 5 peons, 2 lorry drivers, 2 lorry cleaners, 1 second-grade mechanic, 1 third-grade mechanic, 14 pump drivers, 3 pump attendants and 35 other members including workshop artisans, watchmen, casual coolies, etc. During the period, the post of Teaching Assistant was ordered to be transferred to the control of the Principal, and accordingly the Teaching Assistant was transferred. Sri R. G. Menon, Gazetted Assistant, proceeded on one month's leave on 1st June 1952 and I held additional charge of the post of Gazetted Assistant. At the close of the year, this section consisted of about 93 members in all.

2. *Classes for B.Sc. (Ag.) students.*—The Teaching Assistant was ordered to be transferred to the control of the Principal and accordingly the Teaching Assistant was transferred on 16th December 1951. From the commencement of the year under review, until the Teaching Assistant was transferred, 61 practical classes for the B.Sc. (Ag.) first and second-year students and 11 theory classes for B.Sc. (Ag.) second year were conducted.

3. *Training of Agricultural Engineering Supervisors.*—Due to shortage of Engineering Supervisors with a Licentiate certificate or degree in Engineering, Government sanctioned in G.O. No. 2089, dated 25th October 1951, communicated in Director of Agriculture's Endorsement No. S.S.E. 2-1345/51, dated 16th February 1952, the proposal of the Director of Agriculture to train six agricultural graduates in Agricultural Engineering, with a view to utilize their services as Agricultural Engineering Supervisors on successful completion of their training. It is of prime importance to mention here that the training given to two batches of agricultural graduates, six in each, trained during the last periods have proved to be successful. As per the orders, six agricultural graduates were selected by the Director of Agriculture and all of them joined the training in the workshops on 1st April 1952 and they are due for completion on 1st April 1953.

In Agricultural Engineering (Mechanical), the subjects dealt with are workshop practice, maintenance and operation of oil engines, maintenance and operation of tractors, bull-dozers and implements. In Civil Engineering, the syllabus consists of surveying, building construction, drawing, soil and water conservation, irrigation, preparation of estimates for works, execution of works and method of payment of bills. After one month's training in Civil Engineering the trainees would be sent to the workshops of Messrs. P.S.G. and Sons, Messrs. Larsen Toubro and Messrs. Binny & Co. as per approved programme.

In addition, 3 licentiates in Mechanical Engineering were taken in for training for a period of 6 months at their own expense with a view to absorbing them as Agricultural Engineering Supervisors. All of them completed their prescribed training in Agricultural Engineering, consisting of workshop practice, maintenance and operation of tractors, pumpsets and other Agricultural machinery.

Training of tractor and oil engine operators.—During the year, a scheme to train the Tractor and Oil engine operators sanctioned by the Government was started. The first batch of 9 trainees, out of the 12 selected by the Director of Agriculture reported for training and accordingly, their classes started on 15th October 1951. They were trained under the charge of one Agricultural Engineering Supervisor. The subjects dealt with were, workshop practice, care and maintenance of oil engines, minor repairs, etc., and various operations by tractors, their care and maintenance, minor repairs, etc., 5 out of the 9 trainees in the batch were non-departmental and 4 of them departmental candidates. The course came to an end on 14th February 1952 and they were all relieved.

During the second fortnight of February 1952, a second batch of oil engine and Tractor operator trainees consisting of 4 departmental and 5 outsiders reported for training. This second batch of oil engine and Tractor operator trainees completed their training on 19th June 1952.

The third batch of trainees joined training on 1st July 1952 and are undergoing training at present.

4. *Maintenance of lorries.*—Two lorries were maintained. One was used for transport of parcels received for various sections at the parcels office and goods shed and was placed at the disposal of the Parcel clerk on all working days. The other lorry was utilized for purpose of transporting fuel oils, lubricating oils, etc., from Tractor workshops to workspot for tractor operation under Grow More Food Schemes and for transporting articles of District Agricultural Officer and the officers of various sections at the Agricultural College and Research Institute, Lawley Road P.O. The lorries on the whole have performed 11,018 and 10,670 miles, respectively. They were sent for their periodical inspection by the Area Transport Officer and necessary repairs carried out. A sum of Rs. 10,505-12-6 was expended for the satisfactory maintenance of these two lorries and a sum of Rs. 8,256-12-0 was both collected and adjusted towards hire of the lorries. Whenever the lorries happened to be free, they were sent to the District Agricultural Officer and Agricultural Demonstrator for transporting seeds, manures, iron materials, etc., from one taluk to the other.

5. *Maintenance of oil engines.*—At the beginning of the year, there were 39 numbers of oil engines in all as detailed in Annexure I and 4 numbers were received during the year. At the commencement of the period, there were 4 nos. idle due to repair. At the close of the period, there were 43 numbers in all and out of these 2 numbers were under repair due to non-availability of spares readily. A sum of Rs. 14,183 was collected by way of hire charges on oil engines, including those hired out to other Government departments.

6. *Pipes and fittings.*—The ever increasing demand of the pipes and fittings at the commencement of the year was though keenly felt, the demand could be greatly reduced to a satisfactory extent by the increased supplies received during the year. As tabulated in Annexure II, it can be seen that

a greater quantity of stocks of pipes were received and distributed during the year. In issuing the pipes, the drought-affected area and other important factors were taken into consideration. A sum of Rs. 1,61,694 was collected by way of sale of pipes during the period.

Workshops.—A total number of 847 items of job works were undertaken during the period. In addition to normal repair works undertaken for the articles of various sections, both minor and major repairs, to the plant and machinery were undertaken and completed. Works to the extent of Rs. 11,835-11-0 were done in all during the period. Such of the important tractor parts, as are possible, were manufactured and supplied to the tractor workshops as and when an indent is made. As a result of this work being undertaken in this workshops, the number of idle hours in the case of tractors in the districts for want of spares, which in the previous occasions used to be relatively high, has been considerably reduced. Many of the Tractor components were reconditioned.

Sinking of wells.—Location of well-sites for all the parties who had applied could not be taken up with the aid of Mansfield Water Finder, due to the fact that this scientific instrument was sent from here to Tirunelveli from where it was transferred to Rayalaseema districts for famine relief work. Even though this forms part of the three-year programme of research, this work could not be taken up completely during the period under review. It is however hoped to take up the remaining work of locating well sites, with this instrument in the current year.

Estimates and drawings.—The total number of estimates prepared during the year is 24 numbers costing over Rs. 29,127. The number of drawings prepared was 17 and blue-prints 45 numbers.

Preparation of posters.—During the year under report, even though all the posters could not be prepared by the artist, 12 numbers all of them important ones, were prepared.

Exhibition and propaganda.—Active part was taken by way of sending various Agricultural machinery and scale models to the Park Fair Exhibition held in this year.

Reels of Information of India films on Agricultural topics were exhibited and explained at various villages in the Firka Development areas in the State with the aid of a 35 m.m. silent projector available in this office. The films were greatly appreciated by the large crowds which attended these shows, and much useful information on modern agricultural methods was imparted. Though the people who witnessed these shows expressed their greatest appreciation, yet it is to be mentioned that the absence of a projector with sound attachment was very keenly felt, amongst them. The proposals for the purchase of a film projector with sound equipment was deferred and will be taken up this year.

Well boring.—Among the important activities, mention should be made of the new wells bored. New wells were bored in the Agricultural College and Research Institute, Lawley Road P.O. at the following places:—

Place.	Number of bores.	Diameter.
	NOS.	INCHES.
1 Central Farm	2	(1) 12
2 Botanical Gardens	1	(2) 6
3 Paddy breeding Station	1	6
4 Orchards :	1	6

Among the main features of activities of this section during the year, mention must be made of testing the yield of the bore-wells in the Agricultural College Estate. The following wells were tested for their yield :—

Orchard well.—The yield of the bore on the northern side of the Orchard well was tested on 27th October 1951 with the aid of 3 inches by 3 inches centrifugal pump driven by a 7 h.p. oil engine erected in the well with the suction pipe going down 21 feet in the bore. When the test was started, there was 3 feet of water baled out at the rate of 10,000 gallons per hour for 45 minutes. After baling out all the water from the well, the bore was tested for 6 hours and the discharge was found to be 3,600 gallons per hour at a depth of 16 feet 10 inches from the top of the bore level.

Well No. 77.—The yield of the bore in well No. 77 was tested on 31st October 1951 with the aid of a 3 inches by 3 inches pump driven by an oil engine erected in the well with the suction pipe going down 20 feet in the bore. The well was a dry one. The level of water in the bore was 6 inches below the ground level. The bore was tested for 4 hours. The discharge was found to be 10,000 gallons per hour at a constant depth of 5 feet from the top of the bore level.

Well No. 76.—The yield test of the bore at field No. 76 was completed on 19th November 1951. The depth of water in the well was 3½ feet. A 3 inches by 3 inches electric motor pumpset was used for baling out this water and a 2.7 h.p. petrol pumpset with a suction pipe going down 25 feet into the bore was used for testing the yield. The water was baled out within 5 hours at the rate of 6,300 gallons per hour.

After baling out the water from the well, the bore was tested for 2½ hours. The discharge was found to be 450 gallons per hour at a depth of 22 feet from the top of the bore.

Paddy breeding station.—The static level of the water was 4 feet 7 inches below the top of the bore. The yield was tested with a 4 inches by 4 inches centrifugal pump coupled to a 8 h.p. Lister engine with suction pipe going down 20 feet into the bore. The capacity of the bore was found to be 8,200 gallons per hour at a depth of 18 feet 5 inches.

Well No. 72.—The static level of water is 29 feet 3 inches below its top. The yield was tested with clinax deep well pump already fitted in the well. The discharge was found to be 3,830 gallons per hour at a depth of 35 feet 3 inches.

Four mhote well.—The depth of water in the well at the beginning of the test was 3 feet 9 inches. The 3 inches by 3 inches multistage centrifugal pump was used for baling out water. The yield of the 4 inches bore in south-eastern side was tested with the aid of a 2.7 h.p. petrol engine pumpset, with the suction pipe going down 15 feet inside the bore. The water was baled out at the rate of 3,600 gallons per hour for 5 hours. The discharge was found to be 2,600 gallons per hour at a depth of 6 feet 5 inches.

The yield of the bore in the northern side of the well was tested with a second petrol set simultaneously and the capacity of the bore was found to be 2,600 gallons per hour at a depth of 7 feet 4 inches.

Central farm—A block well.—A pit has been dug round the bore for the installation of a pumpset and the top of the bore is 11 feet below ground level. The yield was tested with a 3 inches by 3 inches centrifugal pump coupled with 5 h.p. motor. The static water level of water was one foot below the bore level. The discharge was found to be 4,200 gallons per hour at a depth of 21 feet below the bore level.

Central Farm—J. block well.—The yield test was conducted on 30th November 1951. A pit has been dug around the bore for the installation of a pumpset and the top of the bore is 7 feet below ground level. The static water level was 4 feet 3 inches from the top of the bore. The yield was tested with a 5 inches by 4 inches centrifugal pump.

The discharge was found to be 17,300 gallons per hour at a depth of 12 feet 7 inches.

Bore-well in field No. 68.—The depth of water in the well at the start of the test was 7 feet 10 inches. 7.5 h.p. electric motor with 4 inches by 3 inches pumpset was used for baling out water. The yield of the bore was tested with a 3 inches by 3 inches pump coupled to a 7.5 h.p. electric motor. The water from the well was baled out at the rate of 13,200 gallons per hour for 6 hours.

The capacity of the bore was found to be 8,000 gallons per hour at a depth of 1 foot 4 inches from the top of the bore. The bore was tested for 5 hours of continuous running the pump.

Four mhote well—New bore 6 inches diameter.—The new bore at the north-western corner of four Mhote well was tested with a 2½ inches by 2 inches pump coupled to a 5 h.p. motor. The capacity of the bore was found to be 2,600 gallons per hour at a depth of 19 feet from the top of the bore level.

Botanical garden—(New bore).—The yield test of the botanical garden new bore was tested on 4th February 1952 with a 2.7 h.p. petrol set with 2 inches by 2 inches pump. A gate valve was provided on the delivery side to control the discharge.

The capacity of the bore was found to be 500 gallons per hour at a depression of 19 feet 9 inches. The test was conducted for 5 hours.

Four mhote well.—Interconnection of the three bores were made and the yield of all the three bores was tested on 24th March 1952, the water being pumped out simultaneously. All the bores were inter-connected by 2 inches pipe of 30 feet of suction to an electric motor with 4 inches by 3 inches pump.

The yield was found to be 6,800 gallons per hour at a depth of 14 feet 8 inches in first bore, 15 feet 8 inches in second bore and 12 feet 6 inches in the third bore.

Cotton breeding station—Eastern bore.—The yield of the bore was tested on 20th May 1952 with a Parson Oil engine, 13 h.p. coupled with 4 inches by 3 inches pump. The suction side of the pump was 2 inches of 30 feet and the delivery was 3 feet high. The discharge was found to be 1,480 gallons per hour at a depth of 13 feet from the top of the bore. The test was conducted for 8½ hours.

Demonstrations.—On 1st July 1951, a demonstration on puddling with three types of tractors in the presence of H.H. the Rajpramukh of Mysore, Hon'ble Minister for Industries, Mysore and other distinguished visitors was held in the Model Farm of Messrs. P.S.G. and Sons at Vedapatti.

A "Helical Puddler" with Steyr Tractor, Crow Master with Rotovator and T.D. 6. with "Double Puddler" were demonstrated. The performance of the "Helical Puddler" designed at the Research Engineering workshops was found to work satisfactorily and gained a great deal of appreciation from the public.

The Peanut Planter Attachment was tried with John Deere Tractor at Nemali village in Tiruttani taluk and demonstrated. The soils in the plot selected are sandy and already ploughed. The tractor was run on 1st gear low speed. From this observation it was found that it may not find much favour with the ryots.

On 29th July 1951, Demonstrations of puddling with Crop Master Tractor and Rotovator driven by the representative of the firm were held, for the delegates of the Rice Workers' Conference. On 30th, the demonstrations were conducted in the presence of Hon'ble Minister Sri K. M. Munshi and on 31st July to the District Agricultural Officers and other officers that attended the College Day Conference. The performance of the machine, in the hands of an experienced driver is good, but in heavy soils, it exhibited a tendency to sink.

On 31st July 1951 and 1st August 1951, the helical puddler designed by the Research Engineer and made of wood and mild steel was exhibited. A T.D. 14 on groundnut oil fuel with the helical puddler was demonstrated in puddling at the wet lands C block to the District Agricultural Officers and Mr. R. L. Sethi, Commissioner for Food, Government of India. The performance of both the tractor and the puddler were highly appreciated.

Indian Implements were hitched behind the tractor and their working was demonstrated on 29th, 30th and 31st July and 1st August 1951 to the various distinguished visitors that attended the College Day Conference and they all appreciated highly.

Research—(i) Studies on all mechanized farm.—The object of the research is to study the cost and other economic limitations, (ii) possibilities of the evolution of new implements hitched behind tractors for such of the operations that are not amenable to any of the imported implements and (iii) effect on the yield.

For the purpose of experiments, figures obtained from tests carried out in other countries, under greatly different conditions were made use of. A six feet Tractor Guntaka attached to an angle iron tool bar was worked at the Millet Breeding Station to uproot the weed growth and grass. A draw bar pull of 7 cwt. was recorded—a pull equivalent to the pull of 7 pairs of sturdy bulls. The cost of working was Rs. 2-3-3 per acre. Mechanical sowing was tried with Oliver 1/2 unit seed drill behind a Massey Harris 20k tractor. Seed rate was adjusted for 7½ lb. per acre with 18 inches spacing. The running cost worked out to Rs. 2-6-6 per acre. An outturn of 12-6 acres per day of 8 hours was obtained. It was found that the 6 feet Guntaka designed and fabricated at this workshops fitted on to a multi-purpose tool bar could be used for harvesting groundnut crops also. Experiments were conducted at the Agricultural Research Station, Tindivanam. The difficulties encountered were (1) the wheels of the tractor had to tread over the harvested portion; (2) where the ground is hard, the blade has tendency to come out of the soil and to scrap the weeds and the plants, resulting in breakage of pods. A better performance could be realized if the width of the blade was increased and the cutting angle changed.

With a view to mechanize the harvesting operations of groundnut crops, experiments were continued at the Agricultural Research Station, Tindivanam, during the last week of November 1951. At first, the trials were conducted on a bunch variety of crops, with a hydraulically operated blade, hitched behind the front wheel of the John Deere AW Tractor used for the

purpose. But this failed to give a satisfactory performance, since the weight of the attachment was insufficient to give the necessary 3 inches penetration into the soil. However, the trailer attachment consisting of a curved Guntaka blade mounted on a frame at an angle of about 30 degrees, to the horizontal was found to give a very satisfactory performance. About 2 acres could be tackled in an hour. As this implement only digs up the pods, and collection of the pods has to be done by manual labour, large number of coolies have to be employed, to keep pace with the tractor. After further modifications, the implement was used to harvest the spreading variety of crops. Exhaustive trials were conducted and over 40 acres was successfully harvested.

Mechanical harvesting is more economical and labour saving, and specially so in spreading variety of crops. Due to continued drought conditions, the lands have become very hard and hand digging is very strenuous. The cost of digging embarrasses the ryots. Here, the mechanical tractor harvesting could come to the farmer's rescue. The scope for further improvement is very great. Further simplification and modification of the implement is under consideration; but the trials had to be temporarily closed for the season.

The foreign implement John Deere Peanut Planter harvester equipment was tried with groundnut. As the implement sowed in 27 inch between rows while in local practice only 6 to 9 inches between rows are adopted, the implement was not suitable to Indian conditions. Economically also it did not compare favourably with the mechanical seed drill evolved at the Research Engineering workshop and operated by bullocks. However, the seeding mechanism employed is so novel and promising that further trials would be taken up after making necessary alterations for reducing the spacing from 27 inches between rows to a much lower value to suit our conditions. A John Deere Grain drill was tried in the field of Central Farm. With grains like maize and cholam, the drilling is satisfactory. The drill was hitched behind a W. 6. tractor, and sowing was done on a well ploughed and pulverised soil. The seed rate could be adjusted to 80 lb. per acre: about 3 to 4 per cent of seeds were damaged. Reducing the seed rate resulted in the increase of percentage of damages. The gear conveyors employed in the drill mechanism have a tendency to break the seeds unless the seed is hard enough. Even groundnut was tried in this seed drill in stationary basis in the workshops; unless the variety of groundnut employed is very small like TMV 1, the breakages is too much. The seed drill will be greatly useful in places like Ceded Districts and Rayalaseema where the lands for sowing of cholam, maize, etc., is available on a vast scale. The result so far attained in mechanisation of operations like sowing of cholam, harvesting of groundnut, etc., have promised beyond all doubt that about complete mechanisation of dry land cultivation of most of the important crops of this province is a practicable proposition.

Studies on mechanisation of operations in paddy lands.—Puddling being the costliest and most tiresome of the operations in the cultivation of paddy, means had to be devised to mechanise the puddling operations, taking into consideration the implement suitable for puddling, the cost of mechanisation, to determine the suitable tractor for small land-holders and to study the effect on yield. A six-bladed special tractor puddler, 3½ feet long and 2½ feet diameter, 8-bladed tractor puddler and 9-tined sheet metal

wedges akin to duck-footed cultivator, five tyned wooden country plough wedges, etc., have been evolved and tested at this section. From the trials and demonstrations conducted at various places, throughout the Province under varied soil conditions, it was found that with 3 to 4 inches inundation of water, puddling to a depth of 6 to 8 inches could be obtained. The running cost worked out to Rs. 6-7-0 in heavy soils and Rs. 3-3-6 in light soils. Puddler demonstrations were highly appreciated by the distinguished visitors, the Rajpramukh of Mysore, the Minister for Industries of Mysore and the Minister for Food and Agriculture, Government of India. A rotovator attachment on the model of the Howards Rotovator was designed and fabricated at this workshops to be attached to Cliffords Garden type 2.7 h.p. tractor for puddling trials. Since the small wheels had a tendency to sink, extension rims were manufactured and fitted. It was taken to Pattambi and tried for puddling operations in Agricultural Research Station, Pattambi. The horse-power of the machine was only 2.7 and at least 5 h.p. drive was found necessary to be safe and confident in any soil with this attachment.

Howards rotovator has come to the market recently. Volkart Brothers had condescended to demonstrate the rotovator on a few occasions, with Farmall "M" and "H" Tractors, fitted with iron wheels and extension rims with lugs. From observations, it was noted that the puddler evolved at the Research Engineering Workshop had a drawback in that besides the forward motion, due to the tractor it did not contribute its own rotary motion. The rotovator besides being drawn forward by the tractor also contributes its own rotary motion obtained from the power taken off. This ensures very good stirring of the wet land and thus a good seed bed. The rotovator can work satisfactorily in standing water of 10 to 12 inches and over, puddling to a depth of 6 to 8 inches and producing a fine homogeneous mud. The rotovator can also be used for ploughing in dry and semi-dry land. The advent of the rotovator is likely to dwarf the importance of the puddler. But the high cost of the rotovator is likely to stand in the way of its becoming popular with ryots of ordinary means.

The "GEM" rotary hoe a small self-contained unit of low horse-power and moderate price has come to the market very recently. One such machine from Rallis, India, is kept ready for trials during the coming season.

Studies on modern combine harvester operations.—The object of the research is to determine the cost and other consideration of mechanical harvesting and to determine the limitations of combine harvesting with relation to various crops of this Province. In recent years "Combine" harvesting has become very popular in all the progressive countries. Percentage of harvesting by manual labour has recently been considerably reduced after the advent of these power harvesters with consequent saving in time, labour and timely securing of good crops. The "Self-propelled Massey Harris Combine Harvester" was tried on ragi crops in plot No. 76-A of Central Farm. The usual practice of harvesting ragi is to do the operations in two or more stages, as the earheads go on ripening. But with a machine, the operations have to be completed at one stretch; so much so, a good percentage of unripened earheads have inevitably to be harvested along with ripened earheads. The bunds have to be cut for allowing easy forward passage of the combine. Following difficulties were encountered:—

(1) the loose earth was sucked up into the cylinder and choked the concave;

(2) the machine had to be run slowly, whereas the cutter bar had its maximum speed, which resulted in much power waste;

(3) if the engine is throttled down, the cylinder speed went too low, to give any good threshing.

On the whole the performance was not satisfactory.

The combine was also tried as a stationary thresher for threshing hand harvested ear heads of paddy, by feeding the stuff at the centre of the augur. Even now, the performance was not satisfactory. Since in the above trials, with this machine, satisfactory results were not obtained, the maker's representatives in India were requested to depute one of their service engineers to inspect the machine to suggest remedial measures. Mr. H. F. Cheesman who was deputed for this purpose inspected the machine and reported that the cylinder, cutter bar, reel and augur speeds should be varied to suit the various crops handled and that for this purpose, a set of sprockets and chains of different sizes were required. These are reported to have been supplied and delivered with the machine at Madras. The Joint Director of Agriculture was addressed and steps were taken to trace the parts and obtain them from Madras.

In the meanwhile, the machine was tried at the Cotton Breeding Station for harvesting a crop of horsegram using the sprockets at present fitted with machine. As a "43 sprocket" required for obtaining a cylinder speed of 440 R.P.M. was not available, the engine was throttled down to obtain the speed. This automatically fixed the augur and reel speeds. When the crop was directly fed into the conveyer, the threshing was satisfactory in case of dry pods, but the green pods were left unthreshed. The machine could however not be operated in the field as the vines wound around the augur and choked it at intervals of every few minutes. The toothed portion of the augur was blinded. But this did not give any effective improvement in the performance. The machine was further throttled down to bring the augur speed to a limit, where there was no windings of the vines. But at this speed, the cylinder speed is reduced considerably, say to a neighbourhood of 150 R.P.M. at which the threshing is extremely poor. The trials had therefore to be suspended.

During the second half-year, the missing parts of the Combine could not be traced at Madras and hence substitute parts were manufactured, and the machine was tried for harvesting ragi in Agricultural College, Coimbatore. The performance was bad and conclusive results could not be drawn. It was inferred that the parts which were manufactured much on guess work as sizes of original ones were not known at the workshop was not of the correct size to give the required cylinder and augur speeds. Afterwards a 15-teeth sprocket was made. The firm has been contacted to supply the necessary chain links and the other sprocket wheels. During the next harvesting season, trials will be taken up using the new set of sprockets.

Hitching Indian implements behind the tractor.—The object is to effect modifications to some of the existing Indian implements with a view to hitch them behind the tractor. Considerable work has been done previous on this item of research work, as a result of which, R.E.'s seed drill Guntaka, bund former, etc., were suitably modified to be hitched behind the tractors. A cultivator hydraulically operated behind a Fordson Tractor was tried at Central Farm fields. The Guntaka was suitably modified to be fitted on to a Multipurpose tool bar. Modifications were effected to the six feet Guntaka and was used for harvesting groundnut crops, which has

been already dealt with under item "*Studies on all mechanised farm*". Mechanisation of groundnut harvesting is just an offshoot of this item of research work. Demonstrations were conducted on the operation of improved indigenous implements behind a tractor. Three country ploughs fitted on to a multipurpose tool bar and hitched behind a tractor. Various distinguished visitors, who had visited the College Day Conference witnessed the performances at the tank-bed area of the Central Farm, Coimbatore and much appreciated the performance.

The materials used in fabricating the above implements were wood, angle iron and a few bolts, things which are easily available even in villages for carrying out repairs.

The most outstanding work done on this line of research is the evolution of a seed drill to be hitched behind a tractor for sowing groundnut. In this province, where over 9 million acres are under groundnut cultivation, one of the biggest problems confronting the groundnut growers is to keep pace with the season. Soon after the rains, they start sowing using country methods by dibbling behind a country plough, which is laborious and costly and they have to finish the sowing before the moisture in the soil is lost, since otherwise germination could not be guaranteed. The R.E. seed drill has recently been acclaimed as very well suited for this purpose. It was decided to effect certain modifications to the R.E.'s seed drill with a view to hitch it behind a tractor. The wooden frames were replaced by angle iron 3 inches by 3 inches by $\frac{1}{4}$ inch and two seed drills were incorporated into one and the unit was tried in a field in Pollachi for sowing. Working was very satisfactory, but further improvements were considered necessary for the implement to cope up with different types of soils and to make it more flexible for handling. The following improvements were carried out:—

(1) The implement was made into two independent units with independent drive mechanism for each seed box.

(2) Four more holes were provided for each seed box with suitable corresponding brushes.

(3) The lower edge of holes in the seed plates were given a smooth curvature to prevent breakages of the seeds. Totally, there is to be 20 drill holes with an optimum spacing of 6 inches between the tynes.

(4) Two rows of tynes were attached behind each unit.

(5) A single beam tool, supported by chains from both ends was attached to the implement.

(6) Adjustable seed tubes to guide the seeds from drill hole to tyne points were provided. The seed tubes were made of tin sheets. After these modifications, the seed drill was taken to Agricultural Research Station, Tindivanam, and preliminary trials were conducted. The seed drill works to every satisfaction. The seed rate is very uniform in the dummy trials made and the percentage of breakages is very negligible as indicated from the following table.

For conducting dummy trials, the tynes were removed and pouches attached to the end of seed tubes to collect the seeds. The seed drill was drawn by a tractor over the field for some time. Then the pouches were

removed and the seed collected under each seed tube was counted. The broken and damaged seeds in each case were also counted and the percentage of breakage calculated as shown in the table below:—

Serial number of tynes.						Number of seeds dropped.	Average dropping.	Number of broken seeds.	Percentage of breakages.
1	..	..	..	..	..	246	236	5	Percentage of average breakage is 1.19 per cent.
2	..	..	..	..	..	235	236	3	
3	..	..	..	..	..	230	236	6	
4	..	..	..	..	..	240	236	4	
5	..	..	..	..	..	247	236	5	
6	..	..	..	..	..	230	236	2	
7	..	..	..	..	..	219	236	4	
8	..	..	..	..	..	229	236	6	
9	..	..	..	..	..	257	236	1	
10	..	..	..	..	..	227	236	2	

Different varieties of seeds were tried on stationary basis lifting implement above the ground and collecting the seeds in bags while rotating the wheels by hand.

Seed varieties.	Weight of seeds collected.	Number of rotations.	Theoretical area covered in acres.	Seed rate lb. acre with six inches spacing in rows.	
				Bunch.	Spreading.
				Six inches spacing in rows.	Nine inches spacing in rows.
				LB.	LB.
TMV 1	3.8	40	.036	105	70
TMV 2	5.19	40	.036	144	96
TMV 3	5.08	40	.036	140	94

From the results tabulated above, it is clear that the sizes of the holes of the seed plates are to be different for each variety to obtain the optimum seed rate. Seed plates with holes of following diameters are considered to be ideal for the corresponding variety of seeds:—

7/16" diameter seed holes .. TMV 2 and other small variety.
 1/2" diameter seed holes .. TMV 3.
 9/16" diameter seed holes .. TMV 5.

Sowing in exhaustive scale with this implement will be taken up shortly with variety of seeds soon after the rains.

Life of imported tractor drawn implements under various conditions.—The object is to determine the wear and tear of these implements under various conditions of the soil and to find out which of the spares available in market resist its wear most satisfactorily. The very limited number of tractor drawn implements available with the Assistant Agricultural Engineer, Tractor Workshops, Coimbatore are required for constant use in the district, while hiring out tractors for various operations according to the demands of the ryots. As such, it is found impracticable for the present to earmark the special type of implement for a similar special work, under identical conditions. Hence, this item of research was deferred during the first half of the year.

Bulldozer centre blades were found to last for 1,200 to 1,500 working hours on the average, working under normal conditions. Corner blades were observed to last for 600 to 750 hours on the average. Worn out central and corner blades can be reconditioned and used again for two or three times.

In track chains of crawler tractors, the pin and bush of the track was observed to last for 3,000 working hours on the average. The life of the pin and bush can be doubled by rotating them through 180° after the first 3,000 working hours.

The life of the street plates of crawler tractors were found to depend upon four factors, namely, (i) the nature of ground over which it travels; (ii) the speed of travel; (iii) the amount of travelling and (iv) the condition of the grouser plate of the track. The first three factors do not require any special explanation. Considering the fourth factor, the grouser plate point wears out as the crawler tractor is worked in the fields. If this wear is too great, when the street plates are fitted on, the point of the grouser plate does not support the street plate firmly but stands below the street plate. As a result when the tractor is moved, the street plates bend out shape and cracks develop. With worn out grouser plates, the street plates will yield even after very short travels, say, 15 miles. As there are four factors affecting the wear on street plates, it is not possible to ascertain an average value of the life of the street plates. Wear on tractor tyres was studied. It is very important to maintain the correct tyre pressure recommended by the manufacturers, if not excessive wear occurs. If the tyre is overinflated, the central ring of the tyre wears out more quickly. If the tyre is underinflated a circular crack on the side walls of the tyre is likely to develop. The tyre on the furrow has a tendency to wear more than the tyre on the land wheel. Hence, the tyres on either side of tractor are to be interchanged at intervals to ensure uniform wear.

Slipping of wheels will make the tyres to wear out rapidly. To prevent slippage, manufacturers recommend inflation of tyres with liquid instead of air. This adds to the weight of the wheels and prevents slippage and so wear also. If liquid inflation is not done, weights can be added to the wheels to reduce slippage.

The very limited number of tractor drawn implements available with the Assistant Agricultural Engineer, Tractor Workshops, Coimbatore, are required for constant use in the district, while hiring out tractors for various operations according to the demands of the ryots. As such, it is found difficult for the present to earmark the special type of implement for a similar special work under identical conditions.

Dynamometer studies on both tractor and animal drawn implements.—

The object is to obtain scientific data on the resistance of various soils of this province; to determine the draft required per square inch of furrow slice and to study the relationship between the depth and width of the furrow slice and moisture in soil to the resistance. During the normal operations, in various soils of the Agricultural College Estate, and nearby places of the district, the draw bar pulls at the various operations like harrowing, ploughing, drilling, etc., were recorded with the help of the precision Self-Recording Traction Dynamometer. The various particulars gathered could be summed up as below :—

Implement.	Soil.	Moisture conditions.	Average resistance per square inch of furrow slice.
(1) Disc plows and harrows ..	Red—Once plowed.	Dry.	1.25 to 1.79
(2) Three disc plows ..	Black soil.	Dry.	2.06
(3) Four furrow disc plow ..	Black soil.	Very dry.	2.75
(4) Three furrow mould board plough.	Red soil—Once ploughed.	Dry.	1.03
(5) Ransomes 28 disc harrow ..	Red soil—Damp and hard.	Damp.	5.01
(6) Rotary puddler ..	Heavy black soil.	3" inundation of water.	3.3

The pressure pipe joint of the Dynamometer has gone out of order.

Since it could not be repaired here in our workshops, it has been sent to Messrs. Volkart Brothers who are original suppliers of this precision machine. Since it could not be repaired by us, they have been asked to replace the spare. Further experiments could be carried on only after receipt of this spare from their overseas firm who has been addressed for the supply, since the same is not available here.

Studies on the feasibility of manufacture of spares for modern implements in groups and stages.—Good amount of agricultural machinery and tractors have been introduced in our land. Mechanisation activities of the department as well as of the farmers are rapidly increasing. The object of this item is therefore to determine the economic lots and batch size for the manufacture of various spares for the machinery with a view to avoid losses and to optimise productions, keeping in view the number of tractors working in the district and their requirement. As and when various spares of the tractor and implements are received, full particulars regarding design, etc., are studied. Even while fabricating new designs, the correct dimensions are recorded in detail. Apart from the repairs taken up, many spares were manufactured in this section. The following are the more important of those.

Pumpshaft and bushes; manufacture of tractor drawn Guntaka; silencer muffler for oil engine; joint pin for power drill; reinforcing broken equilibrer spring; sheet block bushes; hydraulic hose connectors; one valve seat cutter; corner shoes; centre blades and corner blades; rubber belting clutch links; filter element rods; shackles; reconditioning of track carriers; bund former; boring chisels; puller for cylinder sleeves; welding broken track roller frame; repairs to fuel tanks; striker bar; remounting and turning of big end bearings; refacing valves; truing connecting rods; reconditioning water pump impeller; making foot valves; sand shell for sinking filter points; building up the worn-out hole on ploughs; foot valve brass stem; lubrication copper pipes lining pipes needle valve, baffle valve for vacuum pump, circulations coils, decompression lever sets; exhaust flanges, dum pulleys, moline block for power drill, airvent cock for fuel filters, cylinder head studs; centre shaft for water pumps; shim plates, depth adjustment screws; master pins and washers, fuel adjustment needle valve for carburettor, pipe unions.

Studies on water table at Coimbatore.—The object is to aid the ryots in locating best sites for wells, for irrigation purposes. The data collected will be studied and conclusions will be arrived at on scientific basis, since the location of well-sites is attempted by ryots as now, is on no rational basis, thereby involving themselves in considerable capital loss with wells of poor or no yield.

A Mansfield patent water finder was received from Madras in October 1949, for conducting trials and locating sites for wells, for Agricultural purposes. The services rendered for location of the sites with the aid of this instrument was free of cost. On application received from ryots of different districts, over 440 sites were examined and best suitable sites were located for digging wells and undertaking boring operations. During the second decade of this century in Bombay State considerable help was rendered to the farmers by the aid of this instrument in locating subterranean currents of water for irrigation purposes.

Due to the continued draught, farmers have come to depend much on lift irrigation, the cost of which has considerably come down after the

introduction of oil engines and electric motor pumpsets. Availability of water is the only question; so much so every farmer wishes that there is at least good subterranean water source beneath his land though the surface has long been dried up.

The Mansfield water finder was sent to Tirunelveli from where it has now been sent to Rayalaseema, where it is being utilized in Famine relief work. It is in great demand by ryots for locating subterranean springs and it is reported to detect subterranean water-sources very effectively by large number of ryots who used it. This item of research work could not be pursued for want of this scientific instrument. Work would be taken up immediately on receipt of this instrument.

Miscellaneous items—Groundnut oil as fuel on diesel engines.—The object of research is to find out the possibilities of using the groundnut oil as fuel in High Speed Diesel Oil engines. In view of the critical supply position of petroleum, it was decided to explore the possibility of running the High Speed Diesel Oil engine powered tractor with local groundnut oil instead of mineral High Speed oil. On this item of research, considerable amount of work has been done in foreign countries, in Engineering College at Guindy, Indian Council of Research and in Research Engineer's Workshops. But the results obtained are not conclusive. Moreover no work appears to have been done on mobile engines of recent origin. All authorities who conducted the research on this subject have agreed that a highly refined grade of groundnut oil free from suspended impurities is necessary to parallel with High Speed Diesel oil.

A T.D. 14 Diesel Track type tractor of International Harvester Company was selected for experiments on "Groundnut oil as Fuel" as directed by the Joint Director of Agriculture. The tractor was run on High Speed Diesel oil initially with no load and then with load to observe the fuel consumption and other factors under the existing conditions of the machine. The diesel fuel was drained out and the engine flushed out and double refined groundnut oil supplied by East Asiatic Company was put in. The above trials were repeated for the same period under almost similar conditions of load, etc. The comparative oil consumption is given below:—

	Idling in half throttle.	On loads of average nature.
H.S.D. oil	93 glns/hr.	1.83 glns/hr.
Double refined groundnut oil	81 do.	2.12 do.

The trials were continued for 50 hours in order to observe the effects on this machine. The machine was subjected to various kinds of loads and operations for which any tractor is normally called, such as ploughing, harrowing, levelling, puddling, drilling, etc. Under all conditions, machine was able to pull as efficiently as when worked with diesel oil.

After 50 hours of operations, machine was worked with fifty-fifty mixture of groundnut oil and High Speed Diesel oil as fuel for a period of another 50 hours. The general performance does not appear to be materially improved by the addition of 50 per cent High Speed Diesel oil. After this, 50 hours of operation, the cylinder head was removed to inspect such effects as carbon deposit, corrosion, etc., if any. The engine was perfectly in good condition. The machine did not appear to have been subjected to any extra strain by this change over to groundnut oil fuel. The observations could be summed up as below:—

(1) As the engine is one that is initially started on petrol, the use of groundnut oil did not result in any starting trouble.

(2) Running of the engine was quite as smooth and normal on groundnut oil as on High Speed Diesel oil.

(3) The consumption of groundnut oil during the later stages of the experiments was slightly more than that in the earlier stages both on no load and load conditions.

(4) There was no noticeable decrease in the power output as a result of the change over from High Speed Diesel oil to groundnut oil.

The exorbitant cost of groundnut oil at present is perhaps the only factor against the use of this oil as fuel for tractors. Following table gives the comparative costs:—

	[Price.
	RS.
OK. brand double refined groundnut oil	41 per tin of 35 lb net weight.
High Speed Diesel	5 do.

On the whole it could be stated that in an emergency, groundnut oil can be used as fuel for diesel powered tractors without any pronounced adverse effects on the life or performance of the machine provided this oil could be made available at a price tolerably comparable with High Speed Diesel oil.

Test on "Steyr" tractor.—The object is to determine the suitability of this newly imported tractor, supplied by Messrs. Jayems Engineering Company for agricultural purposes.

A new tractor called "The Steyr" tractor imported into the State by Messrs. Jayems Engineering Company, was tested to evaluate their performances. The tractor was put to work under different conditions for different agricultural operations. On light soils, three furrow light ploughs could be safely hitched behind this tractor. In heavy soils, only a two furrow disc plough or mould board plough could be used.

On idling at half throttle, the fuel consumption was observed to be 45 gallons per hour, while hauling on top gear without load on smooth roads, a mileage of about 8 to 10 per gallon could be obtained. With an average load, the fuel consumption was observed to be about 1.4 gallon per hour on second gear. Following two points have to be mentioned towards the discredit of this machine:—

(i) By dint of its lightness, front portion of the machine has a tendency to lift upon heavy loads and consequently due to the reduced friction between the front wheels and the earth the steering becomes extremely difficult,

(ii) its complete dependency upon a well-maintained good battery which is necessary to actuate the heating coils arrangement while starting. The problem of battery going weak is commonly encountered, as with any other type of tractor and hand starting is ordinarily impossible.

Bullock-driven deep well bore hole pump.—A bullock driven deep well pump for bore holes, as per the blue prints and specifications supplied by the Industries department was manufactured and tested in this section. The working of the pump was not at all satisfactory. The mechanism employed to transmit the bullock power to the pump is too cumbersome and complicated. The impulsive load to which the bullock is subjected is beyond the capacity of the animal to stand. Moreover the cost of manufacture as against that of oil engines and motor pumpsets available to-day is very discouraging. Hence any further attempt on that line was given up.

Hand operated deep well bore hole pump.—A hand operated deep well bore hole pump, the blue prints and specifications for which were also supplied by the Industries department was fabricated with modifications in the design. This was found to give satisfactory results. From a depth of about 50 feet, single man can pump out over 150 gallons of water per hour. This pump could be installed in deep bore wells, where pumping out water is not possible using ordinary centrifugal pumps.

Tractor drawn bund former.—The designing of this tractor drawn bund former to be used as a mounted implement was taken. The implement was designed fabricated and tried. The results were very encouraging and bunds varying in height from 6 to 9 inches and having a width of $1\frac{1}{2}$ to 2 feet at the base were formed. The main advantage of the implement over the one previously fabricated at this section for the same purpose is that this implement does not require a preparatory ploughing even in heavy clay soils, the disc being capable of ploughing and forming bunds in the one and the same operation.

Double desi plough.—The Double Desi plough brought from the Indian Agricultural Research Institute, New Delhi, was tried in field No. 58 of Central Farm. During the first trials, it was found that uniform pressure could not be exerted as there was only one handle. The depth of ploughing was 3 inches and width 10 inches. After carrying out the following few modifications, it is found to give very good and encouraging results: (i) a double handle was provided to give better stability for the man behind the plough when he walks over the rugged and ploughed land since unless he keeps the plough in vertical position proper cutting could not be guaranteed. (ii) The cutting angle and the space between ploughs were altered to give proper and uniform cutting of soil without leaving undisturbed soil in between the furrows—a disadvantage common with ordinary country plough. This double desi plough is bound to become very popular among the ryots since the turnover of work is double that with ordinary country ploughs. There is considerable saving in time also. The plough was tried in field No. 57 in the Central Farm. The depth of ploughing was about 5 inches and width 10 to 11 inches. No ridge was left between furrows. The soil in which the trials were carried out was red loamy moist soil.

Clifford garden tractor with Rotavator attachment.—The Clifford garden tractor with the Rotavator attachment, manufactured in the workshops was tried for puddling in the A Block fields of Central Farm. The soil was fairly heavy clay and the following defects were noticed:—

(1) The diameter of the wheel fitted on the machine is only 10 inches and the minimum ground clearance only 4 inches with result that when the wheels went down into the soils, there was no clearance below the sump and the gear case.

(2) The power of the engine was found insufficient for puddling to a depth greater than 2 inches. This was probably due to the fact that for want of sufficient ground clearance the whole of the bottom of the machine was resting on the ground and there was no sufficient weight on the driving wheels to provide the necessary traction. The machine was modified, larger diameter wheels were manufactured and fitted. This necessitated the extension of axle also to prevent the wheels from fouling the rotovator. A 3-foot diameter wheel was manufactured and fitted up on the extended axle. The machine did not work satisfactorily as the engine did not have sufficient reserve power to cope up with the additional load imposed by the increased

speed of forward motion, resulting from the increase in the size of the driving wheel. Further, the extended axle made steering the machine in the slush, exceedingly difficult. The original wheels have been fitted back and was tried later on at the Agricultural Research Station, Pattambi, where it was expected to give better performance for the following reasons:—

(1) The top soil is only 4 to 6 inches deep and hence the machine is not likely to get bogged with the small wheels.

(2) The soil is mere sandy and hence the load on the machine will not be as heavy as when it was worked in the clayey soil of the A block of Central Farm.

“Briggs and Stratton” high pressure fire pump.—The “Briggs and Stratton” high pressure fire pump transferred from Kozhikode for use with the Kennell's Oscillator was overhauled and tested with the Oscillator. From long disuse, it was found that the Oscillator valves were stuck up and their rubber seats and seals were damaged. These were renewed and the unit was found to work satisfactorily. The pump and the Oscillator were transferred to Coconut Nursery at Pattambi.

Visitors.—The following are the most important visitors who visited the workshops during the period under review:—

(1) John A. Manawwar, Esq., Additional Director of Agriculture, Uttar Pradesh.

(2) Mr. R. L. Sethi, Commissioner for Food, Government of India.

(3) Mr. P. D. Nair, Director of Agriculture, Hyderabad.

(4) Mr. N. M. Deshmukh, Director of Agriculture, Madhya Bharat.

(5) Mr. Amir Ali, Principal, Agricultural College, Hyderabad.

J. P. WALTER DEVASAHAYAM,

28th August 1952.

Assistant Agricultural Engineer (Research).

ANNEXURE.

Details of pipes received and sold during the fasli year.

	Category.	Receipts.	Sales.
1"		3,618' 0"	708
1½"		8,020' 0"	..
2"		31,773' 9"	8,829' 3"
2½"		35,382' 6"	16,719' 6"
3"		13,571' 9"	16,321' 6"
4"		3,009' 0"	2,223'
5"		1,991' 0"	..
6"		179' 10"	75' 0"

Details of Oil engines as it stood on 1st July 1952.

	Nos.
Russel Newberry	30
Lister Blackstone	2
Crossley	6
Blackstone	1
Parson	1
Hallet	2
Waukesha	1

ADMINISTRATION REPORT OF THE LECTURER IN AGRICULTURE, COIMBATORE, FOR 1951-52.

I. Charge.—The post of the Lecturer in Agriculture was held by the following officers during the year:—

- (1) Sri A. H. Subramania Sarma—1st July to 14th July 1951 (additional charge).
- (2) Sri M. Satyanarayana—15th July to 14th August 1951.
- (3) Sri A. H. Subramania Sarma—15th August to 24th September 1951 (additional charge).
- (4) Sri P. A. Venkateswara Ayyar—25th September 1951 to 21st February 1952.
- (5) Sri V. T. Subbiah Mudaliar—22nd February to 30th June 1952.

II. Staff—Gazetted Assistant.—The post of the Gazetted Assistant to the Lecturer in Agriculture was held by Sri A. H. Subramania Sarma throughout the year.

Teaching Assistants.—(1) Sri M. Vaidyanatha Ayyar was relieved on the afternoon of 17th June 1952 on promotion to the Madras Agricultural Service as Additional District Agricultural Officer, Guntur.

(2) The other teaching assistants Sri M. Damodar Prabhu, Sri K. Kuppanmuthu, Sri S. Muthuswami, Sri N. Ranganathachari and Sri T. Srinivasan continued throughout the year.

III. Leave.—(a) The teaching assistants were on leave as detailed below:—

- (1) Sri M. Vaidyanathan—From 6th May to 15th May 1952.
- (2) Sri M. Damodara Prabhu—From 16th September to 3rd October 1951; 1st to 30th April 1952; 18th May to 8th June 1952.
- (3) Sri K. Kuppanmuthu—From 24th April to 15th June 1952.
- (4) Sri S. Muthuswami—From 19th May to 15th June 1952.
- (5) Sri N. Ranganathachari—From 15th May to 15th June 1952.
- (6) Sri T. Srinivasan—From 31st January to 10th February 1952; and 4th to 15th June 1952.

(b) The Gazetted Assistant Sri A. H. Subramania Sarma was on leave from 27th December 1951 to 10th January 1952.

IV. Teaching.—(a) **Degree Course.**—The following classes were held during the year:—

Class.	Theory (Hours).	Practical (Hours).	Library (Hours).
B. Sc. (Ag.) I	63	246	27
B. Sc. (Ag.) II	73	150	22
B. Sc. (Ag.) III	56	170	23

The syllabus prescribed for each class as noted in the College calendar was completed during the hours detailed above. The Poultry Development Officer, Madras, gave special lectures on Poultry. The Agricultural Meteorologist delivered six special lectures on Agricultural Meteorology. Lectures on statistics and conduct of field experiments were delivered by the Paddy Specialist.

(b) **Other courses—Dairy Husbandry.**—Training in dairying was imparted to a batch of 5 literate farmers deputed by the Director of Agriculture from 7th May to 6th June 1952. Besides lectures, the trainees were given practical instruction in handling milk and preparation of milk products.

V. Tours.—The Second year students were taken on a short study tour for 6 days to Ooty, Nanjanad, Coonoor, Kallar, Burliar and Mettupalayam from 15th to 20th October 1951, where they were shown the cultivation of hill crops and fruit trees.

They were again taken on a long tour for 15 days from 7th to 21st November 1951 to Hospet, Bellary, Siruguppa, Vijayavada, Nidadavolu, Maruteru, Bapatla, Kodur and Ranipet. They made a detailed study of the Agricultural practices in various tracts and horticulture at Kodur. At Ranipet the Veterinary Biological Laboratory was visited for the study of control measures adopted for preventing cattle and poultry diseases.

The final year students were taken on an educational tour from 21st December 1951 to 3rd January 1952. They visited Mysore, Belagula, Mandya Bangalore and Hosur. They studied fertiliser manufacture at Belagula, sugar manufacture at Mandya and in addition visited the Irwin Canal Farm and Hesaraghatta Livestock Farm.

Modern methods of dairying were studied at the Indian Dairy Institute and Military Dairy farm at Bangalore. Cattle-breeding, poultry-keeping and pasture management were studied in detail at the Hosur Livestock Research station.

To acquaint themselves with agricultural marketing, the final year students were taken to the Regulated Cotton Market at Tiruppur and weekly shandy at Pollachi.

VI. Miscellaneous.—(1) The monthly publication (abstract service) published by the Principal was edited in this section.

(2) Meetings of the Research Council, Study group and Estate Committee were attended.

(3) During the vacation, the Gazetted Assistant Sri A. H. Subramania Sarma was on a study tour for five days to the Agricultural Research Stations at Pattambi and Taliparamba while teaching assistants Messrs. N. Ranganathachari and S. Muthuswami toured the West Coast and Sri T. Srinivasan visited Agricultural Research Station, Tirurkuppam, and the Milk Supply Organization at Ayanavaram.

COIMBATORE,
26th July 1952.

V. T. SUBBIAH MUDALIAR,
Lecturer in Agriculture.

APPENDIX.

Statement of sanctioned strength of officers and staff in my section as on 30th June 1952.

Name of service and post.	Number of sanctioned posts	
	Permanent.	Temporary.
I Madras Agricultural Service—		
(1) Lecturer in Agriculture	1	..
(2) Gazetted Assistant in Agriculture	1	..
II Madras Agricultural Subordinate Service—		
(Upper subordinates)		
Teaching assistants	4	2
III Madras Ministerial Service—		
Lower Division Clerk	..	1
IV Madras Inferior Service—		
Peons	2	1

ADMINISTRATION REPORT OF THE ASSISTANT AGRICULTURAL CHEMIST, GOVERNMENT MALT FACTORY, COIMBATORE FOR THE YEAR, 1951-52.

I submit, herewith, the Annual Administration Report for the year 1951-52 (Fasli year).

2. *Introduction*—I continued to be in charge of the Government Malt Factory. The Malt Factory which is engaged in the manufacture and sale of malted products worked as a profit-earning concern during the period under report. This is the second successive year in which the factory made a profit. The Factory which was working at a loss since its inception (1943-44) showed a nett profit of Rs. 24,308 for the first time in 1950-51. Though the Audited Balance Sheet of the Factory for the year 1951-52 is not yet ready, the preliminary accounts indicate that in 1951-52 also the Balance Sheet would show a similar profit if not more. The main factors that contributed to the successful working of the Factory may be stated to be the increase in production, and decrease in the production charges as well as indirect overhead charges.

As the Factory is a commercial concern with no staff or facilities for research work, investigations of a research nature were limited to the solution of a few problems connected with increasing the yield of malt extract and reducing the cost of production.

3. *Staff and workers*—The staff of the Factory continued to be the same as in the previous year, except for the change in the personnel of one Lower Division Clerk. The temporary post of Chemical Assistant was made permanent from 26th June 1951, in G.O. Ms. No. 1303, Food and Agriculture Department, dated 26th June 1951. Sanction was accorded to continue the staff till 31st March 1953 in G.O. No. 6, Food and Agriculture, dated 3rd January 1952.

The Factory engaged eleven skilled mazdoors and about sixteen casual mazdoors on an average every day. There were no lock-outs or strikes and the relationship between the workers and staff was always cordial. In view of the substantial profit made by the Factory during 1950-51 the Government were pleased to grant bonus to the mazdoors of the Factory as a mark of appreciation of their good work. All the workers were granted annual leave with wages which they were entitled to under the Factories Act in addition to the usual festival holidays. The workers who were engaged on night shifts were provided with tea free of cost.

4. *Production*.—Production exceeded the target fixed for the year and attained the peak figure of 32,186 pounds of malt extract (32,093 lb. plus 296 X 5 oz. bottles—vide statements attached), which is the highest ever attained so far, in spite of the fact that production had to be temporarily suspended from 4th June onwards for want of cholam seeds—The principal raw material. It is of interest to note that there was a record production of 3,207 pounds of malt extract in November 1951 which is the highest outturn for any one month ever since the beginning of the Factory. The continued unfavourable seasons for the past few years and consequent dearth of suitable variety of cholam seeds for malt manufacture has been responsible for interruptions in production during the past years.

5. *Sales*.—As in previous years, the Medical Institutions in the State were the main consumers of Malt Extract with Shark Liver Oil. There was a steady increase in the off-take by these Medical Institutions year after year. The off-take of Malt Extract with Shark Liver Oil by Government Institutions and Institutions under the local bodies during the period under report was 12,945 lb. and 10,355 lb. respectively, while the corresponding figures for the previous year were 9,211 lb. and 8,820 lb. respectively. This definitely indicates that the product is becoming more and more popular among the consumers. It may be mentioned here that even though this progressive increase in the off-take by these Institutions and the general observations made by them testified to the efficiency of the product, a regular clinical trial with Malt Extract with Shark Liver Oil was conducted at the Government Stanley Hospital, Madras to have the general observations confirmed by scientific data. The results proved that the product was an excellent tonic for growing children and convalescents.

The turnover by the selling agents was, however, far below the expectations. The main reason attributed to their poor off-take was that the price of Rs. 4-12-0 per pound of Malt Extract with Shark Liver Oil was too high. The price was, therefore, revised and brought down by annas four on each pound of Malt Extract with Shark Liver Oil. The prices of Rs. 4 per lb. of plain Malt Extract, and Rs. 3-6-0 per lb. of Malt Extract Plain—loose, were also reduced to Rs. 3-12-0 and Rs. 3-2-0 respectively. The price of 5 oz. packets, however, remained unaltered. The revised prices were given effect to from 1st January 1952. The agents, however, continued to suggest a further reduction of prices and the position is being reviewed again.

Though the total sales during the year was higher than what it was during the previous year, the increase in the off-take was not proportionate to the increase in production. This naturally left a heavy stock-balance at the Factory. A proposal for use of the product as a tonic with Vitamin concentrates for the use of children and undernourished people of famine stricken areas, was accepted by the Famine Relief Commissioner and supplies to some of the districts are now in progress.

Plain Malt Extract was sold to the Deputy Assistant Director-General, Madras, and a few pharmaceutical concerns in the State. The Deputy Assistant Director-General, Madras, was supplied with 1,904 lb. of Plain Malt Extract against a contract entered into with him.

6. *Propaganda*.—Malt Extract with Shark Liver Oil and Plain Malt Extract, the only products manufactured by the Factory at present, were widely advertised through circular letters, picture posters and by putting up attractive propaganda stalls at important exhibitions in different parts of the State. A special propaganda stall with a concessional Christmas season offer for Malt Extract with Shark Liver Oil was one of the main features of the Departmental Exhibition put up at the Park Fair Exhibition at Madras. The concessional offer had a very good response. Exhibition stalls were also put up at Coimbatore during the Agricultural College Day and Conference, the Farmer's Day and the First Annual Rice and Wheat Research Workers' Conference of the Indian Council of Agricultural Research. Exhibits were sent to the District Agricultural Officers, Kozhikode, Tiruchirappalli and Nellore for being exhibited at important exhibitions in their districts.

Free samples of Malt Extract with Shark Liver Oil were despatched to State Governments of Madhya Pradesh, Hyderabad, Orisa and Bombay for

trials with a view to popularise the product in their States. The free supply is being followed up with enquiries for the requirements of the Medical Institutions in these States.

The Government of India were addressed for protection of the industry by affording assistance by way of tariff as the Factory is the only one of its kind and their decision in the matter is awaited.

The Director-General of Health Services, New Delhi and the Director-General, Armed Forces Health Services, New Delhi, were requested to patronise the product of this Factory in preference to foreign products.

Malt Extract with Shark Liver and Plain Malt Extract were advertised in the *Commercial Directory of Madras State* to give the products wide publicity among Industrialists.

7. *Research*.—Items of research were limited to a few trials to find out ways and means of reducing cost of production and increasing the output which are two of the most important problems that have to be tackled in any commercial concern.

Couching trials.—With a view to study the effect of couching cholam seeds on cement floor instead of in wire-gauze trays as is being done at present, one lot of 200 lb. of grains was steeped as usual and heaped in a room with cement floor and was covered with a wet gunny bag. After keeping the seeds covered for 24 hours, the grains were spread on the floor in 2 inch thick layer and allowed to germinate for three days with intermittent stirring and sprinkling of water. The malted grains were extracted and analysed and the results indicated that cholam could be couched on floor instead of in trays without affecting the quality and quantity of the final product. However, there was no economy when this method was adopted with regard to labour charges.

Flavouring of Malt Extract.—Trials were conducted to find out whether the Vanilla Essence used at present for flavouring Malt Extract could be replaced with advantage by a mixture of Cinnamon oil and Vanillin crystals. Mixtures of Cinnamon oil and Vanillin Crystal in three different proportions were tried and it was found that a mixture of 5 mls. of oil and 1 gram of Vanillin for every 80 lb. of Malt Extract with Shark Liver Oil was satisfactory. It was, however, found that the present method of flavouring with Vanilla Essence was more economical and gave a more agreeable flavour to the final product.

Trials with Ragi.—Trials conducted so far to find out whether it would be economical to use ragi instead of cholam in the manufacture of Malt Extract, have shown that ragi has no advantage over cholam regarding yield, nature of extract, etc. The quality of the extract was found to be the best when the temperature of mashing ragi malt was kept at 60°C.

Vitamin Assay.—Batch samples of Malt Extract were periodically got analysed for Vitamin 'A' and was found to conform to the guaranteed specification.

8. *Training of Food Technology Students*.—The Government Malt Factory being the only one of its kind in India, has been attracting the attention of several Industrialists and Food Technology students during the past few years. Qualified Food Technology students as well as enterprising private

Industrialists have had practical training in malt manufacture in this Factory. The Factory is one among those recognized by the Government as a suitable training centre for Food Technology students who complete their course in Polytechnics in the State. During the Fasli year, one student from Kerala Polytechnic, Kozhikode, who was also a Government of India stipendiary, completed one year's practical training at the Factory. The student was given training in all aspects of production, sales of Malt Extract, maintenance of stocks of raw materials and finished products, etc. Though two more students from the Kerala Polytechnic were permitted to join as apprentices in this Factory, they subsequently expressed their inability to join as they had already got fixed in some other factories.

9. *General*.—Though production attained maximum level during the year, there was a break in production towards the close of the year.

The main factor that has been causing dislocation in the regular and planned production in the Factory is the extreme difficulty experienced in obtaining the right type of cholam seeds at the right time and at reasonable rates. The continued unfavourable seasons for the past four years have been responsible for the dearth of good cholam seeds for malt production. Even though, every year, efforts were made to purchase cholam seeds six months ahead of the harvest time, it was impossible to get the seeds in time for maintaining uninterrupted production. The situation was worse than ever before at the close of this fasli year. Cholam seeds of suitable variety were not available in any locality and if at all available, the prices quoted was more than one and half times of what was paid last year. Attempts were made to substitute cholam partly by purchasing barley from Uttar Pradesh. But the sample of barley seeds obtained from Uttar Pradesh also proved to be unfit for malt extract manufacture.

Several samples of seeds from different cholam-growing tracts of the State were tested for their malting quality and only one sample from Bellary was found to be suitable for malt extract manufacture. Arrangements were made to obtain the entire requirements of the Factory from Bellary.

The stock of cholam seeds used for production during the Fasli year was purchased in April 1951 and was used till the end of May 1952. That is to say, the seeds were stored for over one year. By frequent fumigation drying and careful storing, it was possible to keep the stocks free from insect infestation. It was, however, found that from April 1952 onwards there was a marked fall in the yield of extract from the same stock of seeds. This indicates that the maximum period for which cholam seeds could be stored without any detrimental effect in the yield of extract is one year. The viability of the stored cholam seeds diminished considerably after one year's storage.

It was reported in the last year's report that trials with coal as fuel for the Factory Boiler had definitely shown that a substantial saving could be effected in the production cost. Regular supplies of coal were arranged for and firewood was completely replaced by coal.

Manufacture of Activated Carbon was continued with the available labour and without interruption to normal malt extract production work. About 2,000 lb. of activated carbon was manufactured and supplied to the Quinine Factory, Naduvattam (Cinchona department).

The Plant and Machinery of the Factory were all working in good condition. Except for a break-down on one day due to clogging of Boiler Tubes, the production was maintained uninterrupted.

Timely action was taken to purchase the consumable stores and packing materials necessary to maintain regular production and sales of malt extract.

10. *Visitors.*—Visitors were a daily feature of the Factory and included School children, College students, Scientists, Industrialists and others.

Shri K. M. Munshi, the Minister for Food and Agriculture, Government of India, visited the Factory along with Sri A. B. Shetty, the Minister for Agriculture, Government of Madras.

Mr. W. W. Hutcheson, Director of Messrs. Bennet Shears and Sons, England (one of the leading Chemical Engineering Firms), visited the Factory in connection with a quotation for supply of additional equipment to the Factory.

Statements of production, sales, and stock of malt extract during the period under report, and a statement showing the sanctioned posts of officers and staff of the Government Malt Factory are appended.

SUMMARY OF THE ADMINISTRATION REPORT OF THE GOVERNMENT MALT FACTORY, COIMBATORE, FOR THE YEAR 1951-52 (FASLI YEAR).

1. 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 and in appreciation of their good work.

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 ever obtained since the inception of the Factory and exceeded the estimated target.

3. There was a progressive increase in the off-take of Malt Extract with Shark Liver Oil by the medical institutions indicating the rising popularity of the products.

4. Clinical trials conducted with Malt Extract with Shark Liver Oil 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 popularise the product among the public as suggested by the selling agents. The off-take by Agents, however, continued to be far below expectations.

6. Wide publicity was given for the products of the Factory by circular letters, exhibition stalls, advertisement in Commercial Directories and by issue of free samples to other State Governments.

7. Investigations carried out at the Factors indicated that

(a) couching of cholam seeds on cement floor was 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 as flavouring agent; and

(c) use of ragi is in no way more advantageous than the use of cholam in the manufacture of malt extract.

(d) the guaranteed Vitamin 'A' content in the final product is maintained in all the batches released for sale.

8. Government Malt Factory continued to be a training ground for Food Technology students.

K. M. KRISHNA MENON,
Assistant Agricultural Chemist,
Government Malt Factory,
Coimbatore.

STATEMENT OF PRODUCTION, SUB AND STOCK OF MALT EXTRACT DURING JULY 1951 TO JUNE 1952.

Month.	Receipts.			Issues.							Closing balance.
	Opening balance.	Production.	Other receipts.	Government hospitals and other Government institutions (Medical stores, Madras).	Medical institutions (municipalities, district boards and private).	Agents.	Other issues in unities, local sales, exhibition, etc.,	Total issues.			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
July 1951 ..	6,163	2,958	48	9,169	1,339	356	400	42	2,137	7,032	
August 1951 ..	7,032	3,004	2	10,038	715	284	100	21	7,120	8,918	
September 1951 ..	8,918	2,564	..	11,482	2,260	1,199	..	70	3,529	7,953	
October 1951 ..	7,953	2,934	..	10,887	710	734	160	19	1,623	9,264	
November 1951 ..	9,264	3,207	891	13,362	1,325	1,345	20	897	3,587	9,775	
December 1951 ..	9,775	3,093	4	12,872	911	1,306	320	177	2,714	10,158	
January 1952 ..	10,158	2,722	65	12,945	551	870	100	36	1,557	11,388	
February 1952 ..	11,388	3,110	269	14,767	1,725	350	120	54	2,249	12,518	
March 1952 ..	12,518	2,882	119	15,519	965	1,609	72	5	2,651	12,868	
April 1952 ..	12,868	2,856	6	15,730	22	235	40	56	353	15,377	
May 1952 ..	15,377	2,425	23	17,825	1,551	729	140	91	2,511	15,314	
June 1952 ..	15,314	338	..	15,652	871	1,338	20	6	2,235	13,417	
Total ..	..	32,093	1,427	..	12,945	10,355	1,492	1,474	26,266	..	
Abstract for 1951-52 <i>fashi</i> .											
Opening balance ..	..	..	6,163	..	..	..	..	..	..	12,945	
Actual production ..	..	..	32,093	..	..	..	..	..	..	10,355	
Other receipts ..	..	..	1,427	..	..	..	..	..	..	1,492	
Total ..	..	39,683	..	..	..	..	..	..	..	1,474	
Total issues .. 26,266											
Closing balance .. 13,417											
Total .. 39,683											

(5 OZ. BOTTLES)—STATEMENT OF PRODUCTION AND ISSUES DURING JULY 1951-52.

Month.	Receipts.				Issues.							Closing balance.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
July 1951	..	287	..	78	365	..	..	200	3	23	162	..
August 1951	..	12	..	..	162	..	..	20	16	36	126	..
September 1951	..	126	128	..	254	..	..	..	5	5	249	..
October 1951	..	249	..	..	249	..	..	120	14	134	115	..
November 1951	..	115	..	4	119	..	15	80	..	95	21	..
December 1951	..	24	144	..	170	..	96	..	43	139	31	..
January 1952	..	31	8	143	182	..	..	..	11	11	176	..
February 1952	..	171	..	333	504	24	..	..	448	472	34	..
March 1952	..	32	..	143	175	10	..	..	135	145	34	..
April 1952	..	30	..	4	34	4	..	..	..	4	30	..
May 1952	..	30	..	12	42	3	..	..	..	3	30	..
June 1952	..	39	16	..	55	..	20	..	1	21	32	..
Total	..	..	296	719	..	41	131	420	676	1,268	..	..

Abstract for 1951-52, fashi.		
	NOS.	
Opening stock	287	..
Production	296	..
Receipts..	719	..
Total	1,302	..
Total issues	1,268	..
Closing stock as on 30th June 1952	34	..

APPENDIX III.

TOTAL NUMBER OF SANCTIONED POSTS OF OFFICERS AND STAFF IN THE OFFICE OF THE ASSISTANT AGRICULTURAL CHEMIST, GOVERNMENT MALT FACTORY, LAWLEY ROAD P.O. COIMBATORE, AS ON 30TH JUNE 1952.

Name of service and post. (1)	Permanent.		Temporary.	
	Number of sanctioned post. (2)	Strength on 30th June 1952. (3)	Number of sanctioned post. (4)	Strength on 30th June 1952. (5)
1 Madras Agricultural Service— Assistant Agricultural Chemist, Government Malt Factory.	..	..	1	1
2 Madras Agricultural Subordinate Service— Upper Subordinate—Chemical Assistant, Government Malt Factory.	1	1	..	..
3 Madras General Subordinate Service— Foreman, Government Malt Factory..	..	..	1	1
Store-keeper, Government Malt Factory ..	..	..	1	1
Laboratory Attenders, Malt Factory ..	..	..	5	4
4 Madras Ministerial Service— Upper division, clerk—Accountant Govern- ment Malt Factory.	..	..	1	1
Lower Divisions Clerks.. .. .	..	..	2	2
5 Madras Inferior Service— Peons	..	..	2	2

ADMINISTRATION REPORT OF THE MARKETING SECTION
FOR THE YEAR 1951-52 (JULY TO JUNE).

I. Charge.—Sri S. N. Venkataramana Iyer was the State Marketing Officer, in charge of the marketing section, throughout the year except for a period of four months from 11th February to 10th June 1952 during which period Sri S. S. Katchapeswara Iyer acted. The post of the Assistant Marketing Officer, Coimbatore, was held by Sri C. Raman Moosad throughout the year. Sri K. Narayanan Nair was the Assistant Marketing Officer, Tiruchirappalli and Sri V. Suryanarayana was the Assistant Marketing Officer, Kakinada, throughout the year. The following officers held the post of the Assistant Marketing Officer, Cuddapah, namely, Sri P. K. Parameswara Menon (1st July 1951 to 18th March 1952), Sri S. Rajarathnam Chetty (19th March 1952 to 17th June 1952) and Sri T. K. Thangavelu (18th June to 30th June 1952).

Market surveys.—Two reports on the marketing of (1) Fish and (2) Cattle in Madras State were issued from the press, during the year. A special survey report on tapioca was prepared this year. Data were compiled for special report on certain cash crops as ginger, pepper, cardamum, cashewnut, lemon grass, oil and turmeric as required by the Director of Agriculture for the Special Committee of the Indian Council of Agricultural Research. The material of the following market surveys were made up to date, namely, rice, millets, pulses, turmeric, pepper, cashewnut, castor, groundnuts, sugarcane and tobacco. Supplementary information for marketing surveys relating to mangoes, potatoes, tobacco, pulses and coconuts, was collected and sent to the Agricultural Marketing Adviser to the Government of India. Work regarding the market surveys continued side by side with the development programme. Data on the cost of cultivation of many of the important crops were collected in the major growing districts.

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 (1) Guntur, (2) Ongole and three in the southern districts at (1) Madurai and (2) Tirupur. Owing to adverse seasonal conditions the quantity of ghee available for grading, was less this year. The quantity of ghee graded during 1950-51 was 9,046 railway maunds valued at 17.3 lakhs of rupees and it came down in 1951-52 to 6,583 railway maunds valued at 12.1 lakhs of rupees only. 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 Sathukudi oranges by the Kodur Fruit Growers' Co-operative Society, Rajampet had a set back, owing to financial difficulties. In 1951-52, twenty thousand fruits valued at Rs. 2,306 were graded as against 278 thousands of fruits valued at Rs. 33,600 in 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 staff of the inspectorate of tobacco under the Government of India.

The total value of the produce graded under 'Agmark' in Madras State, by the marketing staff was Rs. 14.8 lakhs in 1951-52 as against Rs. 19.4 lakhs in 1950-51. The decrease is mainly due to the diminished quantities of ghee available for grading owing to adverse seasonal conditions. The details are given in Appendix.

Regulated markets.—Market Committees were constituted for the two newly notified areas of (i) Tirunelveli district for cotton only and (ii) Ramnathapuram 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 notifying North Arcot district for groundnuts, under the Madras Commercial Crops Markets Act. A further step was taken this year, by the Madras Government in restricting sale of tobacco to the Mangalagiri market yard within a radius of five miles from it and ordering auction sales, in addition to the Guntur Market yard, which was brought under this restriction, last year. Proposals were sent to the Government for establishment of a regulated market for groundnuts and tobacco in Tiruchirapalli district. The proposal to include tobacco also in the scope of the work of the Coimbatore District Cotton and Groundnut Market Committee under the Madras Commercial Crops Markets Act, was postponed by a year in order to give time for the committee to make arrangements for the storage accommodation of tobacco.

The work of the individual market committees is summarised below :—

(1) *Coimbatore District Cotton and Groundnut Market Committee.*—Owing to adverse seasonal conditions during the latter part of the cotton season and due to blackarm disease and jassid pest the production of cotton in Coimbatore district 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 pethis
1949	6,511	..
1950	2,180	1,77,115
1951	4,051	1,39,368

All the purchases and sales continued to be restricted to the market-yard at Tiruppur within a radius of five 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. (1)	Bellary. (2)	Adoni. (3)	Bellary. (4)
Groundnut pods (bags) Mungari Kapas.	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	1,129
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.				(Tons of Kernels)		Non-notified area.	Total.
				Notified area.			
				From growers.	From traders.		
(1)				(2)	(3)	(4)	(5)
Cuddalore ..	..	..	..	5,764	78	..	5,842
Villupuram	..	..	..	10,020	85	..	10,105
Tindivanam	..	..	..	6,245	106	980	7,331
Tirukoilur	..	..	..	4,806	549	635	5,990
Ulundurpet	..	..	..	807	1 2	..	819
Vridhachalam	..	..	..	6,750	241	8,604	15,595
Panruti	..	..	..	2,825	170	..	2,995
Chinna Salem	..	..	..	865	310	138	1,313
Total	..	..	..	33,082	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 came to 49,990 tons 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.
	(1)	(2)
Cuddalore	20,789	96.6
Villupuram	38,968	93.7
Tindivanam	25,031	59.8
Tirukoilur	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 quantities brought by the growers themselves for sale in lots of small quantities as noted by the huge number of lots handled, shows the success of the market committee in catering to the needs of even the poor primary grower of groundnut in South Arcot district. The marketing was so popular, as to attract nearly 20.77 per cent of the arrivals from outside the notified area even. 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 also, in addition to Guntur, was a further step taken in the marketing of tobacco in Guntur district. The

quantities of tobacco sold by auction for cash and by private treaty on credit at Guntur and Mangalagiri market yards were as follows; totalling 9.37 million pounds :—

(1951-52 Season) (000) lb.

	By auctioning.		By private treaty.	
	Guntur.	Mangalagiri.	Guntur.	Mangalagiri.
	(1)	(2)	(3)	(4)
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	4,358	1,856

The percentage of tobacco sold by auction improved in Guntur during 1951 being 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 being the first year of auctioning. Exports of tobacco outside the notified area during 1951, were as follows :—

Quantity (Railway maunds).

				Flue-cured Virginia.	Sun-cured Virginia and country.	Gulla.
				(1)	(2)	(3)
1950	..	..	..	1,033,834	750,342	184,484
1951	..	..	..	648,691	444,548	160,353

The fall in the quantity exported is due to the poor crop 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 this committee 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 1680 lb.).	Cotton lint. (Borahs).	Groundnut (Candies of 500 lb.).	Groundnut Ker- nals (Candies of 531 lb.).
	(1)	(2)	(3)	(4)
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 everyday during the season, in the market yard. During 1951, the following quantities of tobacco and groundnut were handled in the notified area :—

	1949.	1950.	1951.
(1)	(2)	(3)	(4)
Flue-cured Virginia in lb.	5,943,970	8,595,912	11,044,857
Sun-cured Virginia in lb.	114,080	99,185	436,197
Flue-cured Virginia in lb.	79,293	497,782	937,580
Natu (country tobacco) in lb.	2,368,100	3,682,482	5,639,339
Groundnut pods in tons	68	1,055	42,130
Groundnut kernels in tons	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 Kadiri, Hindupur, Tadpatri and Guntakal were selected and the 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.	Tadpatri.	Kadiri.	Hindupur.	Total.
(1)	(2)	(3)	(4)	(5)	(6)
Western Lint (Bales of 392 in lb). ..	13,536	12,889	..	..	26,425
Groundnut pods (candies of 531 lb.). ..	..	28,567	..	..	28,567
Groundnut kernels (candies of 531 lb.). ..	28,710	12,506	68,867	29,512	140,595

(8) *The East Godavari Coconut 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, groundnuts, tobacco, arecanuts and coconuts.

The marketing staff helped in the day-to-day work of the market committees as framing of by-laws, arrangement of sales and auctions, general improvement of the markets, 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 provision of the Madras Commercial Crops Markets Act and the benefits conferred by it as a preliminary to the working of the act in these districts. A new cadre of secretaries for market committees, has been sanctioned by the Government to work under the State Marketing Officer and Director of Agriculture. The market committees functions would be more under the scrutiny of the marketing staff, as a result of this change.

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. Fort-nightly prices of commodities were ascertained in the wholesale markets at Madras, Tiruchirappalli, Madurai, Kakinada and Coimbatore. Prices of agricultural commodities like jute, sunnhemp, jaggery, sugar, arecanuts,

etc., were furnished to the Economic Adviser to the Government of Madras. Stocks of foodgrains in some places like Nandyal, Salem, Kumbakonam and Kakinada, were 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, groundnuts 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.

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 Tiruppur Co-operative Sales Society, Limited, the Katpadi Egg Marketing Society, the Malabar District Co-operative Marketing Society, the Ponnani Arecanut Society, the South Kanara Central Co-operative Stores, Limited, 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 is also being rendered in organizing a co-operative cotton marketing society for Tanjore district.

Market Legislation.—A number of suggestions were covered in amending the by-laws of the market committees and the various rules under the Madras Commercial Crops Markets Act. The by-laws of the newly formed Tirunelveli Cotton Market Committee were scrutinized. The rules under the Madras Sugar Factories Act, were also amended. The rules framed under the Madras Weights and Measures Act and the Madras Warehouse Act were also further clarified. 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.

Work done for heads of department—I. *Director of Agriculture.*—Some important subjects dealt with were as follows:—

- 1 Production of tapioca and bananas.
- 2 Amendment to Sunnhemp grading and marking rules.
- 3 Storage methods for jaggery.
- 4 Grant of loans to market committees from the Indian Oil Seeds Committee.
- 5 Fixation of yields of sugarcane and gur.
- 6 Standardization of ratio of rice to paddy.
- 7 Marketing of Punjab 216 F. cotton in Tanjore district.
- 8 Co-operative marketing of Uganda cotton of Srivilliputtur seed farm ryots.
- 9 Fixation of cotton prices for 1951-52.
- 10 Costs of cultivation and income per acre of commercial crops.
- 11 Utilization of agricultural waste in Madras State.
- 12 Production and utilization of oil-cakes for 1948-49 to 1950-51.
- 13 A report on accumulated stocks of old groundnut oil.

- 14 Production, consumption and the trade in plantains.
- 15 Supply of pure cotton seed and agmarking of cotton.
- 16 Allocation of cotton to mills.
- 17 Transport facilities for Nilgiris potatoes in 1951.
- 18 Fixation of export quotas for onions for 1952.
- 19 Estimated production of jaggery and sugar, for the last three years.
- 20 The fall in prices of coconuts, arecanuts, pepper and ginger.
- 21 Export of cotton from 'C' Zone, Madras.
- 22 Estimates of extra factory consumption of cotton.
- 23 Season of harvest and marketing of important crops.
- 24 Export of mangoes to Pakistan.
- 25 Fixation of normal yields per acre of Panivaragu, Kudiraivali and Tapioca.
- 26 Export of chillies to Ceylon.
- 27 Cost of living index numbers of low-paid employees.
- 28 Fixation of prices of raw rubber.
- 29 Control and prices of Bhoemunipatnam jute.
- 30 Raise in prices of coffee seeds.

II. *Commissioner of Civil Supplies.*—Many samples of rice and paddy were analysed. Experiments were conducted with Tanjore paddy at Kovilpatti 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 "Malkised" process of preparing rice, was given publicity. Fortnightly reports on the migration of cattle to neighbouring states were also submitted.

III. *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.

IV. *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.

V. *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 imports of chillies, pulses, gram, mangoes, jaggery, eggs and hides during 1948-49 were also communicated. Information regarding market charges in regulated markets was provided. Weekly prices of palm jaggery, cane jaggery, sugar and arecanuts were furnished.

Transport.—Export and import data were collected from all important railway stations, for the various commodities. The State Marketing Officer attended meetings of the South Indian Railway and the Madras Southern Maharatta Railway Advisory Committees. 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 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.

Review of prices and marketing condition.—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 conditions. 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 groundnuts 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 Rs. 400 to 200 per bale and on soft cotton-waste from 50 per cent *ad valorem* to 30 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 decontrolled first, all millets and price control also was lifted. Later on, the control and rationing of foodgrains was abolished on 7th June 1952, with zonal restrictions on movement. This decontrol was welcomed by the traders, producers and the consumer. Even 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 Rs. 0-15-0 to Rs. 1-0-0 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.

Famine conditions in Chittoor, Cudlapha, Anantapur, Kurnool, Chingleput and Coimbatore, were successfully tackled by the Government by rushing food imports, opening gruel centres and affording other relief measures such as famine relief works and supply of fodder grass for cattle, and help by the defence services.

The course of prices of important commodities during 1951-52 is summarised below :—

The prices of rice and millets after the decontrol were selling only at about 1½ times the control rates, the accentuation being more in the deficit districts, considering the advance nature of the paddy season, the rise in the price of the free market rice, was not considerable. The prices of pulses also

came down, in common with the other commodities by March and went up to 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 combodia 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 witnessed world wide slump in prices of cotton and this market also suffered a landslide, combodia kapas came down to Rs. 75 per pothi during March 1952 but later recovered to Rs. 130 in June 1952, combodia 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. 42 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. 62 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 only in June 1952. The prices of west coast produce also had a heavy fall during the year under review. Arecanuts 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, coconuts at Tellicherry (husked) from Rs. 200 to Rs. 110 per 1,000 nuts, pepper at Kozhikode (Madras quality) from Rs. 493-15-0 to Rs. 370-7-0 maund and cardamom at Mangalore from Rs. 1,058 to Rs. 734 (Mysore per imperial quality) per maund. The prices 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)

		Foodgrains.	Commercial products.
1949	.. .. .	378	534
1950	.. .. .	366	637
1951	.. .. .	375	673

1952				Foodgrains.	Commercial products.
January	..	\	..	393	575
February	..	..	..	394	553
March	..	..	..	402	453
April	..	..	..	406	443
May	..	..	..	407	450
June	..	..	..	411	466

While the prices of foodgrains did not change much, the prices of commercial products showed a considerable fall, as seen from the monthly index prices for April 1952.

Administration.—Orders from the Government deferring the consideration of the proposals for the creation of a separate marketing department were received during the year.

The office of the Assistant Marketing Officer, Kakinada, was inspected on the 16th and 17th October 1951. The office of the Assistant Marketing Officer, Cuddapah, was inspected on the 4th and 5th November 1951 and again on the 13th and 14th May 1952. The inspection of the office of the Assistant Marketing Officer, Tiruchirappalli, was conducted on the 29th, 30th and 31st May 1952. There were no serious defects and minor defects were rectified on the spot. The working of the three offices on the whole was satisfactory and the technical correspondence was attended to promptly.

The State Marketing Officer was on tour, inspecting the work of the Market Committees at Mangalore, Kozhikode, Tirupur, Cuddalore, Adoni, Guntur and Vijayavada. He visited Tiruchirappalli district with a view to find out the possibilities of opening a regulated market for groundnuts, tobacco and cashewnuts. Rice milling experiments were conducted in Tirunelveli district to ascertain the ratio of rice to paddy. The four Assistant Marketing Officers, and the Marketing Assistants also toured constantly, studying the market conditions and prices, supplying market information and helping developmental work.

APPENDIX.

Statement showing the progress of grading work in Madras State during fasli year 1951-52 (July to June).

Name of the authorised packer.	Centre.	Grading during 1950-51.		Grading during 1951-52	
		Quantity	Estimated value.	Quantity	Estimated value.
		NOS. Eggs.	RS.	NOS.	RS.
1 Messrs. Eggs and Poultry Mart.	Madras.	259,440	33,805	785,697	1,07,280
2 Messrs. M. M. Ebrahim Brothers & Company.	Do.	459,445	54,381	69,727	6,567
3 Sri M. Rajoo Chettiar.	Do.	160,633	20,530	40,608	5,581
4 Sri K. N. Govindaswami Pillai.	Do.	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

Statement showing the progress of grading work in Madras State during fasli year 1951-52 (July to June)—cont.

Name of the authorized packer.	Centre.	Grading during 1950-51.			Grading during 1951-52.		
		Quantity.		Estimated value.	Quantity.		Estimated value.
		MDS.	SRS.	RS.	MDS.	SRS.	RS.
Ghee.							
1 Sri Srinivasa Rao ..	Ongole.	178	17	40,957	757	6	1,29,186
2 Messrs. Amarchand Gulabchand & Company.	Tirupur.	5,888	2	11,03,720	3,919	20	7,09,245
3 Messrs. Dhanalakshmi & Company.	Do.	12,291	38	2,59,207	1,591	20	3,10,145
4 Messrs. Lakshmi Das Premji.	Guntur.	1,688	33	3,88,582	280	11	50,965
5 Messrs. A. S. M. Aruna-chala Nadar & Company.	Madurai.	..	..	..	34	1	6,248
	Total ..	9,046	10	17,26,466	6,582	18	12,05,787
Potatoes.							
1 Kotti Growers United Corporation.	Kotti.	4,200	0	46,500	..	..	..
2 N. R. Rangaswamy Naidu & Sons.	Do.	..	..	..	8,750	0	1,28,373
3 Sri M. N. Ponnuswamy	Mettupalayam	..	..	..	..	..	..
	Total ..	4,200	0	46,500	8,750	0	1,28,373
Total value ..		1950-51.		1951-52.			
		RS.		RS.			
		LAKHS.		LAKHS.			
		19.4		14.8			

PROGRAMME OF WORK FOR THE YEAR 1952-53.

Regulated Markets.	Introduction of regulated markets for groundnuts in North Arcot district and for tobacco and groundnuts in Tiruchirappalli district. Establishment of more market yards in Coimbatore, Bellary, Anantapur, Malabar and Krishna districts.
Grading work.	Expansion of ghee grading in Coimbatore and Guntur districts. Introduction of grading for arecanuts, fruits, coconut oil and rice. Continuation of grading work on tobacco, eggs, ghee, oranges and potatoes.
Market surveys.	Making up-to-date, the survey reports. Rewriting the rice report.
Market intelligence.	Review of market conditions, fortnightly report of prices, supply of market intelligence to growers and co-operative societies.
Help to other departments.	Help to co-operative societies for grading eggs and oranges and for marketing their produce. Supply of information and schemes in livestock to the Director of Animal Husbandry, Madras, and on Agro industries to the Director of Industries and Commerce, Madras.
Data to the Civil Supplies regarding marketing of foodstuffs	

ANNUAL ADMINISTRATION REPORT OF DEPUTY DIRECTOR OF AGRICULTURE, VISAKHAPATNAM DIVISION FOR THE FAS I YEAR 1951-52.

I. Charge and staff.—I was in charge of the Visakhapatnam division throughout the period from 1st July 1951 to 30th June 1952.

The Deputy Director of Agriculture, Visakhapatnam, was the controlling administrative officer for the following subordinate officers:—

- (i) District Agricultural Officer, Anakapalli—Visakhapatnam district.
- (ii) District Agricultural Officer, Srikakulam—Srikakulam district.
- (iii) Special District Agricultural Officer, Araku valley.

The following Officers held charge of the post throughout the year without any change.

- (i) Sri M. Ramamurthy.
- (ii) Sri Bhaghirathy Padhy.
- (iii) Sri K. Bhushanam.

Personal Assistants to the District Agricultural Officers.—Sri V. V. Jagannatharao was the Personal Assistant at Anakapalli throughout. In Srikakulam the following changes took place:—

Sri K. Rangarao—1st July 1951 to 31st July 1951.

Sri D. Ramarao—1st August 1951 to 17th June 1952.

Janab K. S. Habibullah, Agricultural Demonstrator, Srikakulam, in-charge—18th June 1952 to 30th June 1952.

Agricultural Demonstrators.—The details of Talukwise particulars as on 30th June 1952 are given in Appendix I.

Additional Agricultural Demonstrators.—Four posts of additional Agricultural Demonstrators sanctioned for each district were continued this year also.

Crop and Plant Protection Assistants.—The Crop and Plant Protection Assistants one each for Entomology and Mycology respectively were continued in both Srikakulam and Visakhapatnam districts.

Assistant Inspector of Fertilisers.—The Post of an Assistant Inspector of Fertilisers was sanctioned for each division and Sri S. Vasudevarao held charge from 27th October 1951 onwards.

Ministerial.—The basic staff sanctioned for Deputy Director of Agriculture's office and District Agricultural Officer's offices were continued during the year. The staff sanctioned under comprehensive scheme and Engineering section were continued as in last year.

Fieldmen and maistris.—The Fieldmen and Maistris continued as in last year in both the districts. During the year, from out of the existing staff, one fieldman and two maistris were separately set apart for work in the Rural Welfare firkas of Jallurn and Kotauratla in Golugonda taluk, Sabbavaram in Anakapalli, Pendurthi in Visakhapatnam, Araku, Gara and Amadalavalasa in Srikakulam district.

The bee-keeping maistris and maistris under Plant Protection Assistants were continued as in last year.

Araku V alley Scheme.—At the beginning of the year there were seven Farm Managers each assisted by a maistri. But in December 1951 two posts were retrenched as per G.O. Ms. No. 5716, Development, dated 16th November 1951 and now there are only five Farm Managers each assisted by a maistry. There were no fieldmen here. The strength of the ministerial staff was continued as in last year. Out of the five Farm Managers one is in charge of district work, one in charge of the dairy, tractor, poultry, etc. The rest looked after the three farms.

II. Season and rainfalls.—(a) *Araku Valley.*—There was a total rainfall of 61.25 inches distributed over 89 rainy days as against 56.24 inches during the previous year. This was distributed as 45.58 inches in the South-West Monsoon period, 9.24 inches in North-East and 6.43 inches in the hot weather period. As usual December to February was dry without any rainfall.

The heavy rainfall in the South-West monsoon wiped off the early sown ragi and dry paddy crops necessitating resowing. Heavy rains received in March and April were beneficial for commencement of preparatory cultivation. There were heavy hail-stone showers in the middle of May which damaged the standing crop of plantains and some thatched sheds of the colony.

Severe winter conditions prevailed from December to February with frost in January and February. The minimum temperature recorded was 39° F.

(b) *Visakhapatnam district.*—The period under review received an average rainfall of 42.67 inches as against 34.67 inches last year. This was distributed as 24.06 inches in the South-West monsoon, 9.33 inches in the North-East and 9.28 in the hot weather period.

Rains started very early in the season facilitating early sowing of groundnut, jute, cumbu, etc., crops. The distribution of rainfall till October was even and was therefore good for successful raising of crops. But due to these heavy rains from the early period sugarcane had a severe set-back.

With the close of rains very early some dry land crops and upland paddy showed signs of withering and caused some anxiety but the unprecedented cyclonic weather in the last week of October for one day helped in the revival of these withering crops.

(c) *Srikakulam district.*—The total precipitation during the year under report is 47.82 inches as against 39.14 inches for the corresponding period of last year.

The average for the last 5 years is 45.54 inches.

The distribution of the rainfall seasonwar is as follows:—

	1951-52.	Average for last 5 years.
South-west monsoon	39.22	31.35
North-east Monsoon	0.71	8.30
Hot weather period	7.89	5.83
Total ..	47.84	45.54

(i) *South-west monsoon.*—During this period rains were received in time and were uniformly distributed during the three months—July, August and September 1951.

Rains during July helped the ryots to transplant the paddy seedlings in time. Groundnut and ragi crops have also been benefited to a great extent. Rains during August-September favoured the growth of paddy, millets and groundnut crops and resulted the unusual bumper yields of all these crops.

(ii) *North-east monsoon*.—Commenced late and there were sporadic rains during October. During the last week of November there were heavy rains throughout the district which helped the growth of long duration paddy varieties, Janna, horsegram and other dry crops. These heavy rains to an extent interfered with the mid-season paddy varieties but no large-scale damage was reported.

(iii) *Hot weather*.—There were scanty rains during this period under report as a result of which sowings of Punasa ragi, ganti and gingelly were delayed. The seed beds of ragi and paddy have dried up had to be resown in certain cases. Groundnut crop received a set-back and low yields during 1952-53 under all these crops are expected.

The distribution of rainfall is furnished in Appendix II.

III. *Agricultural education*.—There were no special activities in this division.

IV. *Demonstration and propaganda*.—(i) The district staff carried wide propaganda and enlisted subscribers for the Telugu journal "Padipantalu". Total number of subscribers enlisted were 9,322 in Visakhapatnam district. A number of meetings were held both by the Agricultural Demonstrators and District Agricultural Officers together with practical demonstrations; explaining the various improved methods in agriculture and how to step up food production. This had the desired effect and demand for improved seeds and fertilizers went up.

Exhibitions and propaganda meetings were held to educate the ryots on the various improved methods.

	Srikakulam.	Visakhapatnam.	Total.
(a) Number of exhibitions held	3	..	3
(b) Number of visitors who visited the shows.	95,000	..	95,000

Two large-scale exhibitions were staged in Srikakulam of which one was a fruit show. Hon'ble the Minister for Agriculture was present on the occasion of fruit show. The two exhibitions attracted large numbers of visitors.

In connexion with the distribution of prizes for the crop competition winners several functions were got up with the co-ordinated effort of landlords and officials. The Director of Agriculture, Madras (Sri M. S. Sivaraman, I.C.S.), presided over the district crop competition prize distribution function in Narasapatnam and gave away the prize for the district prize winner.

	Srikakulam.	Visakhapatnam.	Total.
(b) (i) Number of propaganda meetings held by demonstrators.	850	520	1,370
(ii) Number of propaganda meetings held by District Agricultural officers.	82	50	132
(c) Number of demonstration plots laid.	278	199	477
(d) Work through other agencies.—			
(i) Agricultural associations.—			
(1) Number newly formed	..	44	44
(2) Total number functioning	..	98	98
(3) Number of meetings held	..	133	133

(ii) *Through other departments*.—In both the districts the departmental staff had the full co-operation of the Revenue, Co-operative, Forest and other sister departments in implementing the programme of work and carrying out the various improvements. Tree planting, compost week and crop competition fortnights were celebrated with the help of other departmental staff simultaneously in many villages.

(iii) *Honorary Propagandists*.—There were no honorary propagandists in this division.

V. *Problems of the division and the work done*.—(a) *Paddy*.—The cultivation practices adopted come under the broad classification of cultural, varietal and manurial. In each group improved methods to suit to the particular tracts have been worked out and advocated to increase the general outturn of the crops.

The improvements advocated.—

(i) *Cultural*.—Early preparation of seed beds and the use of light iron ploughs for obtaining good tilth.

(2) Thin sowing of nurseries to produce robust seedlings 40 lb. seed rate is advocated against 100 to 120 lb.

(3) Sheep penning in the nurseries to reduce weeds.

(ii) *Varietal*.—Use of improved strains selected from the local varieties is an important item advocated by the department. The strains which have become popular have been fixed up for each taluk and seed multiplication is arranged for further spread.

Seed multiplication schemes are run to produce more seed to meet the increasing demand. About 50 to 60 per cent of the area has been covered by the improved seeds.

Still there are some varieties which are largely cultivated due to their particular adaptability. Strains are required to be evolved from these varieties, to bring the rest of the area under improved seed.

(iii) *Manurial*.—In the past, paddy was grown year after year without any special manuring. What little farm-yard manure was available was applied to nurseries and money crops. Therefore the advantages of green manuring were advocated and wherever facilities existed green leaf manuring was encouraged. But in this division this practice did not spread largely for the following reasons:—

(1) In a large area paddy is preceded by an early millet crop.

(2) Wherever irrigation facilities exist a late crop of ragi or gingelly was taken.

But now a mixed cropping of sunnhemp in the early season and indigo, wild indigo or pillipesara in the late seasons are advocated. The area under this improvement is rapidly spreading.

Besides the planting of green leaf yielding plants like glyricidia maculata on the bunds is being advocated.

Now, without encroaching on the early sown millet crops, sesbania speciosa is being planted on the paddy field bunds for incorporating as green manure after the early crop is taken. This is proving to be very useful and large areas are now under this improvement. Nurseries are being raised and a good number of seedlings are supplied for planting on field bunds.

With the advent of the Grow More Food campaign, ryots have become manure minded and large quantities of oil cakes and fertilizers are now being applied.

The deficiency of phosphates in the soil and the role played by it were explained and now the use of super phosphate is becoming popular.

(b) *Sugarcane*.—With the introduction of Coimbatore varieties sugarcane cultivation has increased in all areas. Simultaneously the other improved methods like line planting, wider spacing, planting selected sets, construction of improved furnaces with double gratings and smoke chimneys are also making rapid strides. Manuring with oil cakes and chemical fertilizers has become a common feature now.

Co. 419 is the variety now under cultivation.

(c) *Other crops*.—In all other crops introduction of improved strains and intensive manuring with concentrated manures are being advocated.

(d) *Fruits and vegetables*.—Grafts and budded plants of mango, citrus and other fruit plants are being supplied from the Agricultural Research Stations. The demand for fruits and good quality vegetables is increasing as a result cultivation of many reputed varieties is being taken up. Vegetable seeds and fruit plants are being supplied on demand.

(e) *Fodders*.—Growing of fodders is not a common feature in this division. Sunnhemp and pillipesara are being introduced in the wet lands to serve as fodder crops. Napier and guinea grass is also being introduced.

Statement showing the salient features of work done in 1951-52.

Serial number and crop.	Particulars of improvements.	Srikakulam district.	Visakhapatnam district.	Araku valley.
(1)	(2)	(3)	(4)	(5)
I. Paddy ..	Quantity of improved seed distributed in tons.	226-1,612	396-1,108	2-1,599
	Area under Improved varieties in acres.	37,453	39,859-38	575-40
	Area planted with thin sown seedlings in acres.	12,874	30,408-68	230-00
	Area green manured in acres.	10,280	21,469-78	49-50
	Area manured with fertilizers in acres.	14,119	21,239-49	..
II. Ragi ..	Quantity of seed distributed in tons.	3-1,712	15-86	0-1,734
	Area under improved varieties in acres.	600-00	6505-40	173-40
III. Cumbu.	Quantity of seed distributed in tons.	0-511	6-2,068	..
	Area under improved varieties in acres.	51-00	3,388-58	..
IV. Cholam.	Quantity of seed distributed in tons.	0-267	0-1,384	..
	Area under improved varieties in acres.	17-00	700-70	..
V. Sugar-cane.	Area under improved varieties in acres.	12,388	21,956	..

Statement showing the salient features of work done in 1951-52—cont.

Serial number and crop.	Particulars of improvements.	Srikakulam district.	Visakhapatnam district.	Araku Valley.
(1)	(2)	(3)	(4)	(5)
VI. Fruits ..	Number of plants supplied—			
	Mango	10,911	1,553	70
	Citrus	224	36	357
	Coconuts	890	2,300	..
	Sapota	100	285	—
	Others	12,784	1,157	2,077
VII. Manures.	Rural compost made in tons.	8,230	18,572	500
VIII. Green manures.	Quantity of seed distributed in tons.	35-812	16-1,811	660
	Area under green manures in acres.	3,490	6,935-09	33-00
IX. Soil erosion.	Area bunded in acres ..	281-00	671-00	66-50
	Area levelled in acres ..	23-00	95-00	1-20
	Area terraced in acres ..	71-40	145-00	5-20
	Ploughing along contours in acres.	..	550-40	2,668-00

VI. *Food production drive*.—The intensive food production scheme with the three-year plan was continued in both the districts. This consisted mainly in the distribution of improved seeds, manures and helping the ryots to bring into cultivation fallow lands by mechanical implements and to supplement the irrigation facilities by oil engines and electric motors.

The progress achieved under the three year plan is furnished below separately for each district.—

VISAKHAPATNAM DISTRICT.

Statement showing the progress of work done under the three-year plan of food production.

Serial number and name of the scheme.	Target for 1951-52.	Progress of work in the year	Remarks.
(1)	(2)	(3)	(4)
1 Land development by mechanical cultivation—			
Oil engines—Hiring of Departmental units.	13	9	
2 Electric motors—Through trade channels.	95	27	Chodavaram .. 2 Anakapalli .. 5 Visakhapatnam .. 4 Bhimlipatnam .. 3 Vizianagaram .. 13=27
3 (a) Oil engines—Hire purchase system.	17	8	Narasapatam .. 3 Anakapalli .. 3 Yellamanchili .. 1 Chodavaram .. 1=8
(b) Electric motors—Hire purchase system.	5	1	Vizianagaram .. 1

Serial number and name of the scheme.	Target for 1951-52.	Progress of work in the year.	Remarks.
(1)	(2)	(3)	(4)
4 Tractor cultivation— (a) Number proposed to be supplied.	14	9	
(b) Area to be benefited..	7,766 acres.	3,000	1949-50—667 1950-51—1249 1951-52—1084 There is no demand for ploughing. Six units are now fitted with bulldozers. Work with bulldozers is slow.
5 Oil engines and electric motors supply through CAES.	22	9	
6 Rural Compost— (a) Quantity to be made in tons.	4,620	23,575	
(b) Amount of subsidy Rs.	4,620	4,620	
(c) Area benefited in acre.	924	1,178	
7 Distribution of super phosphate on subsidized basis in tons.	296	198	
8 Distribution of ammonium sulphate— (a) Quantity to be supplied in tons.	1,467	1,822	
(b) Area to be benefited in acres.	41,076	51,576	
9 Multiplication and distribution of green manure— (a) Area of seed farms ..	300 acres.	305 acres.	
(b) Area to be benefited.	1,900 acres.	20,228 acres.	
(c) Quantity of seed to be distributed.	380 bags.	460 bags.	
10 Multiplication and distribution of paddy— (a) Area of seed farms ..	900 acres.	1,155 acres.	
(b) Area under improved varieties.	12,800 acres.	15,000 acres.	
(c) Quantity of seed to be distributed.	3,200 bags.	5,000 bags.	
11 Multiplication and distribution of ragi— (a) Area of seed farms ..	320 acres.	317 acres.	
(b) Area under improved varieties.	10,000 acres.	1,500 acres.	
(c) Quantity of seed to be distributed.	313 bags.	148 bags.	
12 Multiplication and distribution ofumbu— (a) Area of seed farms ..	225 acres.	359 acres.	
(b) Area under improved varieties.	11,000 acres.	2,000 acres.	
(c) Quantity of seed to be distributed.	413 bags.	120 bags	
13 Multiplication and distribution of cholam— (a) Area of seed farms ..	500 acres.	69 acres.	
(b) Area under improved varieties.	10,000 acres.	200 acres.	
(c) Quantity of seed to be distributed.	687.5 bags.	30 bags.	

SRIKAKULAM DISTRICT.

Serial number and particulars of scheme.	Target number or quantity.	Attained area Number or quantity.	Additional production.	
(1)	(2)	(3)	Aimed at tons.	Attained tons.
(1)	(2)	(3)	(4)	(5)
1 Land Development by Mechanical cultivation and installation of oil engines and pumpsets.	No. 3	3	12	12
	Area 24	..	..	..
2 Electric motor pumpsets ..	No. 10	1	25	2½
3 Electric motor pumpsets through trade channel.	..	..	..	..
4 Tractor cultivation— Ploughing			346.90 acres.	
Levelling			167.50 acres.	
5 Soil conservation and contour bunding.	..	..	..	..
6 Distribution of iron and steel— Standard			1.1148 tons.	Value Rs. 780-7-6
Non-Standard			5.1796 tons.	" " 2,721-0-9
Implements			59 Nos.	" " 73-13-6
7 Distribution of phosphatic manures— (a) Quantity to be distributed in tons.	296	103.1399	247	86
(b) Area to be covered in acres.	8,088	3,090.40	..	..
8 Distribution of ammonium sulphate— (a) Quantity distributed in tons.	1,467	1,835.137	2,934	3,670.274
(b) Area to be covered in acres.	41,734	54,380.00	..	..
9 Subsidiary rural compost— (a) Quantity distributed in tons.	4,620	8,230	115.1120	205.1680
(b) Area covered in acres ..	924	1,646	..	..
10 Intensive green manuring— Area under seed farms ..	500	65	..	..
Quantity distributed	..	35-812	320	467-820
Area covered	3,700	3,490.00	..	..
11 Distribution of improved paddy— (a) Area under seed farms ..	1,500	1,855	..	..
(b) Quantity to be distributed.	4,200	226.1612	357	612
(c) Area covered under improved strains.	16,000	9,193	..	..
12 Distribution of improved millets— A. Ragi (1) Area under seed farms.	125	131	..	..
(2) Quantity of seed to be distributed.	187½	46	133	27
(3) Area covered under improved strains.	6,000	483	..	..
B. Cumbu (1) Area under seed farms.				
(2) Quantity of seed to be distributed.	..	511lb.	..	2-620
(3) Area covered under improved strains.	..	34 acres.	..	..

VII. Other special features.—(1) *Plant Protection*—Two Plant Protection Assistants one for Entomology, and another for Mycology are stationed at each district headquarters for attending to work in the respective districts. They are working under the technical guidance of the Crop and Plant Protection Officers, Bapatla. All the agricultural depots are equipped with the necessary pesticides, fungicides, rodenticides, sprayers and dusters. Reserve stocks of these chemicals are kept at the district headquarters depots to meet emergencies.

Details of work done under plant protection.—

(1) VISAKHAPATNAM DISTRICT.

Crop. (1)	Pest or disease. (2)	Treatment given. (3)	Area treated. (4)
<i>A. Pests.</i>			
Paddy ..	Fulgorid bug	Dusting gammexane ..	591.03
	Grass hopper	D-025 ..	109.50
Chillies ..	Thrips ..	Do. ..	371.94
Mangoes ..	Hopper ..	Spraying guesoral 550 ..	1,309.50 or 52,369 trees.
Brinjal ..	Epilachana ..	Do. ..	369.00
Betlewine ..	Bug ..	Do. ..	40.00
<i>B. Diseases.</i>			
Paddy ..	Leaf blight	Seed treatment with agrosan G.N.	340 bags.
	Blast	Spraying peronox ..	59.90
	Leaf blight	Spraying ..	9.50
Jonna ..	Short smut	Seed treatment with sulphur powder.	2,566 acres.
Sugarcane ..	Smut ..	Pull and burn ..	10 acres.
Chillies ..	Fruit rot ..	Spraying peronox ..	7.00 acres.
Betlewine ..	Wilt ..	Drenching to soil with peronox ..	1.50
Citrus ..	Frengching ..	Spraying ferrous sulphate ..	2 trees.
	Gummosis ..	Smearing bourdeaux paste ..	249 trees.
	Die back ..	Spraying bourdeaux mixture ..	75 trees

(2) SRIKAKULAM DISTRICT.

Paddy ..	Cass worm	Passing rope and draining water.	93.50
	Fulgorid bug	Dusting gammexane ..	248.30
	Grass hopper	Do. ..	57.90
	Swarming caterpillar.	Do. ..	22.50
	Leaf roller	Do. ..	10.00
	Jaasida ..	Do. ..	11.50
	Kodu ..	Do. ..	9.50
Ragi ..	Laphygma ..	Do. ..	14.85
Sugarcane ..	Early shoot borer.	Spraying D.D.T. 50 per cent.	4.00
	White ants	Spraying creosote oil emulsion ..	3.40
	Stem borer	D.D.T. ..	3.00
Redgram ..	Scales ..	Spraying FOR soap ..	4.60
Gogu ..	Flea beetle ..	Spraying calcium arsenate ..	22.00
Groundnut ..	Reed hairy caterpillar.	Dusting gammexane ..	13.80
Brinjal ..	Epilachana ..	Spraying calcium arsenate ..	100.90
Chillies ..	Thrips ..	Dusting gammexane ..	32.50
Onions ..	Thrips ..	Do. ..	32.50
English ..	vege. Caterpillars	Do. ..	51.72
tables.			

(2) SRIKAKULAM DISTRICT—cont.

Crop. (1)	Pest or disease. (2)	Treatment given. (3)	Area treated. (4)
Mangoes ..	Hopper ..	Spraying D.D.T. ..	4,984 trees.
Cattle ..	Ticks ..	Applying pasts of B.H.C. ..	3,968 heeds.
	Field rats ..	Poisonous baist ..	37.50
<i>(1) Diseases—</i>			
Paddy ..	Blast	Spraying peronox ..	107.79
	Leaf spot ..	Treatment of seed with agrosan.	4,867 bags.
Ragi ..	Algal growth	Feronoxone ..	56.15
	Blast ..	Spraying peronox ..	1.25
Jonna ..	Smut ..	Treatment of seed with sulphur ..	17.56
Onions ..	Leaf blight	Spraying with peronox ..	7.2
Chillies ..	Fruit rot ..	Do. ..	10.45
Alocasia ..	Leaf spot ..	Do. ..	5.00
Coconut ..	Mahali ..	Spraying bordeaux mixture ..	3.00
Turmeric ..	Leaf spot ..	Spraying peronox ..	0.12
Sugarcane ..	Smut ..	Pulling and destroying ..	2.50
Citrus ..	Mottle leaf	Spraying Zinc sulphate ..	4,778 trees.
	Die back ..	Pruning ..	..
	Gummosis ..	Treated ..	..

(2) *Takkavi loans*.—Ryots requiring financial assistance for the purchase of seeds and manures were given special interest-free loans at Rs. 120 per individual on personal security.

Besides this an intensive manuring scheme was also run in both the districts wherein manures were supplied by sanctioning loans. An amount of Rs. 25 per acre with a maximum of Rs. 200 per individual were given. This loan was also free of interest. Manures in the shape of ammonium sulphate and super-phosphate were supplied in kind for the loan taken.

Particulars of loan sanctioned. (1)	Srikakulam. (2)	Visakhapatnam. (3)	Total. (4)
I. <i>Seeds and Manures</i> —			
Amount disbursed ..	1,00,000	1,99,950	2,99,950
II. <i>Intensive manuring scheme</i> —			
Amount disbursed ..	55,315	99,630	1,64,945
III. <i>Implements</i> ..	300	..	300

(3) *Bee-keeping*.—Bee-keeping as a side industry was popularized in both the districts. The scheme sanctioned for the improvement and popularization of this industry was continued in both the districts. A special staff of three maistries worked in each district under the guidance of the Plant Protection Assistant (Entomology). The progress achieved is furnished below:—

Particulars. (1)	Srikakulam. (2)	Visakhapatnam. (4)	Total. (5)
1 Number of hives maintained ..	86	91	177
2 Number hived in the year ..	12	33	45
3 Quantity of honey extracted in lb.	750	548 lb.	1,298
Number of bee-hive boxes sold ..	10	4	14

(4) *Tree-planting*.—Tree-planting was done in all taluks throughout the year and particularly tree-planting week called Vanamahostavam was observed from 1st July to 7th July 1951. The particulars of trees planted are furnished below:—

Variety.	Srikakulam.	Visakhapatnam.	Araku.	Total.
(1)	(2)	(3)	(4)	(5)
1 Fruit plants	23,575	41,330	18,479	83,384
2 Green manures	318,130	270,837	60,070	649,037
3 Fuel	61,259	164,539	..	225,798
4 Timber	53,836	6,520	15,340	75,696
5 Fodder	..	5,600	..	5,600
6 Economic	87,521	51,020	14,570	153,111
7 Miscellaneous	23,047	6,656	2,220	31,923
Total ..	567,368	546,502	110,679	1,224,549

(5) *Composts*.—Manufacture of compost from waste vegetable matter was advocated both in the rural areas with waste organic material with cow dung and in municipalities and panchayats with street sweepings and night soil.

"The compost development week" was observed throughout in all taluks with the kind co-operation of the Revenue and other officials. Practical demonstrations were conducted for the manufacture of rural compost and urban compost. The following are the achievements:—

District.	Quantity made in tons.	Amount of subsidy paid.
(1)	(2)	(3)
1 Visakhapatnam	23,575	4,120
2 Araku	500	500
3 Srikakulam	11,613	4,620
Total ..	35,688	9,240

The demand for the urban compost is increasing day by day and the compost is being willingly taken by the neighbouring ryots and applied to crops.

A subsidy of Re. 1 per ton of compost made was given to give encouragement for the production of compost.

(6) *Crop competition*.—Crop competition was organized in paddy and sugarcane. The latter was confined to only sugar factory areas while the former was done throughout. Though a number of competitors entered the competition, finally many dropped down due to the change in the technique from the diagonal strips to 10-cent plots.

The Divisional First Prize was knocked off by Sri Karimi Subbaiah Naidu in Narasannapeta taluk of Srikakulam district.

The list of prize winners with the yields obtained is furnished below:—
Statement showing the Regional Prize Winners in Crop Competition on Paddy in Visakhapatnam Division conducted in the year 1951.

Serial number.	Taluk.	Name of firka.	Detailed postal address of the winner.	Plot weight of paddy in local measure and in standard weight (lb.).		Acres weight of paddy in local measure and in standard weight (lb.).	
				Local measure (kunchams).	Standard weight (lb.).	Local measure (kunchams).	Standard weight (lb.).
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Narasannapeta	Narasannapeta	Sri Karimi Subbaiah Naidu, Vedullavalasa, Polaki P.O.	227½	966	2,275	9,660
2	Do.	Nadagam	Sri G. Asiri Naidu, Tamarapalli, Naresannapeta P.O. ..	116½	520.2	1,162½	5,202
3	Do.	Palathalagam	Sri Manipatruni Chendra Sekharam, Borigipadu, Rahim-ampuram group.	100	450	1,000	4,500
4	Do.	Jalumuru	Sri V. Laxminaidu, Timadam, Nagrikatakam P.O. ..	95	427½	950	4,275
5	Pathapatnam	Pathapatnam	Sri Rama Bayyanna Peda Padmapuram, Maliyaputti P.O., (via) Tekkali.	150	645	1,500	6,450
6	Palakonda	Unukuru	Sri Ko'agiri Venkatasuryarao, Unukuru P.O. ..	125	602	1,250	6,020
7	Do.	Palakonda	Sri Ippili Suryanarayana, Palakonda P.O. ..	108½	536	1,082½	5,360
8	Do.	Navagam	Alubilli Raminaidu, Navagam B.P.O. ..	103½	510	1,035	5,100
9	Do.	Honjaram	Sri B. V. Jagannatha Rao, Gullasiterampuram, Rajam P.O.	99½	490	997½	4,900
10	Do.	Kottisa	Sri Kimidi Chinna Narasimulu Naidu, Kottasa, Veeraghatam P.O.	98½	480	987½	4,800
11	Do.	Burja	Sri Neelamani Choudary, Mamidivalasa, Palakonda taluk.	93	465	930	4,650
12	Ichapur	Ichapur	Sri Punya Mandalo, Koligam, Ichapur P.O. ..	..	571½	..	5,717
13	Do.	Kaviti	Sri R. Bhagavan Naidu, Belagam, Kaviti B.P.O. ..	..	285.87	..	2,857.7
14	Sompeta	Sompeta	Sri Haribandam Mahanti, Sasnam, Sompeta taluk	79½	478	796½	4,780

Serial number.	Taluk.	Name of firka.	Detailed postal address of the winner.	Plot weight of paddy in local measure and in standard weight. (lb.)		Acre weight of paddy in local measure and in standard weight. (lb.)	
				Local measure (kunchams.)	Standard weight (lb.)	Local measure (kunchams.)	Standard weight (lb.)
(1)	(2)	(3)	(4)	(5)	(6)		
15	Srikakulam	Amadalavalasa	Sri Chitti Narayana, Dusi P.O. ..	93 1/2	468 1/4	936 1/2	4,684
16	Salur	Tekkali	Sri Vulli Kamaraju, Mill owner, Salur	93	465	930	4,650
17	Tekkali		Sri R. Padmanabha Rao, Chetthandhra, Dandugopala-puram P.O.	..	..	..	4,325
18	Parvatipur	Nagoor	Sri M. B. Parankusam, Lakshmapuram	..	..	..	4,300
19	Cheepurupalli	Vedullavalasa	Sri Sagi Viswanadharaju, Vedullavalasa	..	398	..	3,980
20	Do.	Cheepurupalli	Sri Pinninti Raju Naidu, Cheepurupalli	..	370	..	3,700
21	Do.	Ponduru	Sri Bhugati Sathanarayana, Sigadam	..	312	..	3,120
22	Bobbili	Sitanagaram	Sri Jammala Ganeswara Rao, Sathanagaram	..	570	..	5,700
23	Do.	Maradam	Sri Kothi Paidithalli, Korapakothavalasa P.O., Maradam.	..	390	..	3,900
24	Vizianagaram	Vizianagaram	Sri P. Sambasivaraju, Moida	..	..	..	5,860
25	Srungavarapukota.	Srungavarapukota	Sri K. Sitharamaraju, Alameda	..	..	..	7,730
26	Bhimilipatam	Bhimilipatam	Sri K. Sanyasi, Denkada	..	..	..	6,450
27	Visakhapatnam	Visakhapatnam	Sri Rajapati China Ramu Naidu, Venkupalem	..	..	..	5,780
28	Anakapalle	Anakapalle	Sri Raja Chintalapati Sitaranumurthy, Lakavaram	..	..	..	8,357
29	Veeravalli	Chodavaram	Sri Raja Sagi China Suryanarayana Raju, Tangedu	..	..	..	5,470
30	Gudem	Jalluru	Sri Sunkari Appala Naidu, Rolugunta	..	..	..	6,275
31	Golugonda	Rolugunta	Sri Venkulu Peddiah Naidu, Singavaram	..	..	..	6,985
32	Do.	Nathavaram	Nil.	..	..	..	7,460
33	Do.	Narasapetam	Sri Petla Appalaswamy, Aratlakota	..	..	..	5,770
34	Do.	Nakkapalli	Sri Yellamanchili Kannaiah	..	..	..	4,900
35	Sarvasidhi	Dimili	Sri Tantapureddi Venkata Rao, Kottapalem	..	..	..	3,500
36	Do.	Yellamanchili	Sri Sanapathi Pantulu Naidu	..	..	..	
37	Do.	Kondakarla		..	..	..	
38	Do.			..	..	..	

Visakhapatnam District.

As the number is below 50 rejected.

In sugarcane a record yield of 97 tons 1,820 lb. was obtained by Sri D. Appalaraju of Thummapala with Co. 419.

Taluk.	Number of entrants.	Name and address of the winner.	Yield per acre.	Remarks.
Anakapalle ..	23	D. V. Appalaraju of Thummapala	97	1820
Yellamanchili ..	22	C. V. Suryanarayananaraju, Etikop-paka.	57	00

(7) *Model Farms.*—(i) Model farms were instructed to be started in all taluks at one for each taluk with an average cultivation having both wet and dry land who is agreeable to cultivate as per the instructions of the Agricultural Department and permit other neighbouring ryots to visit the activities on the farm. A subsidy of Rs. 250 was allowed as rebate for the seeds, manures, implements purchased by the farmer. The articles were supplied at 25 per cent less cost. The following are the particulars of the model farms in both the districts.

I. VISAKHAPATNAM.

Num-ber.	Taluk.	Village.	Name of the model farmer.	Extent.		
				Wet. ACS.	Dry. ACS.	Total. ACS.
1	Golugonda*	Bapirajukotha-palli.	Sri Lagudu Venkataswamy	15.15	5.00	20.15
2	Krishnaderipeta	Nimmagedda ..	Sri Panasala Krishnapadal ..	5.37	4.78	10.15
3	Veeravalli*	Modugole ..	Sri Chilikireddi Peeri Naidu ..	7.00	2.50	9.50
4	Anakapalli	Kasinkota ..	Sri Kasibhatla Subba Rao ..	2.00	10.00	12.00
5	Visakhapatnam*	Pondurthi ..	Sri Saragadam Appala Naidu	10.57	3.66	14.23
6	Bhimilipatam	Majjiyalasa ..	Sri Datla Jagannadharaju ..	20.56	5.00	25.56
7	S. Kota	Vizinigiri ..	Sri Gorupotu Chinayerram	12.00	1.50	13.50
8	Vizianagaram	Gajapathinagara-m.	Sri Kotta Appalanarasimham,	10.00	6.00	16.00

* NOTE.—These model farms are in the Rural Welfare centres.

(ii) *Nature of cropping adopted.*—In all the farms improved strains of paddy and millets were grown. Besides in Anakapalle, Veeravalli and Golugonda sugarcane Co. 419 and in Golugonda plantains on improved lines were sown.

(iii) *Concessions given.*—An amount of Rs. 570-9-3 was paid towards the 25 per cent rebate on the seeds and fertilizers purchased in Bhimilipatam, Vizianagaram, Srungavarapukota and Golugonda taluks.

(iv) *How far ryots were stimulated.*—Almost every month in each taluk not less than 10-15 special visitors from the surrounding villages were taken round the model farms and activities explained. On an average during the cultivation season three meetings were held on the model farms.

(v) *Side industries started on the model farms.*—(1) In Veeravalli a bee hive was maintained and in Srungavarapukota and Visakhapatnam poultry white leg horns were maintained.

2. SRIKAKULAM.

Num-ber.	Taluk.	Village.	Name of model farmer.	Extent		
				Wet. ACS.	Dry. ACS.	Total. ACS.
1	Srikakulam	Badullapeta	Sri Kallepalli Kurmayya.	35.00	3.00	38.00
2	Narasannapeta.	Tamarapalli	Sri Goddu Ramanna ..	17.00	7.00	24.00
3	Tekkali	Gopinadapuram.	Sri Sattam Somu Naidu.	6.50	1.70	8.50
4	Patapatnam	Patapatnam	Sri Satyanarayana Patro	33.00	1.00	34.00
5	Ichapuram	Ichapuram	Sri K. Viswanadham ..	10.00	45.00	55.00
6	Sompeta	Benkili	Sri P. Janardana Naidu.	13.00	10.00	23.00
7	Cheepurupalli.	Sumitrapuram	Sri S. Kamanna ..	6.00	15.00	21.00
8	Palakonda	Tampatepalli	Sri M. Rajaram Naidu.	30.00	..	30.00
9	Parvatipur	Venkampeta	Sri Voleti Laxmoji Rao.	10.00	4.00	14.00
10	Bobbili	Kalavarai	Sri M. A. N. Sarma ..	7.00	8.00	15.00
11	Salur	Ramabhadrapuram.	Sri M. Chinpapi Naidu.	5.00	4.00	9.00

(2) *Nature of cropping adopted.*—In all the farms improved varieties of paddy, ragi, were cultivated. In Srikakulam taluk Co. 419 sugarcane, H. 420 cotton in Narasannapeta and English vegetables in Ichapuram formed special features.

(3) *Concessions given.*—An amount of Rs. 170 was given towards subsidy in the Srikakulam taluk. No subsidy was paid in other taluks.

VIII. *Special Schemes*—(1) *State Trading Schemes.*—State trading schemes were continued during the year as in last year with iron and steel, fertilizers, pipes and pipe fittings. Except pipes and pipe fittings retail distribution was done by the Co-operatives and the department functioned as a wholesale stockists. In pipes and pipe fittings the retail sales were done by the department.

(2) *Seed development.*—The special staff of seed development officer with headquarters at Kakinada and one seed development assistant for each district functioned during this year also. Nucleus seed from the agricultural research stations were arranged to be distributed for organizing primary seed farms by the seed development officer. The seed farms were organized and run by the respective Agricultural Demonstrators in the strains fixed for them. The following are the details:—

Crop.	Visakhapatnam.		Srikakulam.		Total.	
	Seed farms acres.	Quantity procured bags.	Seed farms acres.	Quantity procured bags.	Seed farms acres.	Quantity procured bags.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Paddy	1,554	4,069	1,855	3,094	3,409	7,163
Ragi	369	83	131	46	500	129
Cumbu	239	63	..	511	239	66
Cholam	68	12	..	..	68	12

(3) *Rural welfare work.*—The four rural welfare centres in this division continued this year also. One general rural welfare centre in each district, one agency development centre at Paderu and an intensive khadi development centre at Kotauratla were continued, with the exception of one general centre in Srikakulam district the rest are in all located in Visakhapatnam.

A special staff of one fieldman and two maistris were posted under the administrative control of the rural welfare officer for each firka.

The work done is given in Appendix III.

(4) *Cotton extension schemes.*—This scheme was worked in both the districts. H. 420 cotton seed from Madhya Pradesh was imported and supplied at 150 Imperial Maunds to each district. In the Visakhapatnam district an extra area of 788 acres with H. 420 and 687 acres with the local chinnapethi were sown.

(5) *Engineering section.*—Separate Engineering section with one Agricultural Engineering Supervisor, Tractor foreman, and necessary operational staff functioned at both the districts. From 1st April 1952 the entire section in the Visakhapatnam district was transferred to the administrative control of the Assistant Agricultural Engineer (Inspection).

Work done is furnished below:—

			Srikakulam.	Visakhapatnam.
A. Bull dozers—				
1 Number available	..	..	4	7
2 Area levelled	..	..	167.50	95 acres.
B. Tractors—				
1 Number available	..	..	4	2
2 Area ploughed	..	..	346.90	721 acres.
3 Area harrowed	..	..	..	350 „
C. Pumping sets—(hire)				
1 Number available	..	..	7	9
2 Area irrigated	..	..	24	50 acres.
D. Pumping sets—				
Supplied on hire purchase	..	..	..	8 oil engines 1 oil motor.

(6) *Agency Development Scheme in Srikakulam.*—The special staff of two Agricultural Demonstrators with the requisite staff continued in the two agency centres of Gummalakshimpuram and Sitampeta.

Improvements effected in the Agency—

1 Improved strains of paddy seed supplied	..	14 ton.	1,120 lb.
2 Area covered	..	..	580 acres.
3 Improved strains of ragi seed supplied	..	..	210
4 Area covered	..	..	20 acres.
5 Area covered by cultural improvements	..	..	..
6 Area covered by green manure	..	..	57 „
7 Area covered by green leaves	..	..	20 „
8 Quantity of manure supplied—			
(a) Groundnut cake	..	..	..
(b) Amonium sulphate	..	..	2-79 tons.
(c) Green manure seeds	..	..	0-1798 „
9 Area under improved varieties of sugarcane	..	..	Nil.
10 Area brought under vegetables	..	..	32.80 acres.
11 Number of fruit plants supplied	..	..	786 plants.
12 Number of sirumalai plantain suckers supplied.	..	..	..
13 Amount of loans granted	..	..	90 rupees.
14 Number of manure pits started	..	..	675 pits.
15 Quantity composted	..	..	1,350 tons.
16 Subsidy paid	..	..	460 rupees.
17 Trial and Demonstration plots laid	..	..	31
18 Waste lands brought under cultivation	..	..	..
19 Soil conservation	..	..	39.50 acres.
20 Area under improved strains of millets	..	..	20 „
21 Quantity distributed	..	..	210 lb.
22 Sales of pesticides and fungicides	..	..	210 „
23 Tapioca seedlings supplied	..	..	750 „
24 Number of village associations functioning.	..	..	19

(7) *Araku Valley Scheme in Visakhapatnam.*—The work in the Araku valley scheme comprises of two aspects, one is the propaganda and demonstration wing to uplift the hillmen and the other aspect is the testing of the suitability of various strains already evolved, the adoption of suitable agronomic practices beneficial to the tract. The work turned out under each branch is separately furnished below :—

A. DEMONSTRATION AND PROPAGANDA.

Hiring of the departmental tractor to hillmen at half rates was continued this year also and an area of 130 acres was ploughed after which the tractor went out of order. Though there was much demand for the tractor it could not be met due to the repairs of the tractor.

Crops—(i) Paddy—

1 Quantity of improved strains distributed	..	2-1,599 tons.
2 Area under improved varieties	..	575.40 acres.
3 Quantity of green manure seed supplied	..	660 lb.
4 Area covered by the green manure seeds	..	33.00 acres.
5 Area under green leaf application	..	16.50 ..

(ii) Ragi—

1 Quantity of improved seed distributed	..	1,734 lb.
2 Area under improved varieties	..	173.40 acres.

(iii) Fruits.—The following fruit plants were supplied to the hillmen—

	Number of plants.
1 Lemon layers	357
2 Guava layers	60
3 Pomegranate cuttings	131
4 Grape vine rooted cuttings	100
5 Papaya seedlings	148
6 Passion fruit seedlings	92
7 Pine apple suckers	400
8 Bannana suckers	946
9 Mango grafts	70
10 Drumstick cuttings	200

(iv) Vegetables.

1 Quantity of seeds supplied free to villagers	..	26½ oz.
2 Quantity of seeds supplied free to schools	...	22½ ..
3 Increase in the area of vegetables—		
(a) Exotic	..	1.50 acres.
(b) Indigenous	..	5.00 ..

(v) Oil seeds—

Quantity of seed supplied—		
TMV 2 groundnuts	..	40 lb.
Niger (mass selection)	..	1,035 ..
Area covered by TMV 2	..	0.40 acre.
Do. Niger	..	103.00 acres.

Number of plants.

3 Tree planting—				
Fruit plants	..	..	..	18,479
Green manures	..	..	..	60,070
Timber	..	..	..	15,340
Economic	..	..	..	14,570
Others	..	..	..	2,220

Total .. 1,10,679

4. Manure conservation—

(a) Compost made	..	500 tons.
(b) Conservation of urine by litter	..	1,581

5. Soil erosion—

		ACS.
(a) Terracing	..	5.20
(b) Levelling	..	1.20
(c) Contour bunding	..	66.50
(d) Contour ploughing	..	2,668.00

6. Pests and diseases tackled—

(a) <i>Nymphula depunctalis</i> on paddy.	
(b) <i>Plutella Maculpenison</i> cabbage.	
(c) Blast on paddy.	
(d) Rice case worm.	

7. Subsidiary Industries—

(a) Number of Mandya sheep distributed to hillmen.	2 Rams
	8 Ewes
(b) Number of white leg horn eggs exchanged.	781

8. Exhibitions and shows—

Number of exhibitions held	5
----------------------------------	---

B. RESEARCH.

Summary of the salient features of work done during 1951-52 on the research station.

The main work on the research station consisted of (i) Improvement of local crops and (2) Introduction of new crops from plains.

I. *Improvement of local crops.*—The improvement of local crops was done by (a) introduction and trial of new strains from plains and (b) rigid mass selection work in promising local varieties and local important crops.

(a) *Introduction and trial of new strains from plains.*—(1) *Wet paddy* (a) *Main crop—Bulk.*—Four, strains of paddy, i. e., MTU 3, AKP 2, SR 26-B, and Ninnidhan (mass selected) were grown in a total area of 7.50 acres. Paddy blast was severe both in the nurseries and the transplanted crop of the variety MTU 3. The nurseries of AKP 1 and BAM1 were completely spoiled by blast. The local variety Ninnidhan however was completely free from the attack. SR 26-B has given the maximum yield of 2,704 lb. followed by the local Ninnidhan with an acre yield of 2,120 lb. The seeds of the above varieties were distributed to hillmen. Further mass selection was done in Ninnidhan.

Culture No. 10,034 a cross between MTU 3 and SR 26-B was tried for the first time. The yield of 666 lb. per acre is not encouraging. As the nurseries of varieties like AKP 1 and BAM 1 were spoiled by blast, the observation plots could not be laid out.

(b) *Second crop paddy*.—As in the previous year four varieties, i. e., MTU 15, SLO 12, Sathikalu (local) and X 60 (as cross between Nallarlalu and Kasipichodi) were grown in 0.60 acres under second crop. SLO 12 has given the highest yield of 2,486 lb. per acre followed by MTU 15 with an acre yield of 2,125 lb. The local has given 1,366 lb. per acre. The yield of X 60, 950 lb. per acre is not encouraging and further it was noticed that the grains of the same earhead do not mature at the same time and they shed badly.

(2) *Dry paddy*.—As the local variety battadhan was found superior to other departmental strains, mass selection in this crop is being done every year. The mass selected crop grown as bulk has given the highest yield of 1,647 lb. per acre. Demonstration plot comparing the yields of this mass selected Battadhan with the local were laid out with the following yields:—

	LB.
PER ACRE.	
Battadhan—mass selected	1,020
Battadhan—local	910

Observation trial.—The following six varieties were under observation trials in duplicate plots of 0.05 acre each and their yields are given below:—

Variety.	Yield per acre.
	LB.
Vedurusannam	1,000
Bhattadhan (local)	980
Sathikalu (local)	790
MTU 18	750
MTU 17	670
Karini	100

(3) *Ragi*.—The Ragi crop in general was a failure during this year as it could not be sown in time due to heavy continuous rains. Hence the bulk crop has given a very poor yield of about 100 lb. per acre. The observation trials of six varieties have also given the following very poor yields, as this trial also could not be sown in time:—

Variety.	Yield per acre.
	LB.
A K P 3	390
A K P 6	360
A K P 7	350
Jagaralamandya Mass selected	240
Mudaimuskal Mass selected	135
Jagaralamandya local	160

The demonstration plots of the mass selected crop of Jagaralamandya and Mudaimuskal as compared with the local which could be sown in time have recorded the following yields:—

Variety.	Yield per acre.
	LB.
Jagaralamandya mass selected	2,360
Variety.	Yield per acre in lb.
Jagaralamandya local	1,940
Mudaimuskal mass selected	2,500
Mudiamuskal local i	1,500

(4) *Samai*.—Mass selected pedda sama was compared with the local and the following yields were obtained:—

	LB.
Samai—mass selected	820
Samai local	650

(5) *Chillies*.—The chilli nurseries also failed during the year due to heavy rains and hence the crop could not be planted in time.

II. *Introduction of new crops from outside*.—The following are the crops introduced from outside and being grown here:—

(3) *Potato*.—Potato seed material got from Hosur was detained in transit for 17 days and most of it got spoiled and rotten. Hence as the tubers were thus effected the crop gave a poor yield of 2,503 lb per acre.

During winter the manurial trial on potato was conducted for the 5th final year with the following results:—

	Yield per acre.
	LB.
Manure mixture A	2,572
Manure B	2,452
Manure C	2,340
Nanjanad mixture D	2,472

The results are not statically magnificent in favour of any one mixture.

Potato storage trial.—Potato seed material was stored on a bulk scale for taking up Monsoon planting. It was spread on racks and dusted with Darris dust and gummexane. There was not much rottage and the tubers were sown as Monsoon crop during the last week of May. If a proper storage shed with racks is available, potato can be stored during summer months for seed purposes.

Sweet potato.—The trial of the six varieties was repeated during this year also with the following results:—

Variety.	Yield per acre.
	LB.
Triumph	12,250
Ranger	11,000
B 4004	10,250
B 5941	10,040
B 196	9,810
B 4306	8,750

The promising varieties, Triumph and Ranger are also grown on a bulk scale.

Sugarcane.—The rottom crop of Co. No. 419 has given an acre yield of 48 tons 1,760 lb. of cane.

(4) *Banana*.—Sirumalai and Amruthupani varieties continued to be grown under rainfed conditions. The Sirumalai crop planted during the previous year has started throwing bunches. The harvest of Bontha bunches was completed during this year and the crop gave an acre yield of 4,000 lb. under rainfed conditions.

(5) *Groundnut*.—Groundnut TMV 3 was sown on a bulk scale in 0.40 acre. On account of heavy rains the crop gave a poor yield of 240 lb. per acre.

(6) *Kasigogu*.—The crop was grown for the second year and it gave a very good yield of 1,722 lb. of fibre per acre.

(7) *Vegetables*.—The exotic and indigenous vegetables were successfully grown and the produce was sold to the residents of the colony. Considerable quantities of seeds of brinjals, tomatoes, bitter-gourds and snake-gourds were also produced and were distributed to other places.

(8) *Orchard*.—Of the hundred varieties of fruit plants of the hill and plain types the following are coming up successfully and they have come to bearing and are under distribution.

Sweet oranges.—Sathgudi, Washington Navel, Malta Ruby and Teneriffe, Acid lime, Kodur type, citron :—Bengal, banana :—Amrithapani, Sirumalai and Bontha, Grape fruit :—Ducan, Poona and special, Guava : Lucknow No. 49, pomogranate :—Mischaelpatti, grape :—Red Muscadel, passion fruit :—Purple fruited, Tree tomato and Gape gooseberry spice : cinnamon.

III. *Subsidiary industries*.—The dairy unit with 18 buffaloes with a breeding bull was maintained on self-supporting basis and the milk was sold to the residents of the Colony. The poultry unit with white leg horns birds was continued and the eggs were given to hillmen in exchange for the eggs of the local birds. Mandya breed of sheep are thriving successfully and the rams are distributed to hillmen to grade up their stock. Ewes also were given. Rearing of "Mirror carps" variety of fish was continued in the pond at the Orchard.

IV. *Programme of work 1952-53*.—The programme of work was prepared for each district in consultation with the concerned District Agricultural Officers, Crop and Plant Protection Officers, Bapatla, Seed Development Officer (Paddy) Kakinda.

Important items programmed are—

A. *Srikakulam*.—The programme of work for 1952-53 was prepared by the Deputy Director of Agriculture, Visakhapatnam in consultation with the District Agricultural Officer, Agriculture Demonstrators, Personal Assistant, Plant Protection Officer (Mycology) Seed Development Officer, Plant Protection Assistant (Mycology) and the same was approved by the Director of Agriculture, Madras, in No. L. 3-393/52, dated 28th June 1952.

(a) *Agricultural Journal*.—A target of 1,000 subscribers has been fixed for each taluk except Ichapuram, Sompeta and Pathapatnam where the target fixed is 500 as they happened to be bilingual taluks. In the two agency sub-taluks the target is fixed at 100 each.

(b) *Rural Development work*.—It was decided to chalk out the programme of work once in six months in consultation with the rural development officer.

(c) *Loans*.—A sum of Rs. 1,00,000 for seed and manure Takkavi loans and Rs. 1,30,000 for purchase of chemical fertilisers was allotted under intensive manuring scheme apart from Rs. 300 allotted for agricultural implements.

(d) *Tree planting*.—From the past experience it is found that more planting of seedlings does not bring in the desired results as high percentage of mortality is reported from all taluks. The need for taking more after-care has been emphasized to. Each depot shall have a nursery to raise at least 5,000 seedlings to distribute during tree-planting week.

Rural compost.—Targets under rural compost to be attained.

Town compost.—The two municipalities of Srikakulam and Salur and the nine panchayat boards are preparing compost with nightsoil and town sweepings. The departmental staff are to give necessary technical advice.

Paddy—(a) *Dry*—(1) *Parvatipuram*.—MTU 17 tried in five localities. The crop gave an average acre yield of 930 lb. (880 to 1,000) against Vedurusannam which has given 1,150 lb. per acre. The trial will be discontinued as the strain MFU 17 did not fare better than the local.

1 *Palakonda*.—Average yield of 1,200lb. against BAM 3 which give 1,650 in wet lands as a transplanted crop. No rainfed area. Trials to be dropped.

Ichapuram.—Performance reported good and seed is available. Trial to be repeated.

(2) Vedurusannam seed could not be had from Salur. Agricultural Demonstrator Parvatipuram, has procured 160 lb. of seed which will be distributed to Agricultural Demonstrators G.L. Puram Sitampeta, Cheepurupalli and Tekkali for trials.

(3) *Kondangi trials*.—Kondangi trials in G.L. Puram have not proved successful 65 lb. of seed have been collected. Trials to be repeated in G.L. Puram and Seethampeta with the seed already collected.

(4) *Mettu Dhanrasulu*.—Seed from mass selection in Seethampeta failed due to want of rains. The Agricultural Demonstrator, Seethampeta will again attempt mass selection and collect seed for trials.

(b) *Semi-dry*.—Seed farms are to be organized is (SS 5) AKP 2 and BAM 1 in all taluks. Supply of AKP 2—160 lb. and 60 lb. of BAM 1 (nucleus seed) to be arranged by the Seed Development Officer from Anakappalli to each of the taluks.

(c) *Main crop*.—(1) In consultation with the Seed Development Officer (Paddy), the following particulars have been fixed for the year 1952-53 details are given below :—

BAM 3	All taluks (excluding agencies).	
BAM 6	Do.	and Narasannapeta.
SLO 17	Do.	
SLO 18	Do.	and Narasannapeta.
MTU 19	Do.	and Srikakulam and Sompeta.
GEB 24	Do.	
AKP 6	Salur alone.	
MTU 10	In Srikakulam, Bobbili and Cheepurupalli.	
BAM 32	In Narasannapeta.	
MTU 8	In Tekkali.	
MTU 3	In Bobbili.	

(d) *Saline areas*.—(a) MTU 1 and SR 26-B found suitable in all taluks and should be multiplied. Supply of pure seed for primary seed farms will be arranged by Seed Development Officer, Kakinada, and secondly seed farms may be organized with seed produce already grown in the taluks.

(b) SLO 13 : SLO 13 was tried in Sompeta with BAM 3. Since it is better to compare it with MTU 1 the trial will be repeated with MTU 1. Other trials conducted in Ichapur, Narasannapeta, Palakonda and Parvatipur gave encouraging results but the comparison was made with BAM 3 and

not MTU 1. Trials have to be repeated in all taluks with MTU 1, as controllable as the object is to determine which is more suitable for saline soils.

(e) *Special trials*.—(1) MTU 16 yielded 1,750 lb. against BAM 6 yielding 2,600 lb. in Parvatipur taluk. Further trials will not be pursued. Fresh trials to be conducted in (low lying areas) Beela areas in Sompeta, Paalkonda, Tekkali and Pathapatnam.

(2) R.S 221—In Parvatipur yielded 1,600 lb. of grain per acre as against BAM 3 which gave 2,500 lb. No further trials are therefore called for.

(3) Trials with AKP 6 in Pathapatnam to be repeated under deep water conditions in suitable localities.

(4) BAM 9 v. AKP 6 was found better yielding than BAM 9 in Srikakulam. The trial has to be repeated for further confirmation.

(5) MTU 19 was reported to have yielded well in all localities where tried except Srikakulam and Sompeta—Trials to be repeated in Srikakulam and Sompeta. Seed farms to be organized in other taluks for multiplication of seed and distribution. As MTU 19 is longer in duration than local variety, the cultivation should be restricted to areas of assured water-supply with irrigation facilities up to the middle of December. Supply of nucleus seed for primary farms will be arranged by the Seed Development Officer, Kakinada.

(6) Co. 20—As suggested by the Seed Development Officer, Kakinada, further trials will be conducted with a very close planting and heavy manuring to promote maximum outturn in Ichchapuram, Narasannapeta, Srikakulam, Bobbili and Palakonda taluks. 1,600 lb. of Co. 20 seed already procured will be utilized for the above.

(7) Trials suggested by the Paddy Specialist.—(i) ASD 5 Tekkali—Planted in August yielded 2,430 lb. against 2,240 lb. outturn per acre from BAM 3. The trials will be conducted.

Cheepurupalli—Not yet thrashed. Trials to be repeated in Tekkali, Rajam sub-taluk, Cheepurupalli, Bobbili and Salur. Agricultural Demonstrator, Tekkali, to procure a bag of seed and distribute to the above Agricultural Demonstrators.

(ii) Trials of saline resistant paddy culture No. 10034—Compete—In low lying saline lands the above culture yielded 4,800 lb. against 2,700 lb. of BAM 3. The Agricultural Demonstrator, Sompeta, will send five pounds seeds distributed for trial in Cheepurupalli, Srikakulam, Narasannapeta, Tekkali and Ichchapuram taluks.

Seed Development Officer, Kakinada, will send seeds of paddy culture Nos. 10034 and 10032 to Agricultural Demonstrators, Sompeta and Palakonda for further trials.

iii, Type No. 1145 seed was not received. Seed Development Officer will endeavour to send seed to Narasannapeta and Palakonda from Agricultural Research Station, Anakapalli.

II. *Crops*.—(a) ADT 3 is found to come up well in places where Sastikam is usually grown. Seed farms will be arranged in Srikakulam, Palakonda, Narasannapeta, Salur, Bobbili, Pathapatnam, Ichchapuram and Sompeta. Supply of nucleus seed to all the above Agricultural Demonstrators at 120 lb. for each will be arranged from Aduturai by the Seed Development Officer, Kakinada.

(b) Co.13 seed now received to be utilized for early sowing in summer and general distribution.

(c) PLR 2 is popular in Bobbili only. Small quantity of nucleus seed to be arranged by Seed Development Officer.

(d) MTU 15—Trials made during previous season having been found encouraging the cultivation will be extended on a large scale and the results watched.

(e) SLO 16—This was tried in Seethampeta sown in August and yielded 1,960 lb. per acre as transplanted crop and 1,720 lb. broadcasted whereas the local yielded only 1,800 lb. per acre. The trials will be repeated for obtaining conclusive results.

(f) MTU 9 seed already issued to Pathapatnam Agricultural Demonstrator. Results to be watched and reported.

III. *Blast resistant types*—(1) Trial of Co.25 blast resistant variety was suggested in Parvatipuram, Palakonda, and Bobbili by the Plant Protection Officer, Mycology, in small areas. Seed supply to be arranged by the Seed Development Officer from Paddy Specialist, Coimbatore.

(2) Millets—

Ragi—(a) Irrigated.—Burada chodi (AKP 1 and 2) May sowings
Pyruchodi—(AKP 2 and 6) January sowings.

(b) Unirrigated.—Punasa salu chodi—July sowings AKP 7
Pedda chodi—September sowings
AKP 6.

Millet seed farms were run on all the taluks and seed also procured. The procurement by the Agricultural Demonstrators is not yet completed. But the target quantities are expected to be procured.

Millet seed farms for 1952-53.—The same extent of seed farm areas will be continued as the target for 1952-53 also. Seed procurement should not fall short of the taluk targets already communicated to all taluk Agricultural Demonstrators.

Trials.—Two new varieties Jagarala Mandya and Muddai Muskal tried in Seethampeta fared better than the local. Their cultivation will be extended. In the G.L. Puram agency tract where the trial was not conclusive a repetition is necessary.

(3) *Ganti*.—AKP 1 and 2 tried at Cheepurupalli fared badly when compared with the local. No further trials will be made.

Ganti hybrids (X 1 and X 2) tried at Palakonda gave meagre grain yields not warranting further continuance of the trial. Such trials, however, be repeated at Bobbili, Cheepurupalli and Tekkali taluks.

(4) *Jonna*.—No trial with AKP 2 was made at G.L. Puram as expected seed from Superintendent, Agricultural Research Station, Anakapalli was not supplied. Attempts will again be made to obtain supply of seed for trial from Sugarcane Research Station, Anakapalli.

AKP 1—*Jonnatried* in Cheepurupalli, Bobbili, Srikakulam, Narasannapeta, Ichchapuram and Tekkali was successful. Seed will be multiplied.

(5) Korra—Seethampeta Agricultural Demonstrator will procure available seed of G 1 and Nucleus seed also from the Assistant Cotton Specialist, Lam, will be obtained if available.

(6) TMV 3 groundnut tried at Parvatipuram, Palakonda did not give satisfactory yields and will therefore be discontinued. However in other places where it fared well, seed farms will be organized at Pathapatnam, Cheepurupalli and Srikakulam for multiplication of seeds. Fresh trials will be started in Tekkali taluk to test suitability for that locality.

TMV 2—No trials could be conducted as the oil seeds specialist did not supply seeds required for sowing.

Supply of seeds will be sought again by addressing the oil seeds specialist in November 1952.

(7) Gingelly.—Pyrus sowings have just been completed. Results to be watched and reported.

(8) Castor.—TMV 2—Regarding performance of the strain no comparisons with local were made. Plants were grown either on field bunds or on hedges. The Agricultural Demonstrators were instructed to compare the strain with locals and report results.

(9) Sugarcane.—Co. 449 and 475 mid season varieties are already popular in Bobbili, variety Co. 475 will be tried on a large scale at Parvatipuram and also introduce for trial in Salur taluk. The sets for planting to be obtained from Agricultural Demonstrator, Bobbili.

(10) Chillies.—G 1 chilli (strain 398) has been found to gain popularity with ryots in Cheepurupalli, Parvatipur and Salur. Seeds will be multiplied on a larger scale.

(11) Pulses.—Blackgram 189 tried in Narasannapeta taluk failed. This will not be pursued any further.

Horsegram.—Strain No. 93—The trial at Sumatrapuram, Cheepurupalli is promising and will be extended to some other locality.

Redgram strain Nos. 97 and 72.—The trials which appear promising in Ichchapuram, Cheepurupalli and Palakonda taluks to be repeated for confirmation.

In Cheepurupalli strain No. 97 which was found better will be further multiplied.

Greengram strains 127.—The culture to be tried exclusively in dry lands in Ichchapuram, Palakonda and Narasannapeta.

Strain No. 188.—This has just been issued in Pyru season. Results to be watched and reported.

(12) Cotton.—H 420 was reported to have yielded 560 lb. of kapas at Sompeta in rainfed lands. The Agricultural Demonstrator, Sompeta, will extend the cultivation of H 420 in other suitable areas.

P 216 F.—Seed supply of P 216 F has been just received. This will be tried in the taluks of Tekkali, Pathapatnam, Srikakulam, Narasannapeta, Palakonda, Parvatipuram, Bobbili and Cheepurupalli. Results be watched and reported.

Perennial cotton.—The variety Mocco, and qubradinho will be spread further on a small scale in Srikakulam and Parvatipuram taluks.

(13) Fruits.—Indents for fruit plants are to be placed on specific requests from individuals.

(a) Pine apple suckers.—Simbachalam variety may be introduced in Seethampeta and G. L. Puram agency tracts.

(14) Vegetables.—The District Agricultural Officer will address and obtain seeds from Anakapalle, Samalkota, Kalahasti and Aduturai Research Stations and supply to the Agricultural Demonstrators. Local collection of vegetable seeds and distribution should also be encouraged.

If private indents are received the Agricultural Demonstrators should take the following action:—

(a) Refer to the catalogue of private nurserymen and calculate the cost of seed required along with incidental charges.

(b) Collect advance and remit.

(c) Address the private nursery men direct and send copy to the District Agricultural Officer for the supply.

Edible mushroom.—Trials were not encouraging with edible mushroom and this will not be pursued any further.

(15) Sweet potato and Tapioca.—Trials with improved varieties of I.B. 22 white variety sweet potato and Malvella and Velenca under Tapioca will be extended with the material that may be available.

(16) Apiary.—There are three demonstration maistris to carry on propaganda at Srikakulam and Ichchapuram. One additional demonstration maistri is expected to be deputed for this work at Sompeta by the Crop and Plant Protection Officer (Entomology), Bapatla. The Agricultural Demonstrators should maintain registers containing details of the hives maintained and honey yields in all these localities.

B. Visakhapatnam.—The programme of work for 1952-53 was prepared by the Deputy Director of Agriculture, Visakhapatnam, in consultation with the Plant Protection Assistant, Seed Development Officer and Superintendent, Sugarcane Research Station, Anakapalle.

(a) Agricultural journals.—A target of 800 subscribers during 1952-53 was fixed for the district at one thousand per taluk.

(b) Loans.—A sum of one lakh under seeds and manures and another two lakhs under intensive manuring scheme was proposed to be distributed.

(c) Plant protection work.—Basic and reserve stocks with the necessary sprayers and dusters to be stocked in the various centres as per the guidance of the crop and plant protection officers.

(d) Tree planting.—Collection of seeds of economic plants and raising nurseries by the departmental staff to be continued for supplying seedlings both in the Vanamahotsava week and in the rest of the period.

(e) Rural compost.—The manufacture of rural compost with waste vegetable matter to continue.

(f) Seed farms.—Seed farms to be organized in the strains having natural spread in consultation with the Seed Development Officer.

(g) Trial of new varieties.—Trial of new varieties to be continued this year also.

Fruits and vegetables.—When indents from parties are received they may be complied with by getting them either from the Government Research stations or from private nursery men.

C. Araku Valley.—The main progress of work for 1952-53 will be on the same lines as last year and the following are the main items of work:—

(1) Introduction and trial of new crops, vegetables, fruit plants and fodder crops.

(2) Improvement of local crops by—

(a) Trial of strains from outside.

(b) Mass selection and pure lines work in local crops.

(3) Improvement of agronomical, cultural and manurial practices of the tract.

(4) Continuation of the trial of plantation crops like cinchona, eucalyptus, camphor and coffee.

(5) Grading up of local scrub cattle, sheep and poultry by maintaining a breeding bull and by distribution and exchange of Mandya breed of sheep and white leghorn eggs and cockrels, respectively. Continuing the trial of fish and honey bees and growing of economic plants.

The above items of work will be tackled in the Kantabhamsaguda farm consisting of 40.50 acres, in the Kothavalasa farm consisting of 36.00 acres, and in the orchard consisting of 18.00 acres.

In the dry land block of Kantabhamsaguda farm the cultivation of regular crops will be continued in 10.00 acres besides 4.00 acres under pine apples, and the rest of the area will be under pasture where the trial of different pasture grasses will also be conducted. All rainfed crops introduced from outside and mass selected local crops will be grown in the 10.00 acres and demonstration plots comparing the improved and local crops will also be laid out for the hillmen to go round and observe.

In the Kothavalasa farm 7.50 acres are under wet land in which cultural, manurial and varietal trials on paddy will be conducted. In the rest of the area garden land crops like potato, sugarcane, banana and exotic and indigenous vegetables will be continued to be grown. Varietal and manurial trials on potato will be conducted and regular trials will be made for preserving seed material here. Vegetables will be grown all the year round and attempts will be made to produce as much vegetable seed as possible. In the dry land area rainfed crops like dry paddy, ragi, samai and chillies will be grown. Varietal trials of these crops will be conducted and mass selection of promising local varieties will be done. Other promising dry crops like sweet-potato, kasigogu, groundnut, buckwheat and cottons will be continued. The trial of six varieties of sweet-potato got from Almora will be continued. Seed of the promising varieties of all crops will be distributed to local hillmen.

In the orchard trial and study of 60 varieties of tropical and sub-tropical fruit plants including spices and beverage plants will be continued. Multiplication and distribution of the following fruit plants which are found promising will be done i.e., banana, lemons, pomegranate, papaya, passion fruit and cape-goose-berry.

Subsidiary industries like maintenance of dairy unit with Murrah buffalo breeding bull, poultry unit with white leghorn birds and sheep unit with Mandya breed of sheep will be continued. All the officers and staff of the various departments stationed here depend upon the farm for vegetables and milk, and the dairy is being run as a self-supporting unit. Eggs and cockrels of white leghorn breed and rams and ewes of Mandya sheep will be distributed to hillmen for improvement of local stock.

Practical demonstration.—Regular demonstration and propaganda will be conducted in all the 20 valley villages under the scheme. The important items of work to be tackled and the target fixed for each are indicated below:—

Serial number and item of work.							Target fixed.
1	Tractor ploughing	..	..	..	..	..	600 acres.
2	Contour ploughing, bunding, etc., to check soil erosion.	..	..	..	..	..	1,000 ..
3	Distribution of improved seeds—						
	Paddy	..	..	..	..	..	200 acres
	Ragi	..	..	..	..	..	300 "
	Niger	..	..	..	..	..	150 "
	Samai	..	..	..	..	..	200 "
	Chillies	..	..	..	..	..	50 "
4	Introduction of new crops—						
	Sweet-potato	..	..	..	..	..	30 acres.
	Exotic and indigenous vegetables	..	..	..	..	..	30 "
	Kasigogu	..	..	..	..	..	2 "
5	Compost making	..	..	..	..	..	600 tons
6	Green manuring with sunnhemp, etc.	..	..	..	..	..	50 acres.
7	Green leaf manuring	..	..	..	..	..	200 "
8	Distribution of fruit plants	..	..	..	..	..	1,000 Nos.
9	Planting economic plants	..	..	..	..	..	50,000 "
10	Exchange of white leghorn eggs	..	..	..	..	..	1,000 "
11	Pest, disease and rat control	..	..	..	..	..	According to the incidence.
12	Multiplication and distribution of Mandya sheep to hillmen.	..	..	..	..	..	According to availability.

APPENDIX I.

Statement showing the executive staff as on 30th June 1952 in the Visakhapatnam Division.

I. Srikakulam district—

1	Ichchapur	..	..	..	Sri N. M. Bhukta.
2	Sompeta	..	..	..	Sri K. Subbarao.
3	Tekkali	..	..	..	Sri A. Jagannadham.
4	Patapatnam	..	..	..	Sri L. Harichandramurthy.
5	Narasannapeta	..	..	..	Sri J. Suryanarayana.
6	Srikakulam	..	..	..	Janab K. S. Habibullah.

I. Srikakulam district—*cont.*

7 Cheepurupalli	Sri T. V. Varaprasadarao.
8 Palakonda	Sri B. Achyutaramaraju.
9 Parvatipuram	Sri G. Jagannadharao.
10 Bobbili	Sri K. Ramamohanarao.
11 Salur	Sri K. Suryanarayana.
12 Gummalakshmipuram	Sri K. Srinivasarao.
13 Seethampeta	Sri V. Panakalarao.
14 Plant Protection Assistant (Entomology).	Sri K. Valisinaidu.
15 Plant Protection Assistant (Mycology)	Sri P. Appalanarasayya.

Additional Agricultural Demonstrators—

1 Srikakulam	Sri P. Krishnamurthy.
2 Palakonda	Sri K. Krishnamurthy.
3 Parvathipuram	Sri R. Rajeswararao.
4 Patapatnam	Janab Haji Shareef.

II. Visakhapatnam district—

1 Yellamanchili	Sri M. Atchannasastry.
2 Narasapatnam	Sri E. V. Prasadarao.
3 K. D. Peta	Sri A. Gopalakrishna.
4 Chodavaram	Sri V. Lakshmipathirao.
5 Anakapalli	Sri K. Appalanarasaiah.
6 Visakhapatnam	Sri B. Madhavarao.
7 Jami (Srungavarapukota)	Sri G. Parthasarathy.
8 Vizianagaram	Sri G. Satyanarayanaraju.
9 Bhimilipatnam	Janab Mohammed Fasiuddin.
10 Plant Protection Assistant (Entomology).	Sri V. Ramanna.
11 Plant Protection Assistant (Mycology).	Sri B. Seshavatharam.

Additional Agricultural Demonstrators—

1 Anakapalle	Sri J. Ramakrishna Rao.
2 Vizianagaram	Sri S. B. Venkatapathiraju.
3 Chodavaram	Sri T. L. Narasimharao.
4 Yellamanchili	Sri P. Paparao.

III. Assistant Inspector of Fertilizers—

Sri S. Vasudevarao.

IV. Araku Valley Scheme—

- 1 Janab Mohammed Zainulabdeen.
- 2 Sri K. A. Narasimharaju.
- 3 Sri M. Ramasomayajulu.
- 4 Sri J. Appalanarasimham.
- 5 Sri D. Narayanamurthyraju.

APPENDIX II.

Statement of Rainfall in inches.

						INCHES.
I. Araku Valley—						
South-west	..	..	..	..	..	45.58
North-east	..	..	..	..	..	9.24
Hot weather	..	..	..	..	..	6.43
Total						61.25
II. Visakhapatnam district—						
South-west	..	..	..	..	..	24.06
North-east	..	..	..	..	..	9.33
Hot weather	..	..	..	..	..	9.28
Total						42.67
III. Srikakulam district—						
South-west	..	..	..	..	..	39.22
North-east	..	..	..	..	..	0.71
Hot weather	..	..	..	..	..	7.89
Total						47.82

APPENDIX III.

Statement showing the work done in the rural welfare centres in 1951-52.

Item of work.	General centres.		Khadi centre.	Agency centre.
	Penturthi.	Gata.	Kotauratta.	Paderu.
1 Quantity of paddy seed distributed (1 bag 165 lb.).	55 bags.	115 bags.	320 bags.	..
2 Quantity of millets distributed.	2 ..	2 ..	7½ ..	..
3 Area under vegetables ..	114 acs.	80 acs.	..	55.50 acs.
4 Ploughing with cooper No. 11 plough.	9 ..	67.05 acs.	..	..
5 Land reclaimed by tractors ..	28 ..	5.00 ..	139.00 acs.	..
6 Sugarcane on improved lines ..	8 ..	20 ..	..	..
7 Manure pits covered	552 ..	634 ..	..	340
8 Byres started	414 ..	535 ..	..	167
9 Sowing green manures .. ..	.. ..	195 acs.	..	..
10 Rural compost	630 tons.	794 tons.	961 tons.	632 tons.
11 Pest control	38 acs.	30 acs.	..	..
12 Glyricidia and Sesbania planted.	2,924	55,000	..	..
13 Planting fruit plants	20	658	..	..

ADMINISTRATION REPORT OF THE DEPUTY DIRECTOR OF AGRICULTURE, SECOND DIVISION, ELURU, FOR THE YEAR 1951-52 (FASLI 1361).

I. General.

1. *Jurisdiction.*—East Godavari, West Godavari and Krishna districts form the Second Division with headquarters at Eluru and the Division is in charge of a Regional Deputy Director of Agriculture.

2. *Charge.*—Sri S. S. Katchapeswaran, B. Sc. (Ag.), was in-charge of the Division from 1st to 6th July 1951 and Sri T. Rangabrahmarao, B. Sc. (Ag.), who succeeded him, was in-charge till 13th June 1952. I assumed charge of the Division on 14th June 1952 and continue to be in charge.

3. The following District Agricultural Officers continued to be in charge of the districts noted against them, throughout the year:—

East Godavari	..	..	Sri K. Veerabhadra Rao, B.Sc. (Ag.)
West Godavari	..	..	Sri B. Santhanakrishna Naidu, B.Sc. (Ag.)
Krishna	..	..	Sri M. Satyanarayana Murthy, B.Sc. (Ag.)

4. The scheme for Intensive Manuring of food crops (paddy) was sanctioned in G.O. Ms. No. 171, Food and Agriculture, dated 28th April 1951, and the following Special District Agricultural Officers worked in the scheme.

Name.	Headquarters.	Period of duty.	
		From	To
Sri S. Rajaratnam Chetty	..	Kakinada	.. 21-5-1951 17-9-1951.
Sri K. Krishnan	..	Kakinada	.. 17-9-1951 30-11-1951.
Sri N. Rameswara Rao	..	Eluru	.. 16-5-1951 30-11-1951.
Sri D. Hanumantha Rao	..	Vijayavada	.. 18-5-1951 30-11-1951.

5. The Intensive Manuring Scheme for the year 1952-53 was sanctioned as per G.O. Ms. No. 215, Food and Agriculture, dated 6th June 1952 and the following Additional District Agricultural Officers joined duty on the dates noted against each

East Godavari	..	Sri G. Ranganadhaswamy	..	..	18-6-1952.
West Godavari	..	Sri P. Somayajulu	..	..	18-6-1952.
Krishna	..	Sri K. C. Thomas	..	..	28-6-1952.

6. Two posts of Sugarcane Inspectors were originally sanctioned as per G.O. No. 2118, Food and Agriculture, dated 20th October 1951, up to 30th April 1952 and further continued up to 31st May 1952 in G.O. No. 681, Food and Agriculture, dated 18th April 1952, for ensuring better supply of sugarcane to the several sugar factories in the Division and prompt payment to the growers by the factories, and the following officers worked during the period of sanction.

Name.	Headquarters.	Period	
		From	To
Sri T. N. Balasubrahmanyam.	..	Samalkota	.. 11-12-1951 31-5-1952.
Sri J. H. S. Ponnaiiah	..	Vuyyur	.. 14-12-1951 21-5-1952.

II. Season.

7. The season was, in general, very favourable for Agriculture in the Division except in parts of West Godavari district where some areas suffered due to flooding in August 1951. The yields of main crop paddy and other food crops were slightly above the average in most of the

areas, except those that were affected by the floods. The following are the details of seasonal conditions in the three districts in the Division.

(a) East Godavari district.

The details of distribution of the rainfall in the district are furnished below:—

Period.	1951-52. INCHES.	1950-51. INCHES.	Average. INCHES.
South-west monsoon	 27.07	30.60	23.93
North-east monsoon	 5.99	13.19	13.21
Hot weather	 4.87	10.79	9.73
Total	.. 37.93	54.58	46.87

8. A total rainfall of 43.40 inches in the plains and 42.39 inches in the Agency was recorded during the year, in the district, against 54.58 inches recorded during the previous year. The rainfall was heavy during the south-west monsoon and some low-lying areas in the delta were flooded. But the heavy rains were very helpful to the crops in the upland. The north-east monsoon was weak and hot weather rains also were quite inadequate. Consequently the water level in the River Godavari was very low (the lowest so far recorded) and second crop paddy in many areas suffered for want of water.

9. Mango flowering was very late and also poor this year, probably due to weak north-east monsoon. Flowering was also very much protracted, thereby affording good ground for breeding of Hopper and consequential damage to the crop.

All the dry land crops fared better and normal yields were recorded in the district.

(b) West Godavari district.

10. The following are the details of distribution of rainfall in the district during the year:—

Period.	1951-52. INCHES.	1950-51. INCHES.	Average. INCHES.
South-west monsoon	 30.44	30.80	21.90
North-east monsoon	 5.77	6.92	10.20
Hot weather	 2.76	10.92	8.60
Total	.. 38.97	48.64	40.70

11. A total rainfall of 38.97 inches was recorded in the district, against 48.64 inches, during the previous year, and the distribution also was quite uneven. Precipitation was heavy during the south-west monsoon (30.44 inches against an average of 21.90 inches) and resulted in floods in August 1951. All the deltaic taluks, viz., Eluru, Tadepalligudem, Tanuku, Bhimavaram and Narsapur were affected and the damage was estimated at 50 per cent in Tanuku and Tadepalligudem taluks. Besides paddy, other crops like gingelly, millets and redgram were affected by the heavy concentration of rains. The north-east monsoon was very weak recording 5.77 inches against an average of 10.20 inches and the level of water in the River Godavari was very low. Hence second crop paddy suffered for want of water. Hot weather rains were also few and the summer was very severe. 2.76 inches only were recorded during the hot weather period against an average of 8.60 inches.

12. The onset of the south-west monsoon was again delayed and June, 1952 recorded only 3.92 inches. Consequently preparatory cultivation was delayed and in many areas dry paddy and paddy nurseries suffered badly.

(c) Krishna district.

13. The details of rainfall received are given below:—

<i>Period.</i>	1951-52.	1950-51.	<i>Average.</i>
	INCHES.	INCHES.	INCHES.
South-west monsoon	22.56	7.53	22.61
		21.50	
North-east monsoon	4.49	5.25	11.35
Hot weather	3.74	3.30	4.65
Total ..	30.79	37.58	38.61

14. A total rainfall of 30.79 inches was received on 54 rainy days during the year under report, as against a total rainfall of 37.58 inches received on 59 rainy days in the previous year and the average rainfall of 38.61 inches received during the five preceding years. The rainfall received during the year was unevenly distributed.

15. The south-west monsoon set in early this year. Consequently all the sowings of dry crops and the transplantation of paddy could be finished in time. The early sowings helped in getting increased yields in almost all the early crops. There was a total precipitation of 22.56 inches distributed on 36 rainy days, as against an average rainfall of 22.61 inches received during the five preceding years. The rainfall was evenly distributed during the period unlike in the previous fasli and it helped all the early sown crops to put forth a vigorous growth. The yields of all the early sown crops were above average.

16. Dry and cold weather crops were sown in the north-east monsoon period. A total rainfall of 4.49 inches on 8 rainy days was recorded during this season, as against the average rainfall of 11.35 inches for the five preceding years. This poor rainfall was responsible for the low yields of all the crops sown during this period. The major crops, chillies and tobacco suffered due to the failure of north-east monsoon. The harvest of early sown dry crops and paddy was finished in good stead.

17. A total rainfall of 3.74 inches on 10 rainy days was recorded during this season as against the average rainfall of 4.65 inches received during the five preceding years. The season facilitated the harvest of all crops and the gathering of the produce. The season also facilitated the preparatory cultivation for the early sown crops.

18. The season during the year was on the whole favourable to the Agriculturists except for the growers of chillies and virginia tobacco.

III. Food Production Drive.

19. This is the final year of the three-year programme and all the activities of the Department were concentrated on the drive, for intensive food production to attain self-sufficiency. The results achieved under the various schemes included in the programme are given below:—

(i) Land Development by mechanised cultivation—Installation of pumpsets.

20. Under the scheme, oil engine pumpsets and petrol driven pumpsets were hired out to cultivators at concessional rates to encourage the production of short-term food crops and the following results have been achieved

District.	Number of petrol driven pumpsets hired out.	Number of engine pumpsets hired out.	Area irrigated in acres.	Additional production expected in tons.	Length of pipe line sold. feet.
East Godavari ..	8	84	42	..	..
West Godavari ..	1	12	96	48	1,457
Krishna ..	9	72	36	1,193	..
Total ..	1	29	252	126	2,650

(ii) Land development by mechanised cultivation—Supply of electric motor pumpsets for lift irrigation.

21. As electric energy was not extensively available in the Division, fresh supply of electric motor pumpsets was not made during the year under report. The 17 sets supplied in East Godavari district during the year 1950-51 continued to function and an area of 85 acres was estimated to be irrigated.

(iii) Central Agricultural Engineering Stores and Supply Centre—Supply of pumpsets on hire-purchase system.

22. To encourage the production of food crops by outright purchase of pumpsets by the ryots, the scheme for the supply of oil engine and electric motor pumpsets under the hire purchase system continued to be in operation during the year under report and the following results have been achieved.

District.	Number of sets supplied.	Area covered in acres.	Additional production attained in tons.
East Godavari	16	128	64
West Godavari	8	64	32
Krishna	10*	77	38.5
Total ..	34	269	134.5

* Including one electric motor.

(iv) Land development by mechanised cultivation by tractors and bull-dozers.

23. Hiring out of tractors and bull dozers for land reclamation continued to be in operation during the year. The demand for tractors and bull dozers was on the increase owing to the high cost of labour. The results achieved are given below:—

District.	Number of tractors hired out.	Number of bull-dozers hired out.	Area covered in acres.	Additional production attained in tons.	Amount of hire charges collected. RS.
East Godavari	5	7	1,414	141	48,713
West Godavari	5	5	2,159	252	55,956
Krishna	6	5	3,497	349	59,400
Total ..	16	17	7,070	742	1,64,069

(v) Rural Compost Making.

24. To convert waste vegetable matter into useful manure by composting, the scheme of subsidized rural compost making was in operation during the year also. This gave an impetus for compost making and the following results have been achieved :—

District.	Number of compost pits.	Quantity produced in tons.	Area covered in acres.	Amount of subsidy paid.	Additional production expected in tons.
East Godavari	437	9,649	1,930	6,930	241
West Godavari	680	3,401	680	2,236	85
Krishna	920	4,620	920	4,620	115
Total	2,037	17,670	3,530	13,786	441

(vi) Subsidized distribution of phosphatic manures to increase food production.

25. The scheme of subsidised distribution of Phosphatic fertilizers continued to be in operation during the year under report till April 1952. During April the subsidy was reduced to 25 per cent and later in June 1952 the subsidy was abolished. The practice of applying super phosphate to paddy has become more popular in the delta taluks of West Godavari district and to some extent in Krishna district. In the East Godavari district the response is somewhat poor. The quantity distributed in the division is given below :—

District.	Quantity distributed in tons.	Area covered in acres.	Additional yield obtained in tons.
East Godavari	548	Merged with the area under ammonium sulphate.	498
West Godavari	1,485	Do.	1,238
Krishna	3,297	Do.	2,747
Total	5,380		4,483

(vii) Distribution of Ammonium Sulphate.

26. The practice of applying ammonium sulphate to paddy has become very popular in the division, especially in the delta areas, due to the credit facilities given under the Intensive Manuring Scheme and the better prices obtained for food grains. The demand for this fertilizer was very great and supply also was fairly satisfactory. The quantity distributed and the area manured in the three districts are furnished below :—

District.	Quantity of ammonium sulphate distributed in tons.	Area covered in acres.	Additional estimated production in tons.
East Godavari	3,879	108,484	7,757
West Godavari	5,165	144,620	10,330
Krishna	4,960	138,880	9,920
Total	14,004	392,084	28,007

(viii) Intensive Green Manuring Scheme.

27. Distribution of green manure seeds, especially sunnhemp, continued to be done by the department, besides wild indigo, pillipesara and indigo. The quantity of seed distributed and the area covered are given below :—

District.	Quantity distributed in tons.	Area covered in acres.	Additional food produced in tons.
East Godavari	51	3,729	500
West Godavari	203	15,200	2,044
Krishna	20	1,833	231
Total	274	20,762	2,775

(ix) Multiplication and distribution of improved paddy seed.

28. Pure seed accounts for at least 10 per cent increase in yield and this has been realized by practically all the ryots of this division. To cater to their needs of pure seed, the Seed multiplication and distribution Scheme for the supply of pure paddy seed was in operation during the year under report. Specific targets were fixed for the running of seed farm and procurement of seed. The results achieved are furnished below :—

District.	Quantity of seed distributed in tons.	Area covered in acres.	Additional food production in tons.
East Godavari	211	14,250	784
West Godavari	767	48,400	2,446
Krishna	537	30,072	1,879
Total	1,515	90,722	5,149

Due to the general slump in prices that prevailed during April 1952 to June 1952, the price of paddy has come down in the division, and as the sale price fixed for seed paddy was high, the progress of distribution of paddy seed during June 1952 was slow.

(x) Control of pests and diseases of crops.

29. Many effective remedies have been put on the market to control pests and diseases of crops and the special staff of one Plant Protection Assistant for Entomology and one Assistant for Mycology continued to work in each district during the year. The details of work turned out by the special staff for the control of pests on the different crops are furnished below :—

Serial number and name of crop.	Pests or diseases.	Area tackled in acres.			Treatment.
		East Godavari.	West Godavari.	Krishna.	
1 Paddy ..	Foot rot	7,772	812	15,000	Agrosan seed treatment.
	Grasshopper	75	120	250	B.H.C. dusting.
	Spodoptera	2	169	25	Do.
	(Swarming Caterpillar)				
	Rats	800	2,730	1,735	Zinc phosphide baiting.
	Stem borer	50	6	140	B.H.C. spray.
	Root grubs		778	400	Manuring with ammonium sulphate and Super.
	Beetles		335		D.D.T. Calcium arsenate.
	Leaf roller		33	166	B.H.C.
	Kodu fly		38		Do.
	Caseworm	2			Do.
	Jassids and Fulgorids.	2,215	3		Do.
	Mealy bugs		5		Fish oil rosin soap.
	Leeches		20		Leeches.

Serial number and name of crop.	Pests or diseases.	Area tackled in acres			Treatment.
		East Godavari.	West Godavari.	Krishna.	
2 Jonna ..	Short smut	70,000	26,654	52,000	Sulphur seed treatment.
	Borer	..	6	..	B.H.C.
	Ground grasshopper..	3	..	..	Do.
	Mites	19	..	..	Sulphur dusting.
3 Redgram ..	Pod borer	..	18	..	B.H.C.
4 Bengalgram.	Caterpillar	3	..	..	Do.
5 Castor ..	Caterpillar	4	15	..	Do.
6 Groundnut.	Aphids.. ..	..	5	32	Do.
	Field rats	..	95	..	Zinc phosphide.
	Red Hairy Caterpillar	..	..	15	B.H.C.
7 Gingelly ..	Red Hairy Caterpillar	..	56	..	Do.
8 Coconut ..	Rhinoceros beetles ..	..	1,500	..	Hooking.
9 Sugarcane.	Pyrilla.. ..	5	..	6	B.H.C. dusting.
	Borer	..	50	..	D.D.T. spray.
	Smut	..	25	8	Eradication (pulling out).
	Rats	80	..	..	Zinc phosphide.
10 Chillies ..	Thrips	264	262	4,182	B.H.C.
	Rats	42	..	..	(Zinc phosphide baiting).
	Powdery Mildew	..	..	63	Bordeaux mixture.
	Damping off	..	50	6	Do.
11 Turmeric ..	Leaf spot	23	110	..	Perenox.
12 Tobacco ..	Damping off	3,400	100	14	Bordeaux mixture and perenox.
	Caterpillar	..	579	125	Hand Picking.
	Broom rape	..	5	..	Eradication.
	Grasshopper	7	..	..	D.D.T. 50 per cent.
13 Vegetables.	Beetles, Caterpillar, Aphids, Mealy bug, etc.	149	520	935	D.D.T., B.H.C. Arsenates fish oil rosin soap.
14 Citrus ..	Mottle leaf	432	150	3,805	Zinc bordeaux mixture.
	Gummosis	293	140	2,860	Bordeaux paste.
	Die back	95	..	(trees)	Preventive bordeaux mixture.
	Canker	..	110	..	Bordeaux mixture or Perenox.
	Iron deficiency	6	..	..	Ferrous sulphate spray.
	Red ants	40	40	..	B.H.C.
	Mealy bugs	..	4	..	Do.
15 Mango ..	Hopper	286	55	517	D.D.T. 50 per cent spray.
	Red ants	..	21	1	B.H.C.
District. Sales of insecticides and fungicides					
		TONS.	LB.		
East Godavari	..	11	1,168		
West Godavari	..	9	1,526		
Krishna	..	34	1,836		
Total ..	..	56	50		

(xi) Distribution of Iron and Steel for Agricultural Purposes.

30. The distribution of iron and steel for agricultural purposes continued to be done by the co-operative societies. For the manufacture of agricultural implements, the approved fabricators in the division were being allotted

materials from the Registered Stockists Messrs. V.S.R. and Company. The proper utilization of the materials allotted was periodically checked by the District Agricultural Officers and Agricultural Demonstrators, in the division and the accounts of Messrs. V.S.R. and Company were being checked by the Deputy Director of Agriculture.

(xii) Other items of work.

31. Increased area brought under food crops including vegetables during the year 1951-52.—

Serial number and crop.	Increased area in acres.			Total.
	East Godavari.	West Godavari.	Krishna.	
1 Paddy	19,856	905	7,729	28,490
2 Millets	1,612	336	8,510	10,458
3 Vegetables ..	355	630	1,330	2,315
4 Pulses	2,653	..	..	..

32. Number of wells sunk or renovated.—

	East Godavari.	West Godavari.	Krishna.	Total.
Number of new wells sunk	93	..	25	118
Number renovated	..	..	36	36

33. Fresh areas brought under irrigation.—

District.	Area in acres.
East Godavari.. ..	1,379
West Godavari	134
Krishna	366
Total ..	1,879

34. Area under non-food crops diverted to food crops.—

Non-food crops.	Area diverted to food crops.			Total.
	East Godavari.	West Godavari.	Krishna.	
1 Groundnut	250	470	915	1,635
2 Cotton	109	..	185	294
3 Others	340	..	..	340

35. Additional area brought under short-term food crops.—

Crops.	Area in acres.			Total.
	East Godavari.	West Godavari.	Krishna.	
1 Ragi	913	..	10	923
2 Cholam	1,820	..	..	1,820
3 Cumbu	1,210	..	..	1,210
4 Paddy	..	790	4,309	5,099
5 Vegetables	715	..	..	715

36. Additional area brought under sweet potato.—

District.	Additional area under sweet potato in acres.
East Godavari	3.00
West Godavari	2.12
Krishna	71.00
Total ..	76.12

37. Quantity of seeds and manures distributed free :—

Particulars.	East Godavari.			West Godavari.			Krishna		
	Quantity distributed in tons.		Additional quantity of food produced in tons.	Quantity distributed in tons.		Additional quantity of food produced in tons.	Quantity distributed in tons.		Additional quantity of food produced in tons.
	T.	LB.		T.	LB.		T.	LB.	
Paddy ..	5	5 32	16 ..	..	..	.. ..	..	..	.. ..
Cholam ..	0	480 15	7 ..	..	..	.. ..	..	..	.. ..
Sunn-hemp ..	2	320 64	.. ..	..	..	.. ..	..	..	.. ..
Vegetables ..	0	90 81	161 ..	0	28 19	16 450 ..	..	46 230	460 ..
Sweet Potato ..	1	650 3	9 ..	..	..	.. ..	..	..	.. ..

38. Waste lands reclaimed and brought under cultivation—

Particulars.	East Godavari.	West Godavari.	Krishna	Total.
	ACS.	ACS.	ACS.	ACS.
	TONS.	TONS.	TONS.	TONS.
Area reclaimed. ..	1,379	857	1,500	3,736
Quantity of foodgrains produced in ..	387	214	375	976

39. Seeds and manures distributed, area covered and additional quantity of foodgrains produced.

Particulars.	East Godavari.			West Godavari.			Krishna.		
	Quantity distributed in tons.	Area covered in acres.	Additional quantity of food produced in tons.	Quantity distributed in tons.	Area covered in acres.	Additional quantity of food produced in tons.	Quantity distributed in tons.	Area covered in acres.	Additional quantity of food produced in tons.
Paddy ..	211	14,250	784	767	46,400	2,486	537	30,002	1,879
Green manure seeds.	57	3,729	500	203	15,280	2,044	20	1,833	231
Ammonium sulphate.	3,879	108,584	7,757	5,165	144,620	10,330	4,960	138,880	9,920
Phosphatic manures.	598	Merged with ammonium sulphate.	482	1,485	Merged with ammonium sulphate.	1,238	3,297	Merged with ammonium sulphate.	2,747

IV. Agricultural Education.

40. Agricultural Education was imparted to the farmers by publishing articles on crop production in popular language in the Journal 'Padipantalu' and the vernacular edition of the Villagers' Calendar and by holding both large scale and small scale exhibitions on festive and other occasions. The achievement in this direction is furnished below :—

(i) Distribution of the Journal—Padipantalu.

District.	Number of subscribers enrolled in 1950-51.	Number of subscribers enrolled in 1951-52.
East Godavari	4,128	3,065
West Godavari	4,476	7,094
Krishna	10,997	2,400
Total ..	19,601	12,559

(ii) Distribution of Villagers' Calendars—

District.	Number of calendars distributed in 1951-1952.
East Godavari	1,300
West Godavari	270
Krishna	800
Total ..	2,370

(iii) Exhibitions.—Large scale and small scale exhibitions were held on important festive occasions and Jamabandi meetings conducted by the Collectors. Ordinary lectures and film shows were held on the occasion and a large number of exhibits of improved crops and implements, etc., were put on show. One large scale exhibition was held at Kakinada during Agri-Horticultural show in January 1952 and another at Rajahmundry during the Sree Ramaswami festival in April 1952. The total number of exhibitions held and the amount spent on these are furnished below :—

	East Godavari.	West Godavari.	Krishna.	Total.
(i) Number of exhibitions held.	8	11	9	28
(ii) Amount spent. Rs.	507	190	20	717

The United States Publicity and Information Bureaux exhibited films on Improved Agriculture in four villages in East Godavari district, three villages in West Godavari district and five in Krishna district. Large number of Agriculturists were attracted at these shows and were benefited.

(iv) The Juvenile Labour School on the Agricultural Research Station, Samalkota, continued to function till 31st March 1952 and then closed as per the orders of the Director of Agriculture, Madras.

V. Propaganda and Demonstration.

41. Increasing food production was the main item of Departmental activity during the year and all items of demonstration and propaganda were directed towards this end. The several food production schemes under the three-year programme continued to operate during the year.

42. An intensive drive for green manuring was launched in East Godavari district and sunnhemp seed was supplied to the ryots for sowing in the standing second crop of paddy for manuring the subsequent first crop paddy grown in the year under report.

43. To popularize the use of glyricidia and Sesbania as green manure crops, a special campaign was undertaken and planting of sesbania seedlings on paddy field bunds during the first and second crop season was taken up. An area of 4,750 acres was planted during the first crop season and 1,200 acres during the second crop season in the Division. During the first crop season in many areas, the sesbania seedlings were smothered by the growing paddy crop. In the remaining areas the plants set seed and the same was collected by the concerned Taluk Agricultural Demonstrators. Much damage was caused to the plants by stray cattle after the harvest of first crop paddy. The total quantity of sesbania seed collected in the Division was about 3,400 lb.

44. About three lakhs seedlings of glyricidia were planted in the division during the year and most of them are establishing.

VI. Crop Improvement.

45. *Paddy*.—This is the important food crop of the state and all items of crop improvement were concentrated on this to maximise food production. The improvements fall under varietal, cultural and manurial. Under varietal improvements introduction of improved strains, suitable for dry lands, semi-dry lands (main crop (wet) and submergible and saline areas were introduced and strains of proved merit were multiplied on seed farms and distributed as per the Seed Multiplication Scheme.

On the cultural side, thin sowing and economic planting of paddy seedlings, and raising of semi-dry nurseries in suitable localities in the second crop season are the improvements advocated.

Manurial improvements consisted of green manuring paddy land and application of quick acting manures like ammonium sulphate and super phosphate.

The following statement gives the results achieved under the above items of improvements :—

Particulars.	East Goda. vari.	West Goda. vari.	Krishna.
(a) Quantity of improved strains of paddy distributed in tons.	211	767	537
(b) Area covered by (a) in acres. . . .	14,250	46,400	30,072
(c) Quantity of green manure seeds distributed in tons.	51	203	20
(d) Area covered by (c) in acres	4,122	15,260	1,833
(e) Quantity of phosphatic and other manures distributed in tons.	4,476	6,650	8,257
(f) Area covered by (e) in acre. . . .	87,255	1,44,620	1,38,880
(g) Cultural improvements :	Economic planting, semi-dry nurseries, pre-treatment of seed with Agrosan G. N. and thin sowing of nurseries.		
(h) Area under (g) in acres.	74,877	1,54,983	1575
(i) Additional quantity of paddy produced from (a) to (h) in tons.	9,894	16,098	12,010

Seed multiplication schemes—Paddy.—

District.	Areas of seed farms			Quantity purcha- sed in tons.	Quantity distribu- ted in tons.	Area covered in acres.
	Target for 1951-52.	Attained for 1951-52	Programme for 1952-53.			
East Godavari	2100	2317	..	921	211	14,250
West Godavari	2100	2638	..	1,500	829	46,780
Krishna	2100	2100	..	900	537	30,072

Trials and demonstrations in paddy—Rainfed paddy.—B.C. 130 or MTU. 17 was tried in East Godavari, West Godavari and Krishna districts under rainfed conditions. The strain gave better yields than the local Budama in all the areas.

ADT. 22 was tried in Peddapur and Pithapuram taluks of East Godavari district. It gave an acre yield of 1,328 in Peddapur and it is proposed to repeat the trial.

Semi-dry.—In the West Godavari district, MTU. 3 was tried under semi-dry conditions in Tadepalligudem and Eluru Taluks. The trials failed due to floods and hence they will be repeated.

Main crop (wet) paddy.—BAM. 3 a strain from the Rice Research Station, Berhampur, which is popular in Srikakulam and Visakhapatnam districts was tried in West Godavari district against MTU. 4. But the trial was a failure owing to floods. BAM. 3 was tried in Bhadrachalam taluk of East Godavari district but the yield was not on par with the local.

Deep water areas.—MTU. 16 and cultures 1311, 1315 and 1316 were tried in Kakinada and Amalapur taluks of East Godavari district. MTU. 16 gave 2,637 lb. per acre and the cultures gave 3,155, 3,400 and 3,430 lb. respectively. The trials would be repeated. In West Godavari district also the deep water paddy cultures were tried but all of them failed due to floods.

Saline areas.—MTU. 1, S. R. 26-B. and Saline resistant cultures 10022 and 10034 were tried in Kakinada and Pithapur taluks. MTU. 1 gave the maximum yield of 1,500 lb. followed by S.R. 26-B. 1,460 lb. The cultures gave 1,320 lb. and 1,280 lb. respectively.

The above trials were conducted in West Godavari and Krishna districts also but they failed due to floods immediately after planting.

In the second crop season Nx. 60 was tried in Kakinada taluk but the yield was not encouraging. In West Godavari district also the culture was tried but here also it was reported to be a failure.

Early Basangi or MTU. 20 which was under trial in the second crop season in West Godavari district was a success and in one centre in Tadepalligudem taluk it gave 26 bags of 166 lb. each per acre. The area under this crop is extending.

46. *Millets—Jonna*.—This is the next important food crop in the division. The area under improved strains was not much in the Division, as the strains released from the several stations are still under trial.

N. 1, N. 2, N. 3, CO. 1, CO. 3, CO. 11 and G. 1 and AKP. 1 and 2 Jonna strains were tried in the different districts of the Division. CO. 2 and CO. 3 failed in East Godavari district due to heavy rains. N. 1, G. 1 and AKP. strains which were tried in West Godavari district failed due to drought. In Krishna district, CO. 11 gave an acre yield of 600 lb. N. 2 gave 250 lb. and control 500 lb. N. 3 failed. It is proposed to repeat the trials in the next year.

Ragi.—AKP. 2. AKP. 6 and AKP. 7 were under trial in the division. All the strains failed in the East Godavari district.

In West Godavari district, both AKP. 6 and AKP. 7 gave about ten per cent more yield than the local.

In Krishna district, AKP. 7 gave better yield than the local and the trial would be repeated.

Sajja.—AKP. 3, X. 1 and X. 2 and CO. 3 were under trial in the division. AKP. 3 gave higher yields than the local in East Godavari district. CO. 3 in Krishna district was practically on par with the local. In West Godavari district the trials failed and they have to be repeated.

47. *Fruits*.—Area under fruit plants is on the increase and the particulars of fruit plants supplied through the agency of the department is furnished below:—

(a) Introduction of plants.

Variety.	East Godavari.		West Godavari.		Krishna.		Total for the division.	
	Number	Area	Number	Area	Number	Area	Number	Area
	distri- buted.	covered.	distri- buted.	covered.	distri- buted.	covered.	distri- buted.	covered.
		ACS.		ACS.		ACS.		ACS.
1 Mango	3,794	948	470	18	80	2	4,344	968
2 Citrus	1,188	29	1,642	40	37	1	2,867	70
3 Plantain	25,814	37	1,200	2	400	1	27,414	40
4 Pine apple	2,650	0.65	100	0.30	..	..	2,750	0.95
5 Coconut	2,127	53	1,588	44	100	2	3,815	99
6 Guavas	24	0.5	301	6	..	..	325	8.50
7 Others	937	20	43	1	2,530	15	3,510	36

(b) Cultural and other improvements—Cultural*.

Particulars.	East Godavari.		West Godavari.		Krishna.		Total.	
	ACS.	ACS.	ACS.	ACS.	ACS.	ACS.	ACS.	ACS.
Mango	..	470	20	490	..	..	..	..
Orange	785	1,642	52	2,479	..	..	..	..
Others	3	56	..	59	..	..	..	..

* REMARKS.—Inter-culture, pruning of diseased branches and water shoots.

(c) Manurial.

Variety.	East Godavari.		West Godavari.		Krishna.		Total.	
	ACS.	ACS.	ACS.	ACS.	ACS.	ACS.	ACS.	ACS.
Mango	..	..	55	55	..	..	..	..
Orange	1,350	1,236	120	2,706	..	..	..	..

REMARKS.—Application of bonemeal and other phosphatic manures along with cattle manure and green manure and growing green manure crops like sunnhemp and incorporating the same in the area.

(d) Irrigation.—Ring method of irrigation.

Variety.	East Godavari.		West Godavari.		Krishna.		Total.	
	ACS.	ACS.	ACS.	ACS.	ACS.	ACS.	ACS.	ACS.
Citrus	186	1,417	28	1,631	..	..	..	..

(e) Control of pests and diseases.

Variety.	East Godavari.		West Godavari.		Krishna.		Total.	
	ACS.	ACS.	ACS.	ACS.	ACS.	ACS.	ACS.	ACS.
Mango	178	55	520	753	..	..	..	..
Citrus	534	84	100	718	..	..	..	..
Others	..	133	..	133	..	..	..	..

REMARKS.—Spraying zinc sulphate for chlorosis, application of bordeaux paste for gummosis, Guesarol, spraying for mango looper, pruning diseased branches and spraying with Bordeaux mixture for die back.

The above demonstrations will be continued during the next year.

48. *Sugarcane*.—With the starting of two more Sugar Factories at Tanuku and the high price obtained for sugar and jaggery, the area under sugarcane increased. The Special Agricultural Demonstrators stationed at Peddapuram and Ramachandrapuram taluks in East Godavari district and at Vuyyur in Krishna district continued to carry on propaganda for popularising the improvements tested and found applicable to the tract. The improvements effected in cane cultivation in the district are tabulated below:—

Name of improve- ment.	East Godavari.		West Godavari.		Krishna.	
	Number of demon- strations.	Area covered.	Number of demon- strations.	Area covered.	Number of demon- strations.	Area covered.
		ACS.		ACS.		ACS.
Cultural	..	6,932	194	536	..	..
Varietal	..	110	495	680	..	7,500
Manurial	..	7,175	143	241	..	..
Control of pests and diseases.	..	10	542	432	..	14
Sindwaha and other furnaces.	212	..	..	..	..	..
Jaggery manufacture.	110	..	..	..	..	..

REMARKS.—Cultural.—Line planting, regular spacing and selection of seed material.

Varietal.—Introduction of CO. 527 and CO. 449.

Manurial.—Combination of Organic and inorganic manures at 2:1 Nitrogen basis.

Control of pests and diseases.—Dipping setts in Bordeaux mixture to prevent redrot and spraying fish Oil Rosin soap for mealy bugs.

The above work will be continued in the coming year.

49. *Vegetables*.—Vegetable cultivation was given a special impetus by free distribution of vegetable seeds to schools and supply of vegetable packets to households at nominal cost. The following table gives the results achieved:—

District.	Quantity of seed sold lb. oz.	Area.		Quantity produced.
		ACS.	TONS.	
East Godavari	210.0	500	1,500	..
West Godavari	97.1	1,887	4,580	..
Krishna	46.4	230	460	..

50. *Fodders*.—

Particulars.	East Godavari.	West Godavari.	Krishna.	Total.
Normal area in acres	23,500	13,400	85,100	1,22,000
(a) Additional area brought in acres.	2,480	1,129	970	4,579
(b) Estimated quantity of fodder produced.	9,920	5,500	9,700	25,120
Quantity of fodder seed supplied.	600	6,000	..	6,600
	Slips Napier.	Slips of elephant grass.	..	..

51. *Pulses*.—The cultures in redgram, blackgram, greengram and horsegram released by the Pulses Specialist were tried again in the three districts of the division. The following were the results achieved:—

Redgram.—Nos. 97, 2,900 and 72 were tried in the division. Culture No. 97 gave 280 lb. per acre in East Godavari district, while control gave 250 lb. per acre. In West Godavari and Krishna districts, the results were inconclusive.

Blackgram.—Culture No. 189 was tried in East Godavari district and Krishna district. In East Godavari district the culture gave 320 lb. per acre while control gave 300 lb. and in Krishna the results were inconclusive.

Greengram.—Cultures 127 and 188 were tried in the division. In East Godavari district No. 127 gave 140 lb. while control gave only 100 lb. per acre. Culture 188 did not give conclusive results.

Horsegram.—Cultures 76 and 93 were tried in West Godavari and Krishna districts. In West Godavari district the cultures failed while in Krishna district culture No. 76 gave 738 lb. against 690 lb. of control. The trials will be repeated.

52. *Chillies.*—G. 1 chillies from Guntur has been under spread in West Godavari district while in the remaining two districts the strain was under trial and the performance was not satisfactory. Culture No. 1402 from Guntur was tried in Krishna district and the trial requires to be repeated. The quantities of improved seeds distributed in the districts are given in the following table:—

District.	Natural area.	Quantity of strains distributed.	Area covered.	Estimated quantity produced.
	ACS.	owst. lb.	ACS.	TONS.
East Godavari ..	21,600	0-96	96	8
West Godavari ..	9,460	0-253	253	23
Krishna ..	10,042	0-1,290	1,000	93

53. *Oil seeds.*—(a) *Groundnut.*—In the upland tracts of the division groundnut cultivation is taken up during the south-west monsoon season and the practice of cultivating short-duration bunch variety during the Pyru season in rice fallows has been rapidly increasing throughout the division.

The area covered by this practice in the division is tabulated below:—

	ACS.
East Godavari district	500
West Godavari district	45,000
Krishna district	10,000
Total ..	55,500

In the dry lands TMV. 1 and 2 were under trials in the district.

(b) *Castor.*—Strains TMV. 1, 2 and 3 have been tried during the year under report. The trials were not conclusive and require to be repeated.

(c) *Coconut.*—Two coconut nurseries at Samalkot and Maruteru continued to raise seedlings as per programme and distribute them in the three districts of the division. Three thousand one hundred and seventy-nine seedlings were distributed as shown below:—

District.	Number of seedlings distributed.
East Godavari	1,255
West Godavari	1,588
Krishna	336
Total ..	3,179

54. *Fibres.*—(a) *Cotton.*—With a view to extend the area under cotton to make up the deficiency in the country's requirements of cotton, a special drive was launched to extend the area under this crop. Specific targets for growing cotton as a pure crop and as a mixture with chillies, dry paddy and groundnut were fixed and short duration varieties like H. 420 were introduced. Cultivation of cotton in rice fallows was also encouraged and high yielding and early maturing strains like P. 216 F. were introduced. A total quantity of 56,861 lb. of H. 420, 8,200 lb. of CO. 1 and 150 lb. of P. 216 F. cotton seed were distributed during the year. The additional area brought under cotton in the division was 8,732 acres.

(b) *Mesta.*—The cultivation of mesta has been extending in the West Godavari and Krishna districts for the present. There is an area of 250 acres in Polavaram, Eluru and Chintalapudi taluks of West Godavari district and 500 acres in Krishna district. In East Godavari district the crop has been just introduced.

55. *Tobacco.*—The area of Virginia tobacco has been increasing steadily due to the high prices prevailing for tobacco. The department multiplied and supplied 208 lb. of H.S. 9 seed which covered an area of 6,240 acres. The I.L.T.D. Company and nurserymen from Bapatla, Chirala and Kakinada also supplied seedlings to the growers in the division. The area under Desi type of tobacco also was on the increase due to the high price obtained.

VII. Tree-planting.

56. The Vanamahotsava was celebrated during the first week of July 1951, all over the division in pursuance of the Government policy to plant more trees. With the financial assistance from the Collectors' discretionary grants, nurseries of economic plants were raised in all the Agricultural depots and tree-planting which was inaugurated during the 'Vanamahotsava' week was continued for a long time afterwards. A summary of the work turned out is embodied in the following table:—

Particulars.	East Godavari.	West Godavari.	Krishna.	Total for the division.
1 Seeds sown	641 lb.	482 lb.	528 lb.	1,651 lb.
2 Economic plants—Number of seedlings and stumps planted—				
Pungam	29,335	24,211	16,022	69,568
Casuarina	6,604	..	..	6,604
Glyricidia	55,378	218,376	22,402	296,156
Leucaena glauca ..	23,327	26,132	16,322	65,781
Albizia	..	..	6,057	6,057
Thespesia	20,078	..	500	20,578
Tamarind	36,886	3,919	2,127	42,932
Neem	15,077	9,227	7,725	32,029
Others	112,400	94,700	21,934	229,034
Fruit-bearing plants and seed supplied.	8,404	7,864	12,965	29,233
Total ..	307,489	384,429	106,054	797,972

VIII. Manures.

57. (a) *Cattle manure.*—Proper preservation of cattle manure and conservation of cattle urine, received attention at the hands of the departmental staff and the following work was turned out:—

Particulars.	East Godavari.	West Godavari.	Krishna.	Total.
Number of pits opened	1,605	2,636	1,624	5,865
Number of pits renovated	3,498	2,382	1,090	6,970
Total	5,103	5,018	2,714	12,835
Byre system—Number started	747	64	..	811
Number renovated	627	..	..	627
Loose box—Number started	..	..	..	..
Number renovated	10	..	..	10
Dry earth system—Number started	..	1,652	1,125	2,777

(b) *Green manure*.—Green manure campaign received a special drive and besides sunnhemp, pillipesara, indigo and wild indigo seeds, sesbania and glyricidia seeds were distributed for raising seedlings and planting on field bunds. The quantity of different green manure seeds distributed and the area covered are given in the following table :—

Variety.	East Godavari.			West Godavari.			Krishna.		
	Quantity distributed.		Area covered.	Quantity distributed.		Area covered.	Quantity distributed.		Area covered.
	TONS.	LB.	ACS.	TONS.	LB.	ACS.	TONS.	LB.	ACS.
Sunn hemp ..	32	2,229	2,956	193	1,715	14,550	11	391	837
Daincha ..	0	2,237	111	5	2,128	450	0	800	25
Indigo ..	12	363	136	1	1,052	119	1	800	100
Kolingi ..	4	1,561	526	0	80	3	7	480	540
Pillipesara ..	..	..	..	0	520	17	..	..	..
Sesbania ..	..	..	..	0	257	85	..	..	..

(c) *Compost*—(1) *Rural compost*.—A total quantity of 17,670 tons of rural compost was prepared under the scheme of subsidized rural compost making and this covered an area of 3,534 acres. Ryots have become more manure minded and have learnt to prepare compost from waste vegetable matter available in the farm yards. The compost week was celebrated during October 1951 to give a special fillip for the preparation of compost and prizes were distributed to the villages which produced the maximum compost.

(2) *Urban compost*.—All municipalities and most of the major panchayats have been preparing compost from town sweepings and night-soil and the departmental staff have been carrying on propaganda to make the manure popular. A total quantity of 16,920 tons of urban compost has been prepared during the year and 8,686 tons were applied to crops.

IX. Miscellaneous items of Propaganda.

58. (a) *Demonstrations*.—Statement showing the demonstrations conducted with agricultural implements and demonstration plots laid is given below :—

Particulars.	East Godavari.	West Godavari.	Krishna.	Total.
Small ploughs	2	131	280	422
Other implements	408	185	12	605
Turmeric polisher	12	18	..	30
Horticultural tools and other implements.	..	248	14	262
Water lifts	..	295	..	295
Number of demonstration plots laid ..	38	152	..	190
Number of propaganda meetings held ..	60	436	145	641

(b) *Soil erosion*.—No special schemes were in operation in the division for the control of soil erosion but the regular staff carried on propaganda for the prevention of the ravages of this "Silent Thief" and the results achieved are tabulated below :—

Particulars.	East Godavari.		West Godavari.		Krishna.	
	Number of demonstrations conducted.	Area covered in acres.	Number of demonstrations conducted.	Area covered in acres.	Number of demonstrations conducted.	Area covered in acres.
(a) Terracing	..	..	..	..	2	6
(b) Levelling	235	348	278	761	30	141
(c) Contour bunding	19	40	4	12	35	191
(d) Hedge planting	21	17	23	304	36	300

X. Subsidiary industries.

59. A special scheme for the development of bee-keeping was in operation in all the districts of the division with special staff of 19 demonstration maistries to assist the cultivators in hiving colonies and maintaining them properly. The progress achieved is tabulated below :—

Particulars.	East Godavari.	West Godavari.	Krishna.	Total.
1 Number of hives introduced during the year.	410	258	216	884
2 Total number functioning ..	1,092	1,658	606	3,356
3 Quantity of honey produced ..	2,306 lb.	10,000 lb.	4,848 lb.	17,154 lb.

XI. Special schemes in operation in the division.

60. (a) *Nephantis scheme*.—A scheme for the breeding of parasites on *Nephantis Serinopa* was sanctioned in G.O. No. 2239, Food and Agriculture, dated 19th November 1951, with one upper subordinate, one fieldman and two laboratory boys. This is the fourth year of the scheme. The parasites bred at this station were distributed in the districts of East Godavari, West Godavari, Guntur and Visakhapatnam. The number of parasites released under each category is given below :—

District.	Bethylids.	Elasmus.	Microbracon.	Eulophid.	Trichogramma.
East Godavari	141,750	6,300	44,300	166,000	2,585,000
West Godavari	315,750	33,790	61,500	749,000	2,330,500
Guntur	500	..	..	400	34,000
Visakhapatnam	1,040	..	..	..	..
Total	459,040	40,090	105,800	915,400	4,949,500

The total area of coconut crop covered by these parasites is 5,923 acres. In addition to the above releases, *Trichogramma* 544,000 in number were released on paddy leaf folder, in Repalli of Guntur district.

61. (b) *Coconut nursery scheme*.—A scheme for the supply of proved coconut seedlings by running a nursery was sanctioned in G.O. Ms. No. 5154, Development, dated 19th October 1948, for five years. This is the third year of work. The scheme is under the administrative and technical control of the Deputy Director of Agriculture and Oil Seeds Specialist, Coimbatore, respectively.

Seed nuts got from selected parent trees by purchase are raised in the nursery and one-year old selected seedlings are supplied to the ryots. During the year under report 27,894 seed nuts were sown, 19,200 seedlings selected and 16,281 seedlings distributed.

62. (c) *Pest Act on bud-rot of palmyra*.—The Pest Act for the control of bud-rot disease of palmyra was notified in all the three districts. In East Godavari one Special Agricultural Demonstrator with 8 Revenue Inspectors and 16 demonstration maistries, in West Godavari 5 Revenue Inspectors and 16 demonstration maistries and in Krishna only 1 Revenue Inspector are working.

A regular survey of the diseased areas is taken up 'detections' noted and 'operations' conducted wherever the ryots do not conduct operations themselves.

In Krishna and West Godavari districts, the control of the staff working in the scheme was transferred to this department only in June 1952 as per G.O. No. 478, Food and Agriculture, dated 22nd March 1952. The quantum of work turned out is given below :—

Districts.	Number of detections.	Number operated.
East Godavari	301,333	147,147
West Godavari	1,254	5,925

XII. Work through other agencies.

63. (a) *Agricultural associations.*—Agricultural associations were started long back for carrying on propaganda on improved methods of agriculture through them, but in most places they have become defunct. The revival of the defunct associations and starting of new associations or agricultural advisory committees received special attention of the Departmental staff. The total number of associations and advisory committees that were functioning during the year is given in the table below :—

	East Godavari.	West Godavari.	Krishna.
Number working	144	97	204
Taluk and village advisory committees—			
Taluk committees	13	3	3
Village committees	55	33	14

64. (b) *Honorary propagandists.*—The scheme for carrying on propaganda through honorary propagandists was extended for one more year during 1951-52 but as the work turned out by the propagandists was not according to expectations, the scheme was closed in June 1952.

XIII. Work through other Departments of Government.

65. Close co-operation with other departments of the Government was maintained for the successful running of the several grow more food schemes and all possible assistance was rendered by these departments in their execution.

XIV. Koya Uplift scheme.

66. In East Godavari, the scheme was continued during the year under report also and the work turned out is furnished below :—

Particulars.	Quantity distributed.
	TONS. LB.
Paddy seed	5 15
Jonna seed	0 480
Chilli pods	0 75
Vegetable seeds	0 48
Sunn hemp seed	2 320
Ammonium sulphate	2 1,680

Special Agency Development Officer, Kakinada, distributed the following :—

Vegetable seeds	4 lb. 10 Oz.
Mango grafts	100 No.
Coconut seedlings	25 „
Bee-hive boxes	4 „

XV. Takkavi Loans.

67. District Agricultural Officers were empowered to sanction loans for the purchase of seeds and manures up to a limit of Rs. 120 per individual ryot; and for intensive manuring of paddy lands in areas of assured water-supply. Special District Agricultural Officers were posted with powers to sanction loans up to Rs. 200 per ryot. Loans were given in the three districts and the amount distributed towards these loans during the year under report is shown in the following table :—

Nature of loan.	East Godavari. RS.	West Godavari. RS.	Krishna. RS.
(a) For purchase of chemical manures ..	8,12,670	9,20,000	11,36,310
(b) Takkavi loans for seeds and manures ..	..	8,612	2,37,730
(c) Loans for purchase of agricultural imple- ments.	..	40	1,000

XVI. Rural Welfare schemes.

68. The scheme for intensive rural development in selected firkas continued to be in operation during the year; three firkas were selected in each district and an all-round programme of development of the area to attain self-sufficiency, especially in food and clothing was drawn up and put into execution. Salient features of the work turned out for the agricultural development of the firkas are given in Appendix A.

XVII. Registered Model Farms.

69. Twenty-seven registered model farms were selected in the division with the object of carrying on all agricultural improvements in their holdings so that they could serve as models for other neighbouring agriculturists to copy and benefit therefrom. Though a few farmers were carrying out the improvements advocated by the department, most of the registered farms were not functioning as per expectation and hence the scheme was closed in June 1952.

XVIII. Crop Competition.

70. With a view to create a healthy rivalry among the ryots to produce more food-crops, the crop competition was organized during the year under report also, on the same lines as in the previous year. This year, the competition was held on the firka level, with a minimum of 25 competitors. The total number of competitors that entered the competition during the year were 2,841. The divisional prize winner was Sri K. Venkatraju of Palakoderu, Bhimavaram taluk, who produced 10,304 lb. of paddy per acre. He is the prize winner for the West Godavari district. The district prize was won by Sri A. V. Suryanarayana Raju in East Godavari and by Sri G. Venkatramayya in the Krishna district.

The crop competition fortnight was celebrated during the first fortnight of June 1952 to enlist a large number of competitors for the competition during fasli 1362, and an appreciable number of competitors was enlisted during the fortnight.

XIX. Agricultural Research Station, Samalkota.

71. A summary of work done on the Agricultural Research Station, Samalkota, is given in Appendix B.

XX. *Report on the inspections of the offices of subordinates conducted during the year 1951.*

72. The following are the offices to be inspected during the calendar year :—

- (1) Office of the District Agricultural Officer, Kakinada.
- (2) Office of the District Agricultural Officer, Eluru.
- (3) Office of the District Agricultural Officer, Vijayavada.
- (4) Office of the Superintendent, Agricultural Research Station, Samalkota.

During the calendar year 1951, all the offices noted above were inspected and inspection notes issued then and there to the concerned officers for rectification of defects.

General remarks.—No serious irregularities were noticed in any of the offices inspected in the year under report. The result of the inspections is considered satisfactory. Minor defects that could be rectified then and there got rectified. In all the offices, the maintenance of records is very poor. This is mainly due to want of a whole-time clerk exclusively for this work. The need for the provision of a record-keeper to the offices of District Agricultural Officers and that of Deputy Directors of Agriculture to maintain the records in a methodical and systematic manner, as enunciated in the District Office Manual and Departmental Manual, was emphasized many a time and in this regard proposals were submitted for the creation of a record-keeper's post.

XXI. *Madras Manure Dealers' Licensing Order and Quality and Price Control Order.*

73. One Assistant Inspector of Fertilizer, sanctioned as per G.O. No. 1826, Food and Agriculture, dated 15th September 1951, for the enforcement of Madras Manure Dealers Licensing Order and Quality and Price Control Order of manure mixtures for the division, assumed charge on 9th October 1951. Sri G. Ranganadhaswamy held the post till 17th June 1952 and he was succeeded by Sri V. Dakshinamurthy on 23rd June 1952 afternoon.

During the year 179 sale depots of licensees were inspected, 47 mills visited and 36 samples were collected for analysis. The revenue for the Government for manure licence was Rs. 28,290.

ELURU,
31st July 1952.

M. SATYANARAYANAN,
Deputy Director of Agriculture, Second Division.

APPENDIX A.

Rural Welfare Work.

(1) *East Godavari district.*—Firka Development Scheme is hereinafter be called as Rural Welfare Scheme. The scheme is working in Rajahmundry, Burugupudi and Raghudevapuram firkas. Two fieldmen and six demonstration maistris are working. The programme of work in these three firkas is the same as that of this department. The target for the taluk will be split up to the various firkas as usual. The staff working in these three special firkas will work up these targets.

Manure pits dug ..	238
Compost pits working ..	96
Seedlings planted ..	3,060
Bee-hives examined ..	183
Honey extracted ..	49 lb.

Pesticides sold :—

Zinc sulphate ..	500 lb.
Copper sulphate ..	1,000 "
D.D.T. 500 ..	42 "
Hexidole ..	471 "
Agrocide ..	22 "
Gammexane ..	229 "
Perenox ..	72 "

(2) *West Godavari district.*—The primary object of the scheme was to tap all the local resources and make the villages self-sufficient in the matter of food and clothing. To this end schemes of work drawn up in consultation and with the active co-operation of other departments were put into operation in four selected firkas, i.e., Denduluru of Eluru taluk, Polavaram of Polavaram taluk, Dharmajigudem and Kamavarapukota of Chintalapudi taluk.

Summary of work done in each firka is given below :—

Denduluru firka.—An area of 102 acres was ploughed with tractor and reclaimed. Eighty-two manure pits were dug besides rectifying 98 manure pits. One hundred and fifty-eight compost pits were also dug. An area of 55 acres of paddy seed farms were arranged out of which 330 bags of paddy seed was procured and distributed. An area of 39 acres 50 cents was brought additionally under vegetables duly supplying 52 lb. 8 oz. of vegetable seeds. Likewise an area of 62 acres was brought under fruit gardens. Pest control operations were in force duly supplying 2,080 lb. of pesticides. Bee-keeping has been advocated as side industry and 41 new hives were started extracted 61 lb. of honey. A sum of Rs. 100 was paid towards subsidy on compost-making.

There is Grama Sevak Vidyalaya at Gopannapalem wherein two batches of Grama Sevaks were trained in all methods of agricultural development. In Andhra Grama Sevak Vidyalayam, Gopannapalem, a 25 cents plot for paddy and 25 cents for vegetables were reclaimed and S.R. 26-B. paddy was grown in the paddy block and obtained 5 bags of paddy in 25 cents. A sum of Rs. 100 was obtained from the vegetable block and on tank bund.

Polavaram firka.—An area of 300 acres was ploughed with tractor and a bulldozer and was reclaimed. Intensive propaganda was carried on cattle manure preservation duly opening 255 manure pits and 565 compost pits. Paddy seed farms were also organized in an area of 52.50 acres procuring 7 tons and 1,216 lb. of paddy seed. Formed 10 agricultural associations through which all the improved methods of agriculture were introduced. Bee-keeping is being advocated as a side industry maintaining 50 colonies. Collected 500 subscriptions for *Padipantalu* journal. Pest control operations were carried on covering an area of 18 acres.

Dharmajigudem firka.—This firka consists of 58 villages. During the year an area of 6 acres was arranged under seed farms. A quantity of 1,660 lb. of improved seeds were distributed besides a quantity of 480 lb. of indigo seed, 1 ton 960 lb. of sunnhemp seed, 12 lb. of prosopis seed and 64 lb. of mesta seed.

A model farm was selected in this firka. He advocated all improved agricultural practices. The neighbouring ryots were very much benefited. The farmer was given a subsidy of Rs. 250 towards the concessions of sales of seeds and manures. An amount of Rs. 7,040 was disbursed to ryots for the purchase of manures in the intensive manuring scheme. Five thousand and seventy green manure plants were planted out of which 2,180 plants survived. Twenty-eight green manures and economic nurseries were raised. A quantity of 58 lb. of seeds of economic importance were collected.

To combat the pests and diseases, spraying and dusting operation were undertaken. The following is the acreage under several crops that were saved from pests and diseases:—

Paddy—320 acres; jonna—600 acres; turmeric—15 acres; vegetables—120 acres; chillies—415 acres; tobacco—20 acres; batavia—95 acres; gingelly—28 acres; mango—5 acres.

Eighty-five manure pits were dug and 122 were rectified. Seventy-one compost pits were opened and 156 pits were rectified.

Trials of jonna with N-1 and G-1, AKP-1 and 3 and X-1 and X-2 cumbu trials were laid out in this firka but the trials were inconclusive as the trials failed for want of rains.

The following demonstrations were conducted:—

Demonstrations with buck scraper	4
Demonstrations with turmeric polisher	8

Besides intensive propaganda was carried out regarding the use of other agricultural implements for economy and efficiency.

Kamavarapukota firka.—This is mainly a dry firka consisting of 102 villages including hamlets.

The salient features of work done in this firka:

One hundred and ten manure pits were dug and 142 were rectified; 82 compost pits were opened and 120 pits were rectified. Demonstration with dry earth system were conducted in 22 places. Propaganda was carried out for popularization of improved seed, implements and pesticides and fungicides. The following crops were saved by pest control methods due to timely help given to the ryots in spraying and dusting operations:—

Name of the crop.	Area covered and saved.
	ACS.
Paddy	290
Jonna	400
Vegetable crops	122
Chillies	66
Tobacco	48
Citrus crops	90
Gingelly	30
Mango	8
Turmeric	5

Propaganda was carried to convert waste vegetable matter and farm refuse into valuable compost manure. To encourage the ryots, in preparation of compost, an amount of Rs. 100 was paid to ryots as subsidy at Re. 1 per ton.

Three hundred and twenty pounds of green manure seeds and 1.84 lb. of improved paddy were distributed. An amount of Rs. 2,690 was disbursed for purchase of manures under the intensive manuring scheme. Four thousand four hundred and forty-six green manure plants were planted and the number survived 2,828. Twenty-two green manure nurseries were raised. A quantity of 52 lb. of economic seeds were collected. Vigorous propaganda was carried out to make this firka self-sufficient with regard to food-grains and green manure seeds. Intensive efforts are pursued to introduce new crops like cotton and mesta besides English vegetable crops which come up during the winter season.

3. *Krishna district.*—A special fieldman was placed under the administrative control of Rural Development Officer for the work connected with the scheme. The work done in the Rural Development area is given below:—

Names of taluks and firkas where the work is in progress.—Tiruvur, Vissannapeta and Nuzvid.

- 1 Number of villages in the area—225 villages.
- 2 Sale of improved strain—248 bags.
- 3 Manure heaps covered—365 numbers.
- 4 Loan amount distributed—Rs. 8,430.
- 5 Manure heaps under dry earth system—190 numbers.

APPENDIX B.

Summary of the results achieved during 1951-52 and programme of work for 1952-53 on the Agricultural Research Station, Samalkot.

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.*—Budama culture 130 and Jilama culture No. 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 Basangi cultures. None of the twenty-two Basangi duration Krishnakatukulu single plant selections, compared for yield in three separate series, have proved better than the controls SLO. 1 and SLO. 2. But among the five long duration Basangikrishnakatukulu cultures compared for yield with SLO. 15, GT. 5 and GT. 9 were observed to record higher yields than the standard. In another experiment, five promising cultures of MTU. 5 and MTU. 10 cross progenies were compared for yield and resistance to stem-borer. All the lots were erect and non-lodging but susceptible to stem-borer. Culture No. 10199 was resistant to insect attack. None of the cultures were on a par with the control SLO. 15. The cross progenies of MTU. 19 X SLO. 17 and SLO. 18 were compared for yield and resistant to stem-borer attack in two series of experiments. All the cultures were heavily infested with stem-borer. Some of the cultures have recorded higher yields than the standards but the difference in the yields were not statistically significant.

The experiment with the object of utilising 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. Iswarikorra alone following the early duration crop of paddy in the main-crop season withstood the adverse effects of the "Turupugali" and the resulting heavy infestation of the

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 X Pishanam were grown. MTU. 15, 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 from the middle of March. The extreme drought conditions revealed the intrinsic quality of drought resisting in respect of MTU. 15. Among the five varieties compared for yield, NX. 60 recorded higher yields over the control SLO. 16. None of the single-plant selections in Nallariu could-out yield NX. 60 and the control Nallariu. The trial with the late varieties was a failure as the crop could not be irrigated at the flowering and grain setting stages. In another experiment the performance of the seedlings of MTU. 15 and SLO. 12 raised from wet and dry nurseries was sought to be compared. Wet nursery seedlings were observed to be good, and preferable to secure better results. The application of phosphate to the green manure and paddy crop separately was studied. No conclusion could be drawn as the crop failed. The effect of the insecticides on the control of stem-borer, mealy bug and silver shoot was compared in another set of the series of experiment. The crop escaped the borer-attack but succumbed to drought.

V. *Crops 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 yields over SLO. 13 and SLO. 12 respectively.

VI. *Other crops.*—In the night-soil compost experiment on Bananas, the crop treated with farm-yard 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 this climate and soils. Broadcast crop of wheat recorded higher yields over the transplanted wheat. Early sowing is associated with high yield. The several green and blackgram cultures sown after the harvest of paddy did not germinate. 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 to 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 in the paddy lands. Madras Uganda I closely followed by 216F were the best of the lot and recorded 640 lb. and 550 lb. of kapas per acre. In the time of sowing-cum manurial experiment with 216 F it was observed that the crop sown early in November and manured recorded higher yields over the late-sown and unmanured crops.

Addition to the existing fruit trees were made by planting Malta Lemon Layers, Gajanimma and Sapota grafts.

The cultivation of Sesbania alongside the field bunds and Gliricidia along roadsides and boundaries of the Farm was taken up on an extensive scale. The cultivation of Crotalaria Striata and Acutifolia was not encouraging.

The juvenile labour school of the Agricultural Research Station, Samalkot, was closed on the afternoon of 31st March 1952 as per the orders of the Government.

The distribution of selected and high yielding coconut seedlings from the nursery at Samalkot continued during the year and nearly 16,281 seedlings were distributed to the ryots.

Programme of work for 1952-53.

I. *Types.*—The performance of the types will be studied as in previous years.

II. *Dry paddy.*—The seed of BC. 130 and JC. 459 will be multiplied for supply of seeds in the districts.

III. *Paddy, first crop.*—The comparison of the Rasangi and Basangi duration Krishnakatukalu cultures will be pursued with MTU. 3 as control instead of SLO. 9, SLO. 1 and SLO. 2 respectively. The comparison of the promising MTU. 5 X the MTU. 10 cross progenies will be continued during the next season. The trial of MTU. 19 X 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 for raising three crops in the double-crop wet lands and two crops in a single-crop wet lands, will be continued with the slight modifications suggested by Paddy Specialist.

IV. *Second-crop paddy.*—The cultivation of the second-crop paddy in all the types and experiments advancing the time of planting will be pursued on the same lines as before.

During the second-crop season all the experiments conducted during the year except the one wherein application of phosphate to green manure crop is contemplated, will be continued.

The crop weather study with SLO. 13 and SLO. 15 for the main crop season and SLO. 12 and MTU. 15 for the second crop season will be taken up as usual.

V. *Sugarcane.*—Co-ordinated crop weather study on Co. 419 will be continued.

VI. *Pulses.*—Yield trails and multiplication of the promising cultures of green and blackgram will be taken up.

VII. *Oil Seeds.*—The cultivation of groundnut as an after-crop to paddy will be taken up. The two strains of gingelly will be tried in comparison.

VIII. *Cotton.*—The trials with all the Asiatic types of Cotton and the several experiments suggested by the Cotton Specialist, will be laid out.

IX. *Coconut.*—The distribution of the selected coconut seedlings will be taken up.

X. *Green manures.*—The cultivation of Sesbania and Gliricidia on the station will be intensified. The cultivation of Crotalaria Striata and Acutifolia will be continued.

Financial statement.

Expenditure.			Receipts.		
RS.	A.	P.	RS.	A.	P.
53,517	8	6	6,703	12	6

APPENDIX C.

Statement showing the Permanent and Temporary Posts as on 30th June 1952 in the Second Division.

Name of Service and Post.	East Godavari.		West Godavari.		Krishna.		Total.	
	Permanent.	Temporary.	Permanent.	Temporary.	Permanent.	Temporary.	Permanent.	Temporary.
I. Madras Agricultural Service—								
Regional Deputy Director of Agriculture.	..	..	..	1	..	..	..	1
District Agricultural Officers.	1	..	1	..	1	..	3	..
Superintendent, Agricultural Research Station, Samalkota.	1	..	..	..	..	..	1	..
Additional District Agricultural Officers.	..	1	..	1	..	1	..	3
II. Madras Agricultural Subordinate Service—								
Upper Subordinates ..	17	18	10	12	10	16	37	46
Fieldmen	3	49	..	29	..	31	3	109
III. Madras General Subordinate Service—								
Demonstration Maistries.	16	72	10	74	10	77	36	223
IV. Madras Ministerial Service—								
Upper Division Clerks.	..	6	..	7	..	6	..	19
Lower Division Clerks.	7	30	5	31	5	22	17	83
Typists	..	1	..	2	..	1	..	4
V. Madras Inferior Service—								
Peons	5	5	3	8	3	3	11	16
VI. Madras Agricultural Engineering Service—								
Agricultural Engineering Supervisors.	1	1	..	2	..	2	1	5
Tractor Foremen ..	..	1	..	1	..	1	..	3
Assistant Foremen ..	..	1	..	1	..	1	..	3
Senior and Junior Mechanics.	..	1	..	1	..	1	..	3
Jeep and Lorry Drivers.	..	2	..	3	..	2	..	7
Tractor Drivers ..	..	13	..	14	..	10	..	37
Pumpset and Oil Engine Drivers.	..	6	..	10	..	8	..	24
Cleaners (Lorries and Tractors).	..	11	..	11	..	10	..	32

ADMINISTRATION REPORT OF DEPUTY DIRECTOR OF AGRICULTURE, GUNTUR, FOR THE YEAR 1951-52.

PART I.

I submit below the Annual Administration Report for the year 1951-52 for the Third Division comprising of Guntur, Kurnool and Nellore districts in duplicate.

I. Charge.—Janab Md. Khasim Adeni Sahib was in charge of the division till 14th June 1952 and I took charge from 18th June 1952 and continued for the rest of the period under report. The Deputy Director of Agriculture, Cuddapah, held additional charge of the division for the brief period of four days from 14th to 18th June 1952.

Staff.—The following District Agricultural Officers were in charge of the districts for the periods noted against them :—

Period of charge.

Guntur district—

1. Sri P. L. Narasimham .. 1st July 1951 to 30th June 1952.

Nellore district—

2. Sri G.V. Ratnam .. 1st July 1951 to 30th June 1952.

Kurnool district—

1. Sri T. Krishnareddi .. 1st July 1951 to 16th April 1952.

2. Sri M. Jeevanrao .. 17th April 1952 to 30th June 1952.

The Special Intensive Manuring Scheme was manned by the following additional District Agricultural Officers in Guntur and Nellore districts for the period noted against them :—

Guntur—

Sri S. V. Ramachandran .. 19th May 1951 to 30th November 1951.

Nellore—

Sri A. K. Annaswami Ayyar 12th May 1951 to 30th November 1951.

II. Seasonal conditions.—The rainfall which precipitated in the three districts of the division is enumerated below :—

	Guntur.	Nellore.	Kurnool.
	INCHES.	INCHES.	INCHES.
South-west monsoon	11.83	7.37	11.25
North-east monsoon	3.67	10.15	2.74
Hot weather	4.00	22.50	14.45
Total ..	19.50	40.02	28.44

In general it was found that the south-west monsoon rains were meagre and the north-east monsoon was a total failure in the division. In the hot weather (during the third week of May 1952) there was unprecedented rainfall in Kurnool and Nellore districts. The tanks in Nellore district got

filled up and enabled Kesari, a short duration variety, to be raised in about 20,000 acres. The start of the south-west monsoon was timely in Guntur, but due to failure of subsequent rains the early crops like groundnut, sajjja, jonna, korra did not give normal yields. The north-east monsoon was a complete failure resulting in poor yields recorded for chillies, tobacco, variga, jonna, cotton, etc. Due to food and fodder scarcity the agricultural population of the upland taluks of the Guntur district migrated to the wet-land taluks.

In Nellore district, the south-west monsoon started timely in July and with the Pennar freshes paddy transplantation was commenced. But subsequently there were no rains till November which not only hampered the completion of paddy transplantation but reduced the yields of all early crops. The north-east monsoon was a complete failure and the district which solely depended upon this monsoon suffered appreciably. Severe drought prevailed in the Pennar delta. The yield of dry crops (millets) was far below the average.

In Kurnool district the season started well in July. But due to the drought that prevailed subsequently and on account of the complete failure of the north-east monsoon dry crops like groundnut, jonna, korra, etc., failed and recorded very low yields. Four taluks, namely, Banganapalle, Koilkuntla, Giddalore and Markapur were declared as 'famine-affected'. There was an unusual heavy rainfall of 18" to 20" received in a couple of days in the third week of May 1952 and thousands of cattle about 7,000 and sheep about 75,000 perished throughout the district on account of this down pour of rain. All the irrigation tanks received enough water to raise paddy crop early in the season.

III. Food Production drive.—

	Guntur.	Nellore.	Kurnool.
(a) Increased area brought under food-crops (acres).	20,821	41,825	15,615
(b) Number of new wells sunk	158	433	418
Number of old wells renovated	150	423	174
(c) Fresh area brought under irrigation (acres).	1,262	2,523	3,735
(d) Area under non-food crops diverted to food crops.			
Cotton (acres)	..	1,521	2,390
Groundnut (acres)	680	1,060	6,030
Tobacco (acres)	850	146	870
Chillies (acres)	40	1,831	870
(e) Additional area brought under short-term food-crops such as paddy, ragi, cholam, korra, cumbu, etc.	779	23,370	15,084
(f) Additional area brought under sweet potato (acres).	192	85	85
(g) Percentage of increase in the production of food-crops in the fasli as compared to last fasli.	— 15	..	— 25
(h) Quantity of seeds and manures distributed free or at concessional rates, area covered and additional quantity of food production—			
	Quantity in tons.	Area covered in acres.	Additional quantity of food produced.
	TONS. LB.		TONS. LB.
1 Vegetable seeds	0 43	223	249 0
2 Groundnut oil-cake	0 240	1	1 0
3 Phosphatic manures	2,102 0	60,889	1,979 0

(i) Extent of waste lands brought under cultivation and consequent approximate production of food-grains—

	Area in acres.	Food-grains produced.
		TONS.
Guntur	1,173	407
Nellore	1,698	418
Kurnool	1,069	137

(j) Distribution of manures—

Name of manure.	Quantity.	Area covered.	Approximate additional quantity produced.
	TONS. LB.	ACS.	TONS. LB.
Ammonium sulphate	9,166 0	225,446	18,108 0
Phosphatic manures	2,162 0	60,889	1,979 0

IV. Agricultural education.—Free distribution of leaflets, bulletins, sale of villagers' calendar and guide, sale of "Padipantalu" journals, encouraging ryots to listen to the rural programmes of the All-India Radio, giving special training to the executive officers of the Local Boards, Revenue Officers and school teachers holding agricultural exhibitions in important centres, etc., are the items of work tackled by the department. The subscribers to the "Padipantalu" journal were 3,626 in Guntur, 6,220 in Nellore and 1,540 in Kurnool. Lectures were given by the staff during the "Vanamahotsava" week and the Compost Celebration week and during the jamabandi meetings.

V. Agricultural research.—In Guntur district, groundnut trials with strains TMV 2, 4515, 6481, 4218, 4111 were conducted along with local. It was found that TMV 2 and 4218 gave higher yields. In the cotton trial plot at Gurajala with 336 B, C1, RH 25, it was found that 336 B proved better than the other strains. In Chirala EC 4561 ragi was tried and it gave higher yield than the local.

In Nellore district, dry paddy strains MTU 17, ADT 22, Co 17, ASD 4 were tried. Due to unprecedented drought conditions the trials were a failure in all the places tried. It was found that ADT 22 and ASD 4 were better than local.

In the main season, MTU 19, Co 25, Co 26, and PTB 16, and Co 18 and Co 13 in the second crop season were tried. No conclusive results were obtained due to failure of the season.

In Kurnool district, trials with strains in millets, cotton, sweet potatoe, groundnut and castor were conducted but due to the failure of the season the results were not conclusive.

VI. Crop improvement.—A statement showing the improved varieties of crops, the quantity of seeds distributed and the area covered is given below :—

	Guntur.		Nellore.		Kurnool.	
	Quantity distributed.	Area covered.	Quantity distributed.	Area covered.	Quantity distributed.	Area covered.
	TONS.	ACS.	TONS.	ACS.	TONS.	ACS.
1 Improved paddy strains ..	1,154	1,10,684	1,398	97,860	108	4,604
2 Improved millet strains ..	19	3,600	2	680	164	53,188
3 Improved chilli strains (lb.).	3,570	360	..	..	..	..
4 Improved tobacco seed (lb.).	3,969	64,000	..	..	..	..

VII. *Agricultural industries.*—Bee-keeping is the industry that was encouraged. During the year the special scheme was in operation in Guntur district with three maistris one at Tenali, one at Repalle and the other at Bapatla. Seventy-nine new colonies were started in Guntur district in addition to the 234 already existing. In Nellore district 14 new hives were added to the existing 53 colonies. Due to adverse seasonal conditions, there were many desertions.

VIII. *Agricultural engineering.*—In Guntur district, this section continued to be under the control of the Assistant Agricultural Engineer attached to the Agricultural College, Bapatla. The land development scheme of clearance and reclamation of waste lands by mechanical cultivation with the use of tractors and bull-dozer was carried out in 10,471 acres in Guntur district. A special innovation in the Guntur district was the designing and manufacture of filter points in Tenali and installing filter point tube wells. These filter points have a bright future in the district where water table is high and where electricity is available. In Guntur district about 30 filter point tube-wells were installed. In Kurnool this work is yet to be taken up.

In Nellore district, two tractors were added to the existing 11 tractors and the area tackled was 1,744 acres. Nineteen oil engine pump-sets were supplied during the year bringing the total to and the area tackled was 2,108 acres. The total hire charges realized in Nellore district were Rs. 1,10,659 and the amount realized by the sale of pipes and fittings was Rs. 16,787.

In Kurnool district, there were four tractors and four bull-dozer which tackled an area of 2,565 acres and a sum of Rs. 31,303 was realized as hire charges. There were 16 oil-engine pump-sets which tackled an area of 184 acres.

IX. *Agricultural marketing.*—The Guntur Tobacco Market Committee extended its operations to Mangalagiri also and the ryots availed of its benefits. The transactions occurred in the market yards both by auction and by private negotiations. The Indian Leaf Tobacco Development Company opened a new branch at Giddalore where Virginia is spreading for the purchase of tobacco. The Cotton and Groundnut Marketing Society at Nandyal was functioning during the year.

X. *Demonstration and propaganda.*—During the year the following demonstrations were conducted with improved seeds, manures and implements. Honorary propagandists three in Guntur and three in Nellore districts continued to disseminate the knowledge about the improved methods of agriculture in their respective centres. As their usefulness was not effectively felt, the Government abolished these posts with effect from 30th June 1952. Ocular demonstrations were given in the model farms in each taluk. These model farms which were run on a subsidised basis were also closed towards the end of the year. However, they are being organized on a non-subsidised basis. A new fillip was given in the year for the formation of village Advisory Committees and revival of the old and defunct ones. The targets fixed was one for each village.

	Guntur.	Nellore.	Kurnool.
(1) Demonstration plots	567	163	88
(2) Number of propaganda meetings held—			
(a) By Agricultural Demonstrators	89	1,987	544
(b) By District Agricultural Officers	45	60	36
(3) (a) Number of exhibitions held	11	17	6
(b) Number of visitors received	1,116	1,09,700	29,020

	Guntur. T. LB.	Nellore. T. LB.	Kurnool. T. LB.
1) Improved seed distribution—			
(a) Paddy—			
(i) Quantity of improved seeds distributed	1,267—0	1,397—1,949	108—971
(ii) Area covered in acres	1,34,400	97,860	4,604
(iii) Additional quantity produced in tons	8,710—0	3,495—0	349—1,636
(b) Millets—			
(i) Quantity of seed distributed	15—0	2—277	164—1,612
(ii) Area covered in acres	2,637	692	53,188
(iii) Additional quantity produced in tons	33—0	16—800	570—970
(c) Green manure seeds—			
(i) Quantity of seeds distributed	6—818	115—1,453	25—1,419
(ii) Area covered in acres	1,210	9,362	1,545
(iii) Additional quantity produced in tons	154—0	2,020—0	208—2010
2) Details of seed multiplication schemes—			
(a) Paddy—			
(i) Area under seed-farms in acres	2,027	2,520	573
(ii) Quantity of seeds produced in tons	1,820—0	1,080—0	315—235
(iii) Quantity of seeds distributed in tons	1,154—0	1,397—1,949	98—1,723
(iv) Area covered by the seed in acres	1,10,684	97,860	3,706
(b) Millets—			
(i) Area under seed-farms in acres	338	32	2,679
(ii) Quantity of seeds produced in tons	18—1,158	0—96	494—1,145
(iii) Quantity of seeds distributed in tons	18—1,158	2—166	160—1,242
(iv) Area covered in acres	3,600	680	52,876
(c) Green-manure seeds—			
(i) Area under seed farm in acre	..	..	1
(ii) Quantity of seed produced in tons	..	..	0—450
(iii) Quantity distributed in tons	..	115—1,453	25—1,419
(iv) Area covered in acres	..	9,362	1,545
(d) Pulses—			
(i) Area under seed-farms	..	..	7
(ii) Quantity produced in tons	..	..	1—0
(iii) Quantity distributed in tons	..	..	0—120
(iv) Area covered in acres	..	..	7
(e) Oil seeds—			
(i) Area under seed farms	..	2	16
(ii) Quantity produced	..	..	3—150
(iii) Quantity distributed in tons	..	1—590	0—1,423
(iv) Area covered in acres	..	20	17
(f) Tobacco—			
(i) Area under seed-farms	60	..	..
(ii) Quantity produced (b.)	3,969	..	..
(iii) Quantity distributed (lb.)	3,969	..	..
(iv) Area covered in acres	64,000	..	..
(g) Chillies—			
(i) Area under seed farms	10	..	..
(ii) Quantity produced (lb.)	3,570	..	..
(iii) Quantity distributed (lb.)	3,570	..	..
(iv) Area covered	360	..	..
(h) Cotton—			
(i) Area under seed farms in acres	800	..	1,360
(ii) Quantity produced in tons	40—0	..	38—0
(iii) Quantity distributed in tons	34—0	..	26—0
(iv) Area covered in acres	2,963	..	1,510

Total area under improved strains crops in acres.

				Guntur.		
				Departmental spread.	Natural spread.	Total.
(1)	(2)	(3)	(4)			
1 Paddy	134,400	298,765	433,165			
2 Cholam	3,958	43,000	46,958			
3 Ragi	261	120	381			
4 Korra	1,195	500	1,695			
5 Cotton	2,863	Nil.	2,863			
6 Chillies	345	15,200	15,545			
7 Groundnut	63	Nil.	63			
8 Castor	Nil.	Nil.	Nil.			

				Nellore.		
				Departmental spread.	Natural spread.	Total.
(5)	(6)	(7)				
1 Paddy	97,860	27,590	125,450			
2 Cholam	Nil.	Nil.	Nil.			
3 Ragi	50	2,600	2,650			
4 Korra	10	500	510			
5 Cotton	1,843	50	1,893			
6 Chillies	2	1,150	1,152			
7 Groundnut	10	200	210			
8 Castor	10	3,000	3,010			

				Kurnool.		
				Departmental spread.	Natural spread.	Total.
(8)	(9)	(10)				
1 Paddy	14,253	34,502	31,026			
2 Cholam	69,849	240,413	31,026			
3 Ragi	12	785	79			
4 Korra	90,938	112,270	20,320			
5 Cotton	11,396	48,870	6,006			
6 Chillies	5,217	10,887	15,904			
7 Groundnut	25,059	24,820	49,879			
8 Castor	..	..	..			

			Number distributed.	Area covered (acres).
(6) Fruit plants—				
Mango	..	..	4,233	62.70
Citrus	..	..	3,103	48.25
Plantains	..	..	2,400	3.00
Coconuts	..	..	1,997	17.50
Pineapples	..	..	325	5.25
Papaya	..	..	2,160	20.00
Sapota	..	..	826	18.00
Cashewnut	..	..	1,200	15.00
Others	..	..	100	15.00

(7) *Sugarcane*.—The area under sugarcane in this division is 90 acres only, most of which is under Co. 419. Cultures 400 and 401 were tried at Nandyal, but failed for want of water.

(8) *Fodder*.—The following are the areas under fodder crops:—

	Guntur.	Nellore.	Kurnool.
(a) Normal areas in acres	156,469	63,818	3,968
(b) Additional area under fodder including natural spread	6,415	33,200	3,898
(c) Quantity of fodder seeds supplied (tons)	2—220	2,400	Nil.

slips of Napier grass.

(9) *Pulses*.—It has become a practice in upland taluks of Guntur district to take an early variety of greengram known as "Kommu-Pesara"—Phaseolous Sp.—a variety of three months duration in the punasa season. This is sown in May-June along with the early rains and it is harvested in September. If it fails to give pods it is ploughed in as a green manure crop for the succeeding main crop that comes up in October-November. It has also been a common practice to grow blackgram or greengram after the paddy harvest in the wet lands of the delta taluks.

	Guntur.	Nellore.	Kurnool.
(a) Additional area brought under cultivation	9,260	60	1,092
(b) Estimated quantity produced	1,150	8	53

(10) *Chillies*.—G. 1 chillies is the improved strain that has become popular in the division. The special scheme of G. 1 chilli seed multiplication was in operation in Guntur district with a staff of one Agricultural Demonstrator and two maistries under the administrative control of the District Agricultural Officer, Guntur. Three thousand seven hundred and fifty pounds of seed pods were produced from the seed farm area of 10 acres. This seed was sent to all the Demonstrators in the State.

	Guntur.	Nellore.	Kurnool.
(a) Normal area in acres	79,000	13,197	52,365
(b) Quantity of improved seeds (pods) distributed in lb.	3,750	33	1,926
(c) Area covered by improved seeds	625	17	6,341
(d) Estimated additional production in tons	27	1	19

(11) *Oil seeds*.—In spite of the fact that groundnut is one of the major commercial crop in the division, there is yet no popular strains to replace the local varieties.

	Guntur.	Nellore.	Kurnool.
(a) Normal area in acres	301,550	47,729	575,274
(b) Quantity of improved seeds distributed in pounds (lb.)	1,890	1—1,054	1—242
(c) Area covered by improved seeds (acres)	45	23	30
(d) Estimated additional production in tons	3	1	8

(12) *Fibre crops*.—Special seed multiplication schemes were in operation in Guntur and Kurnool districts. In Guntur district a special Agricultural Demonstrator was in charge of C. 1 and 336 B Cotton seed farm in 800 acres.

	LB.
Quantity of kapas purchased	134,917
Quantity of seed obtained	89,125

In Kurnool district, 881 F. under seed farm conditions in an area of 800 acres was organized. Quantity of seed distributed was 26 tons and the area covered was 5,010 acres. Propaganda was done in the division by the Special staff of Assistant, Cotton Extension Scheme for the spread of Cotton H. 420 cotton received from Madhya Pradesh was sown as a mixture in groundnut, etc., in the early season. The yield of kapas averaged to one hundred pounds per acre in the mixture. In Rice Fallows P. 216 F. cotton was tried with encouraging results. In spite of legislation and propaganda, chilli, cotton, mixture did not gain popularity in the tract.

(13) *Tobacco*.—The scheme for production of H.S. 9 tobacco was in operation in Guntur district during the year. Two acres of nursery was raised in Bapatla College Farm and the main seed farm planting was done in an area of 60 acres. The seasonal conditions were not favourable for the tobacco crop. Three thousand nine hundred and sixty-nine pounds of H.S. 9 seed was produced to cover an area of 63,000 acres. The entire expenditure of the

scheme was borne by the State. In the previous years the expenditure was shared by the Indian Central Tobacco Committee and the State Government on a 50 : 50 basis.

(14) *Tree Planting*.—During the Vanamahotsava week and during the rest of the year, seedlings and sapplings of the following varieties were planted :—

	Guntur.	Nellore.	Kurnool.
Glyricidia	245,323	193,185	341,383
Pungam			
Tamarind			
Gold Mohar			
Raintree			
Sesbania			
Neem			
Luceana			
Millingtonia			
Prosopis			
Agathi			
No surviving of the above	10 per cent.	10 per cent.	10 per cent.

(15) *Manures*.—(a) *Compost making*.—

(i) Rural compost—					
District.	Number of villages.	Quantity produced in TONS.	Amount of subsidy paid. TONS.	Estimated increase in production. TONS.	
Guntur	700	6,643	6,643	150	
Nellore	619	6,827	6,000	170	
Kurnool	278	2,653	2,206	187	

(ii) Town compost—					
District.	Number of panchayats and municipalities.	Quantity of compost produced. TONS.	Estimated increase in production. TONS.		
Guntur	8	460	230		
Nellore	18	7,795	195		
Kurnool	14	8,779	239		

(b) *Cattle manure*.—

(i) Pit system—					
		Guntur.	Nellore.	Kurnool.	
(a) Number of pits opened		2,439	3,783	3,180	
(b) Number of pits renovated		1,743	2,688	3,881	
(ii) Byre system—					
(a) Number started		250	124	8	
(b) Number renovated		238	66	13	
(iii) Loose box system—					
(a) Number started		1	80	3	
(b) Number renovated		Nil.	6	16	
(iv) Dry earth system		2,210	4,008	1,428	
(v) Trench system		16	604	613	

(c) *Green manure*.—

(i) Total quantity of seeds distributed in tons ..	8-818	115-0	25-0
(ii) Area covered in acres	1,210	9,747	1,884

(16) *Agronomy and soil conservation*.—

	Guntur.	Nellore.	Kurnool.
(a) Terracing (acres)	7	103	23
(b) Levelling (do.)	200	486	391
(c) Construction of spill way and gully plugging (acres)	30	4	26
(d) Contour bunding (acres)	501	638	60
(e) Hedge planting	137	465	370
(f) Contour planting and ploughing (acres) ..	480	519	1,348

(17) *Plant protection work*.—Thrips on chillies, field rats in paddy, jonna ear head bug, Epilachna on brinjals were the major insect pests tackled in the division. Thrips on chillies were controlled in an area of 2,094 acres, by the use of 5 per cent gammoxene dust and agroicide. In Nellore district swarming caterpillar, leaf-roller and grass-hoppers on paddy and beetles, on brinjals were the major pests. The total area dealt with against these pests was 2,449 acres in Nellore district in Kurnool district grass hoppers on Korra, Mango hopper and chilli thrips were tackled in an area of 820 acres.

Amongst the plant diseases, short smut on cholam, foot rot of paddy mildew on chillies, leaf spot on turmeric, dieback in citrus were the important diseases tackled during the year in the division.

(18) *Exhibitions and fairs*.—In Nellore district a major Agricultural exhibition was held in connexion with the Ranganayakulu Car festival. This exhibition was opened by Sri A. B. Shetty, Minister for Agriculture. Other minor exhibitions were conducted in Kurnool and Guntur districts in connexion with Mahasivaratri in which the department displayed all the important exhibits.

(19) *Extension service schemes*.—Honorary propagandists three in Guntur district and three in Nellore district continued to assist the department in propaganda work. As their work was not effectively felt the Government have abolished these posts, towards the end of the year under report.

(20) *Loans*.—

Nature of loan.	Name of district.	Target fixed. RS.	Target attained. RS.	Additional food production anticipated. TONS.
(a) Takkavi loans for seeds and manures.	Guntur ..	40,000	39,210	200
Do. Nellore ..	Nellore ..	1,00,000	98,530	..
Do. Kurnool ..	Kurnool ..	..	5,140	20
(b) Loans under intensive manuring scheme.	Guntur ..	6,00,000	60,41,200	3,500
Do. Nellore ..	Nellore ..	7,00,000	7,00,040	..
Do. Kurnool ..	Kurnool ..	..	67,610	180
(c) Loans for purchase of Agricultural implements.	Guntur ..	..	..	..
Do. Nellore ..	Nellore ..	..	1,200	..
Do. Kurnool ..	Kurnool ..	..	..	..

(21) *Registered model farms*.—There were 9 Farms in Guntur district 13 in Nellore district and 10 in the Kurnool district. The several improvements advocated by the department were demonstrated in these farms as far as possible. The subsidy for these farms was withdrawn with effect from 1st July 1952. However the model farms on a non-subsidized basis are being continued.

(22) *Rural reconstruction*.—Special firka development work was in operation in Ongole taluk of Guntur district, Nellore and Rapur taluks of Nellore district and Markapur taluk of Kurnool district. With the help of the special staff intensive propaganda was taken up in all these centres.

(23) *Crop competition*.—To give an impetus for maximum production of paddy this was continued this year also. Prizes were instituted at Firka, Taluk, District and Regional levels, the prizes being awarded in kind and

cash. There were 1,001 competitors from Guntur, 544 from Nellore, and 51 from Kurnool. The following were the recipients of the prizes for the three districts :—

District.	Name of the ryot.	Taluk.	Maximum yield of paddy wet weight per acre.
			LB.
Guntur ..	Jetti Venkatasubbiah ..	Tenali ..	8,067½
Nellore ..	Sri Katamreddi Ramireddi ..	Kovur ..	7,480
Kurnool ..	Sri K. Venkatamurty ..	Kurnool ..	6,650

The regional prize was awarded to Sri Jetti Venkata Subbaiah of Guntur district.

XI. *Administration and supervision.*—I have inspected the following offices during the year under report :—

- (1) District Agricultural Officer's Office, Guntur (August 1951).
- (2) District Agricultural Officer's Office, Kurnool (November 1951).
- (3) Agricultural Research Station, Lam (December 1951).
- (4) District Agricultural Officer's Office, Nellore (May 1952).
- (5) District Agricultural Officer's Office, Guntur (June 1952).
- (6) Agricultural Research Station, Nandyal (June 1952).

XII. *General.*—Though two years have lapsed since the sales section of the trading schemes was transferred to the co-operative societies, the Agricultural department has still to bear the brunt in acting as wholesale stockists of manures for distribution to the co-operative societies and tenderer firms. The several returns and accounts to be rendered by the Agricultural Demonstrators continue and they do not feel relieved much by the present arrangement.

A statement showing the strength of staff working in the division is shown in Annexure I.

The programme of District work for the year 1952-53 for the division is given in Annexure II.

GUNTUR,
2nd September 1952.

G. RAMACHANDRAN,
Deputy Director of Agriculture.

PART II.

Research.

Agricultural Research Stations at Nandyal, Lam and Rice Research Station, Buchireddipalem, were under the administrative control of this division.

I. *Agricultural Research Station, Nandyal R.S.P.O.*—(1) *Charge.*—Sri M. Venkobarao was incharge of the station throughout. The millet improvement work of the Station was in charge of the Assistant Millet Specialist, Striga Scheme, Nandyal.

(2) *Staff.*—The persons holding charge of the various posts are furnished below :—

Nature of the post.	Number of posts.	Name of the incumbent.	Period of duty.
1 Farm Manager ..	2	1 Sri M. K. S. Asirvadam ..	Throughout.
	2	2 Sri M. D. Venkatesam ..	27th July to 31st December 1951.
		Sri M. S. Narayana Reddi.	3rd January 1952 to date.
2 Cotton Assistant 4 (plus 2)			
(a) Scheme posts ..	2	1 Sri M. Rama Rao ..	Throughout.
		2 S.O. Chowdary ..	Upto 7th July 1951.
		Sri B. Gopalan ..	21st August to 26th September 1951.
		Sri V. Dhananjayarao ..	27th September 1951 to date.
(b) Permanent Assistants.	2	1 Janab Syed Mahaboobali.	Throughout.
		2 Janab Md. Waizullah ..	20th September to 27th September 1951.
		Sri J. Venkatarreddi ..	22nd November to 3rd December 1951.
		Sri P. Balasubramanyam.	23rd December 1951 to 19th May 1952.
3 Fieldmen ..	(1 + 5).		
Farm Posts ..	1	Sri S. G. Sambiah ..	Up to 13th September 1951.
		Sri N. Naganna ..	19th November to 20th December 1951.
		Janab S. Peeransahib ..	21st December 1951 to date.
Scheme posts ..	5	1 Sri P. Ramaswamy ..	Throughout.
		2 Janab P. Adamsahib ..	Up to 14th June 1952.
		Sri M. C. Nagojirao ..	From 15th June 1952.
		3 Janab S. Peeran-Sahib.	Up to 23rd September 1951.
		Janab S. Khaja Maiah ..	From 23rd September 1951 to date.
		4 Sri G. Ramaswamy ..	From 23rd up to 23rd July 1951.
		„ K. Balankireddi ..	From 6th August 1951 to 24th September 1951.
		Janab N. M. Akbar ..	From 25th September 1951.
		5 Sri S. Venkateswarlu.	Up to 1st February 1952.
		„ S. G. Sambaiah ..	From 17th March 1952.
4 Lab-attenders ..	2	1 Sri M. C. Nagojirao ..	Up to 11th August 1951.
		Sri P. Subbarao ..	From 11th August 1951.
		2 Sri Z. P. D. Money ..	Up to 11th August 1951.
		„ V. Prasadarao ..	From 20th August to 15th October 1951.
		Janab S. Yasinmiah ..	From 16th October 1951.

It may be seen that one Farm Manager, two Cotton Assistants, one fieldman and one store-keeper continued throughout without break. The other posts were held by more than one incumbent during the year.

Season.—There was a total of 32.54 inches of rain received in 62 days. Its distribution as against normal is given below :—

	During the season.		Normal.	
	Rainfall.	Days.	Rainfall.	Days.
	INCHES.		INCHES.	
South-west Monsoon ..	12.56	40	19.27	42
North-east Monsoon ..	1.50	9	5.07	13
Hot weather period ..	18.48	13	3.83	10
Total	32.54	62	28.17	65

It may be seen that the total rainfall is mainly due to unprecedented rains in the hot weather. The rainfall that affected the cropping during the year was very much short. South-west monsoon had about 7 inches less than normal and North-east monsoon was practically a failure. The rains were timely for groundnut, redgram and other early crops. There was however drought due to which all the crops failed practically. Cotton sowings were late by about a fortnight while jonna seedling was done in normal time. Due to the prevalence of Pyrugali jonna alone matured and ripened earlier than usual and yielded well. Cotton was poor. Groundnut bunch was better than spreading. Paddy also yielded lower than normal due to insufficiency of water in the channel. Thus the season in general was unfavourable to most of the crops and favourable to jonna.

Progress of work during the year—1. Crop improvement.—Breeding work was continued on Patcha jonna and White Northern Cotton.

(a) In Sorghum, work on Mungari Patcha Jonna was continued. The three mungari types N.J. 6, 16 and 20 which are establishing in Pattikonda, Dhona and adjoining area, were given station numbers as N. 10, N. 11 and N. 12. The juicy and pithy strains N. 1 to N. 9 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.—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 cotton crop failed in most all the taluks in the district and the trials with the new strains could not be depended upon. Spinning and Micro-spinning test reports on the selections tried, revealed that many of them were as good as N. 14 in quality and they possessed 5 to 8 per cent more ginning. The unusually bad season prevents drawing conclusions and necessitates further trials in the coming season.

(c) Other crops.—Bunch groundnut trials were conducted for a third year. TMV 2 was found to be as good as local this season. 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 (Bangarutheegalu selections) were sown for seed multiplication. No. 6612 gave slightly better yield than GEB 24 and is finer. It is nearly of the same duration as GEB 24 and appears desirable.

(3) Experiments on cotton extension.—Trial of early varieties of cotton as mixture with groundnut was continued. 881 F was found to yield highest this season though late by a fortnight than the other varieties like 197-3, H. 420, Umri and Pratap. The reduction of yield of groundnuts due to mixture of cotton was non-significant and the yield of cotton more than compensated the reduction of groundnut yield.

Cotton as mixture with either korra or groundnut was found to be more paying than redgram mixture.

Other schemes.—(1) Training of fieldmen and maistries for a period of six months from 1st July 1951 to 31st December 1951 was in operation during the year. Sri S. Lakshminarayana Panthulu was the Special Agricultural Demonstrator in charge of the training. A batch of 32 fieldmen and 15 maistries were trained.

(2) N. 14 Certification Scheme of 1951 season continued up to 15th August 1951. This scheme had one Cotton Assistant, one fieldman and two maistries. I was in charge of the whole scheme. By the end of the period nearly 3,000 bales were certified. The certified cotton obtained about Rs. 100 more than the local white Northern, per Bombay candy. The benefit estimated to the cultivators was about Rs. 3,00,000. Financially also this scheme was profitable.

Details of improved seeds of different crops distributed during the year are furnished below :—

Name of improved strains.	Quantity distributed.	Probable area that can be covered.	
		LB.	ACS.
N. 14 cotton seed	1,213	120	
881 F. cotton seed	90	8	
Jonna strains	18,003	3,000	
N. 1. Korra	808	80	
Paddy GEB 24	4,000	160	
S.R. 26. B	880	35	
6612	1,280	50	

*Progress 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. The strains for multiplication are GEB 24, SR 26B and No. 6612 in paddy, N. 1 to N. 12 in jonna, N. 1 korra, N. 14, 5202 and 5975 in cotton T.M.V. 2 and T.M.V. 3 groundnut and No. 37 in redgram.

Experiments on cotton extension such as groundnut, cotton mixture, trials and intersowing of cotton in groundnut, conduct of manurial cum residual effects of leguminous crops for increasing cotton yields will be conducted.

Observational trials to study the possibilities of raising green manure crops insitu and ploughing in as green manure for increasing sorghum yields will be laid out with a view to lay out regular experiments as required by the Government Agricultural Chemist.

*Millets work of the Agricultural Research Station, Nandyal R.S. & P.O.—*The Assistant Millet Specialist Striga Scheme continued to be in charge of the millets work of the Agricultural Research Station, Nandyal. Sri K. Prasada Rao, Millet Assistant, was transferred to Agricultural Research Station, Hagari, and Sri A. V. Parthasarathi joined duty as Millet Assistant at the Agricultural Research Station, Nandyal, on 23rd August 1951.

*Season.—*A total rainfall of 36.5 inches was received during the year commencing from 1st June 1951 and ending with 31st May 1952 as against the average rainfall of 28.5 inches over 46 days for the past ten years. Seasonal conditions in the early part of the year was encouraging while droughty conditions prevailed in the later part of the year due to the failure of north-east

monsoon rains. In spite of the adverse seasonal conditions the jonna crop in the black soils gave satisfactory yields due to the influence of "Pyrugali" in the cold weather. Unprecedented heavy rainfall was received in the last week of May 1952 causing lot of damage to cattle sheep and cultivated fields.

Progress of work.—"Mungari Patcha Jonna".—Selection work in Mungari Patcha Jonna continued during the year with the collections made from Anantapur and Bellary districts. Five promising selections of Bellary district and six from Anantapur have been advanced for district trials during 1952-53. Strains N. 10, N. 11 and N. 12 were raised in seed multiplication plots in Dhona and Pattikonda taluks of Kurnool district.

Pithy, Juicy and Gundu Patcha Jonna selections.—Pure culture and seed multiplication plots were maintained for all the standard strains under distribution in Kurnool and Cuddapah districts.

District trials.—Under "Mungari" selections N.J. 41 was found to be suitable for Sandur taluk of Bellary district. In the juicy stemmed selections, N 1 Jonna tried in Guntur and Nellore districts was a failure in most of the places due to adverse season, excepting at Tanguturu village of Guntur district where a record yield of 2,000 pounds of grain per acre was obtained.

Striga Scheme work—Agronomic experiments for Striga Control.—Regular experiments were commenced at Coimbatore and Nandyal centres in (1) Trap cropping, (2) Hand weeding and spraying and (3) Deep summer cultivation experiments. At Lam and Hagari Centres the Agronomic experimental sites were reinfected with striga seed and sown to bulk jonna crops. Satisfactory striga infection was established in these areas in all the four experiments and regular experiments will commence from 1952-53 season. Work is in progress as per approved programme.

Selection and Hybridization.—Sorghum selections were under trials for testing their striga resistance character at the various centres of Striga scheme work. Promising selections are taken for further tests. From the crosses made between the standard strains of each centre and A.S. 4003, the reputed striga resistant variety, F. 1s were picked for further study. Fresh crosses were also made using A.S. 4003. "Bonganahils" is the male parent. Further studies are in progress with a view to evolve striga resistant sorghum selections.

II. Agricultural Research Station, Lam P.O., Guntur—Charge and Staff.—Sri L. Neelakantan, Assistant Cotton Specialist, was in charge of the station throughout the period under report. Sri K. Ramamohana Rao was in charge of the post of Farm Manager I from the commencement of the year till 7th September 1951 when he was relieved by Sri P. Sundara Rao, Farm Manager II, consequent on his transfer from the station. Sri V. V. Krishnaiah joined duty as Farm Manager I and continued as Farm Manager I during the remaining period. Sri P. Sundar Rao proceeded on leave and Sri B. R. K. Paramahansa, posted in the vacancy, joined duty on 5th December 1951 as Farm Manager II and continued in the post. Sri V. S. R. Anjaneyulu, Cotton Assistant, was in charge of cotton and coriander work throughout the period.

Sri M. S. Narasimhamurti, the orchard fieldman, was transferred to Polavaram and was relieved on 24th March 1952. The post was vacant till 25th June 1952 and Sri K. Subbareddi posted as orchard fieldman reported to duty on 25th June 1952 and continued.

P. J. Johnson, Cotton fieldman, continued to work up to 16th December 1951 when Sri G. Kameswara Rao relieved him. Sri G. Kameswara Rao and Sri K. V. Narasimham continued as fieldmen in cotton during the period. Sri G. Kameswara Rao was Farm clerk till 16th September 1951 and proceeded on medical leave. Sri V. Prasada Rao, his substitute, reported to duty on 5th October 1951 and continued work in the remaining period. Sri V. Suryanarayana, the store-keeper, was relieved on 17th August 1951 consequent on his transfer to Agricultural Research Station, Nandyal. He was reposted as store-keeper on the station and joined duty on 1st November 1951 and continued to work during the remaining period.

(1) *Season.*—A total rainfall of 25.20 inches was recorded on 44 days as against the normal rainfall of 30 inches for the station. The rainfall was well distributed in the South-west monsoon. The North-east monsoon recorded only 5.60 inches of rain and the continued drought that prevailed from November to January end affected adversely all the late-season crops particularly cotton, coriander and chilli. During the period of hot weather 4.14 inches of rain was recorded.

(2) *Crop Improvement.*—The work on cotton, coriander, groundnut, tobacco and miscellaneous crops was continued and the details are given below cropwise:—

Cotton—(1) *Maintenance and seed multiplication of.*—A two-acre block of Cocanadas I cotton was raised for fourth year with selfed seed of previous season. The plot was rogued for off-types and flowers selfed with the funds provided by the Indian Central Cotton Committee. A total of 705 lb. of Kapas including 210 lb. of selfed Kapas was obtained. The entire quantity of 126 lb. of selfed and 230 lb. of non-selfed seed, after reserving 24 lb. of non-selfed seed was transferred to the Agricultural Demonstrator Gurazala for inner seed farms.

Maintenance and seed multiplication of C. 2 cotton was continued. The selfing of flowers was also done. A total of 376 lb. of Kapas including 100 lb. of selfed Kapas was obtained. On ginning 68 lb. of selfed seed and 156 lb. of non-selfed seed were obtained.

An acre in each of H. 420 and 197-3 were raised for seed multiplication. A total of 898 lb. of Kapas of H. 420 and 650 lb. of 197-3 were obtained.

(2) *Trial of early cottons.*—Observation plots of early cottons, Tadpatri 14/17, T. 14/18, T. 14/24, T. Bk. 2, T. Bk. 7, T. Bk. 8 and Surat Khaki type were raised in Punasa season for study of earliness and seed multiplication for trial in chilli-cotton trials, in the subsequent year. T. Bk. 8 was found to be late. An average acre yield of 379 lb. was obtained for Tadpatri varieties. Surat Khaki type was susceptible to jassid attack and recorded very poor yield of 267 lb. of Kapas per acre.

(3) *Perennial cottons.*—As in previous years, Moco maintained its superiority over other types in yield. Judged on the performance of individual plants in this variety over three consecutive seasons, it was found that a single plant Moco-12 was outstanding with a mean yield of 6.61 oz. Kapas with 28 m.m. halo length and 38 per cent ginning.

(4) *Trial of early cottons in chilli-cotton mixed trials.*—In order to isolate a suitable early cotton that synchronizes its harvest period with chilli, eight medium early cottons, H. 420, K. 21, K. 28, B. 32-48, DA, Lakshmi 2955, 2963 and P. 216 F were sown in chilli-cotton observation plots adopting 14 : 1 proportion. The results recorded showed that none of the cotton varieties tried are able to complete its life period along with chilli. P. 216 F was

earliest to flower and ripen. H. 420 appeared to be next in earliness. K. 21, K. 28 and B-32-48 DA were late. Due to continued drought heavy shedding of flowers of the first flush at various stages was noticed. There was a second flush of flowering and B. 32-48 DA among desi types and 2955 and Lakshmi among American types were noticed to be retentive and recorded better yields than other types. The season being extremely adverse, the trial is to be repeated next season. Two more new Brazilian cottons H. 105 and Acala which are reputed for earliness (three months duration) will also be included in the trial.

(5) *Trial of dibbling H. 420 cotton in standing groundnut.*—A trial of dibbling H. 420, a Madhya Pradesh cotton, in standing groundnut crop, a month, two months and three months after sowing of groundnut, was considered with a view to work out the economics of such a mixed cropping and to see whether it serves as an insurance against failure of groundnut. The yield differences between pure and mixed plots of groundnut were not significant. Due to drought, cotton dibbled two months and three months after groundnut sowing did not establish. Groundnut was harvested on 11th October 1951 and cotton was harvested from 6th November 1951 to 27th March 1952.

(6) *Leguminous crops and effect on cotton.*—To study the effect of previous leguminous crops on succeeding cotton crop the trial of crops of first year in the third cycle was laid and the yields recorded. Cocanadas I cotton was sown in the plots, where legumes raised in the previous season, to complete the second cycle of two years. The cotton yields recorded showed no significant yield differences between the treatments revealing thereby that there is neither effect of previous crop nor manures on the yield of cotton.

(7) *Trial of pre-soaking cocanadas I cotton seed in nutrient solutions.*—An experiment was started with the object of finding out whether pre-soaking of cotton seed in nutrient solutions will improve the yield of cotton. Cocanadas I cotton seed was soaked in water, molar, $\frac{1}{2}$ molar solutions of ammonium sulphate and mono potassium phosphate for 24 hours, dried in shade and sown in the field. Unsoaked seed was used as control. The yields recorded revealed that soaking in molar and $\frac{1}{2}$ molar, mono potassium phosphate and $\frac{1}{4}$ molar ammonium sulphate are as good as unsoaked seed. The yields were poor with other treatments.

Coriander.—Breeding for a high yielding quality strain was continued. Comparative studies on yield and morphological characters of samples of Tamilnad and Andhra Desa was continued for a third season. A review of performance of the samples for three successive seasons showed that Guntur 14 bulk of Guntur district and Koilpatti 15 bulk of Tirunelveli district are better than Ongole local in yield. Fifty-one single-plant selections were under row yield trials during the season. A single-plant selection from Guntur 14 bulk recorded significantly better yield than local while all the other cultures were equal to control in yield. Collection of fresh samples from outside the State was continued. Twenty-five extra State and two extra Indian samples were obtained during the season. Out of these, extra State samples only were received after the sowing season. Among these, Sheopur local had big-sized mericarps while the remaining nine samples possessed small mericarps when compared with local. Dhanwan (Uttar Pradesh), Raichur (Hyderabad) Seoni and Sheopur (Madhya Bharat) recorded better yields than control. Poona and Kashmir samples recorded poor yields.

Groundnut.—The trials of five high yielding bunch groundnut varieties, viz., A.H. 218, A.H. 411, A.H. 4515, A.H. 6481 and T.M.V. 2 was continued for a third season.

Tobacco.—H.S. 9 tobacco was grown for seed production. The plot was rogued for off-types and flowers selfed. A total quantity of 29 lb. of selfed seed was obtained for 668 plants. Eighteen pounds of seed was supplied to the Superintendent, College Farm, Bapatla, for raising nurseries and distribution.

Trial of linseed varieties.—Linseed varieties N.P. 68 and K. 2 were tried in observation plots in red-soil area. N.P. 68 was found to be better than K. 2 in germination and growth. N.P. 68 possessed light blue flowers while K. 2 had white flowers. N.P. 68 was earlier than K. 2 for flowering. The yields recorded were low.

Rainfall and crop yield correlation experiment.—A long range experiment started in 1941-42 was continued for 11th year in succession and yields of the principal crops, groundnut, jonna, chillies and tobacco were recorded. The yields obtained for the season were 323 lb. of pods for A.H. 45 groundnut, 1,080 lb. of grain for G. 2 jonna, 813 lb. of ripe chilli for G. 1 and 2,731 lb. of green leaf for type 20 tobacco per acre.

Night-soil compost experiment.—The experiment was started in 1950-51 with the object of studying relative effects of night-soil compost, farm-yard manure, when compared with no manure on chilli and variga. The residual effect of the manures was studied in 1951-52. A fresh trial to study the direct effect of the manures was also laid in addition. Due to adverse seasonal conditions, no yields were available for chilli in both the trials direct effect as well as residual effect. The yield differences in the case of variga between the treatments were found to be not significant in both the trials.

Orchards.—The season in 1951-52 was not favourable for both mango and citrus trees. Mango suffered from drought which resulted in delayed flowering and poor bearing. There was extensive shedding of fruits due to unusual storm and rain received during summer months. Mango hopper was also seen and was checked to some extent by spraying Guesorol 550. Among the mango varieties, Chinna Suvarnaksha was the best in point of yield during the year followed by Firangiladwa and Banganpalle. A total number of 4,085 fruits were harvested and sold and a revenue of Rs. 305 was realized.

Owing to the complete breakdown of the oil engine intended for irrigating fruit plants and trees and due to the insufficient moisture in the soil, the bearing in citrus trees was very poor during the season.

In the miscellaneous block also the bearing of guavas was very poor.

Seedlings were raised for Vanamahotsava for distribution to public.

Twenty-four pounds of vegetable seed was obtained from the orchard during the year under report.

The quantities of improved seeds distributed and the probable area covered is given below :—

Name of improved seed.						Quantity supplied.	Probable area covered.
						LB.	ACS.
1	G. 1. korra	..	..	..	..	1,210	200
2	G. 1. jonna	..	..	..	..	100	5
3	G. 2. jonna	..	..	..	..	3,500	175
4	G. 1. jonna	..	..	..	..	200	10
5	G. 1. chilli seeds	..	..	..	..	59½	30

Name of improved seed.	Quantity	Probable
	supplied.	area covered.
	LB.	ACS.
6 1402 chilli seeds	19½	9
7 pusa gogu	7½	0.5
8 H. S. 9 tobacco seed (selfed)	18	144
9 G. 1. cotton (selfed)	45	4½
10 G. 1. cotton (non-selfed)	780	177
11 G. 2. cotton (non-selfed)	100	10
12 197-3	2	..
13 Snake gourd	3	0.5
14 Bendai	6	0.50
15 Bitter gourd	0.12 ozs.	0.20
16 Ribbed gourd	1 lb.	0.20

Programme of work for 1952-53.

Cotton—

- (i) Chilli cotton mixed trials.
- (ii) Dibbling H. 420 cotton in standing groundnut.
- (iii) Leguminous crops and effect on cotton (second year—third cycle with C. 1 cotton).
- (iv) Maintenance and seed multiplication of C. 1 and C. 2 cottons.
- (v) Seed multiplication of H. 420 cotton.

Coriander—

- (i) Growing and study of single-plant cultures in replicated row yield trials.
- (ii) Growing and study of bulk samples received in non-replicated observation plots.
- (iii) Study of the correlation between pigment, mericarp size, earliness, late habit and yield.

Groundnut.—Trial of groundnut varieties in replicated plots.

Tobacco.—Maintenance and seed multiplication of H.S. 9 tobacco.

Other trials—

- (i) Rainfall and crop yield correlation trial.
- (ii) Night-soil compost experiment (variga and chilli) third year (direct and residual effects).
- (iii) Observation trial of linseed varieties.
- (iv) Observation trial of paddy varieties.
- (v) Maintenance and seed multiplication of G. 1, G. 2, G. 3, G. 4 jonna and G. 1 korra and C. 1 sajja.
- (vi) Observation trial with chillian nitrate and other manures with 1402.
- (vii) Close planting *versus* local method of bunch planting with 1402—demonstration plot.
- (viii) Seed multiplication of redgram 97, greengram 127 and bengalgram 482.
- (ix) Trial of wheat followed by tobacco, viz., Director of Agriculture's Endorsement No. X. 3-610/51, dated 29th August 1951.

Report relating to Chillies Improvement Scheme—Charge and staff.—Sri L. Neelakantan, Assistant Cotton Specialist, continued to be in charge of the scheme during the entire period under report. Sri T. K. Tiruvengalachari continued till 6th February 1952 as First Assistant and proceeded on medical leave. The substitute, R. Narayanamurti, joined duty on 6th March 1952 and continued to work throughout the period. Sri V. Ramamohana

Sastri worked as Second Assistant during the entire period. Sri N. Subba Rao, the senior fieldman in chillies, continued till 8th June 1952 and his substitute, Sri N. Radhakrishnamurti, joined duty on 9th June 1952. Sri Y. Narasimham, the second fieldman, continued up to 11th March 1952 and his substitute, Sri I. L. Narasimham, reported to duty on 26th March 1952 and continued to work.

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 when compared to 772 for 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 yield difference were not significant.

G. 1-193, a re-selection in G. 1, was more productive than G. 1, the parent. Culture Goa-20-1 was poorer than G. 1 in yield. Kendrapuram dubara was equal to G. 1 in yield as well as thrips incidence. In the trial of cultures in family block, the selection G. 1-193-4 was most productive among them. 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 have recorded significantly higher yields than the standard. Three of these are re-selections from Kendrapuram 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 those received from United States of America. Except varieties from Sabour (Bihar) which were relatively late to the breakdown of thrips incidence, all the others were susceptible to thrips attack.

One hundred and fifty-three crossed pods were obtained from 1,485 crosses made involving 52 combinations. Study of hybrids of second generation revealed that the progeny of a hybrid between G. 1 and Nallapadu was outstanding in retention of bright red colour of pods for two months. Among the F. 1s raised, in the progeny of the cross between G. 1 and 2150 were more homogeneous than the progeny of other crosses.

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

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

The trials 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 to blightened 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.

V. Review.—Nil.

VI. Programme of work for 1952-53—(a) Breeding.—(1) Trial of promising cultures in cultivators' holdings.

(2) Study of promising cultures in replicated small bulk trials for yield.

(3) Study of promising cultures in family blocks.

(4) Study of cultures in progeny rows.

(5) Study of collections obtained from different parts of India and abroad under observation plots.

(6) Study of second generation hybrid populations.

(7) Study including hybrid vigour of first generation crosses.

(8) Synthesis of fresh crosses including double crosses and multiple crosses.

(b) Fundamental.—(1) Studies on grading thrips in chilli.

(2) Studies on progenies.

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

III. Rice Research Station, Buchireddipalem—Charge and staff.—Sri Ch. Hanumantha Rao, Second Assistant, was in additional charge of the station for four days in the beginning of the year when Sri M. N. Balasundaram returned from earned leave on 5th July 1951. He was in charge till 12th August 1951 and went on medical leave from 13th August 1951 and passed away on 21st September 1951.

Sri Ch. Hanumantha Rao was again in additional charge till 2nd September 1952 when Sri V. Rajagopala Reddi came and took charge from him on 3rd September 1952. Sri V. Rajagopala Reddi continued to be in charge of the station during the rest of the year except from 7th December 1951 to 15th January 1952 when he was on earned leave and Sri K. Srinivasulu, Second Assistant, was in additional charge.

Sri Ch. Hanumantha Rao continued to be the Second Assistant till 24th November 1951 when he was relieved by Sri K. Srinivasulu to join as Paddy Assistant, Rice Research Station, Tirurkuppam. Sri K. Srinivasulu continued as Second Assistant during the rest of the year.

Sri A. V. Seshiah continued to be the fieldman during the year except from 10th to 24th November 1951 and from 28th January to 4th February 1952 when he was on earned leave. G. Venkaiah who was working as second fieldman was relieved by Sri D. E. Raju on 3rd July 1951 who went on earned leave from 13th July 1951. Sri T. V. Subba Rao worked as fieldman in his place from 30th August to 3rd May 1952. He went on medical leave from 4th May 1952 and Sri A. Punnaiah joined duty on 23rd May 1952 and continued till the end of the year.

Sri D. Daniel continued as farm clerk till 20th June 1952 when he went on earned leave for 15 days. Sri A. Venkateswarlu continued as peon during the year except from 6th to 30th January 1952 when he went on earned leave.

Season and rainfall.—The season was bad for paddy crop as the rainfall was less than the average and the water-supply from the reservoir was not adequate. A total of only 30.47 inches of rain in 29 rainy days was received during the fasli year as against a decennial average of 38.52 inches in 42.3 rainy days.

The south-west monsoon brought a total fall of 9.10 inches in 12 rainy days while the decennial average for the corresponding period was 9.41 inches.

The north-east monsoon which usually brings the highest rainfall was almost a complete failure and a total rainfall of 9.01 inches was received in eight rainy days. Of this, 6.90 inches were received in the third week of November. There was difficulty for water even from the beginning of the season as the Kaligiri reservoir did not get its full supply from the river Pennar after May 1951. More than a third of the area under the southern channel could not be planted and even the rice crops that planted failed for want of water. The lands of the station being on a high level under a high level channel, the difficulty was more keenly felt. Some experiments could not be planted and some of those planted had to be abandoned as the crops had failed for want of water.

In the hot weather period though there was no rain up to the first fortnight of May 1952, there was a cyclone and heavy rain during the third week of May. A total fall of 10.47 inches of rain in three rainy days was received during this period out of 12.36 inches in nine rainy days for the hot weather period. This rain brought water to the tanks and reservoirs and facilitated raising of green manure crops and starting preparatory cultivation though severe damage was done to vegetables and cattle in the tract.

Crop improvement—(a) Paddy—Research—Pure line selection.—Four promising cultures in the sixth batch of selections in Molakolukulu, 16 selections from the secondary selections in BCP 1, one culture in the third batch of selections in Pishanam, nine cultures of the third batch of selections in Sanna Vadlu and four cultures of the first batch of selections in Masi-pishanam were under comparative yield trials. Sixty-one single-plant selections in Iswarikora were under observation plots. Promising selections in local short-duration varieties were multiplied for trial when better water facilities will be available. Strains BCP 1, BCP 2, BCP 3, BCP 4 and BCP 5 were multiplied for seed.

Hybridization.—Two Kamban Samba cross-progenies, viz., 6993/4 and 6994/1 were compared with BCP 1, BCP 2 and Molakolukulu local. One hundred and eighty secondary selections in Kamban Samba cross-progenies, 176 F. 4 progenies of the cross BCP 2 × Molakolukulu 1834, 159 F. 3 progenies of crosses with Co. 4 and long duration strains and Co. 15 with Pishanam and F. 1 of cross between BCP 1 and Co. 4 were under study. Thirty-one hybrid progenies of the cross between Iswarikora and Pishanam 1283 were planted for yield trials in Iswarikora season.

Blast study.—Experiments to study the incidence of blast on (1) blast resistant strains when manured with graded doses of ammonium sulphate, (2) on paddy planted with seedlings raised under semi-dry and wet conditions, (3) with different systems of planting and (4) under different irrigational treatments were conducted.

Trials with different strains and cultures from the Government Mycologist were continued. Nimmidhan, a paddy variety from Araku Valley, reported to be blast resistant was also tried.

(b) Cotton.—P. 216-F cotton was grown after paddy in an area of 12½ cents.

(c) Green manure.—Sesbania speciosa was planted along the field and channel bunds for seed.

Review—(a) Pure line selections.—Three cultures, 42, 257 and 151 in Molakolukulu, two cultures, viz., BCP 1/176 and BCP 1/76 in secondary selections in BCP 1, six cultures in Sanna Vadlu, 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 the unprecedented drought and failed.

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

(ii) In the progenies of crops BCP 2 × Molakolukulu 1834 for semi wet conditions 32 single plant selections from the best lots 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 and long duration strains and Co. 15 with Pishanam. Seeds were collected from the F. 1 of BCP 1 × Co. 4, which was made for evolution of blast resistant quality Molakolukulu.

(iv) No results could be obtained in the yield trial with hybrid progenies of Iswarikora 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 experiments for blast study.

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 *Glyricidia* seeds were collected from the old plants on the bunds.

Seed distribution statement, 1951-52 fasli—

Serial number and name of the improved seed.	Quantity distributed in lb.	Probable area that can be covered.
		AOS.
1 BCP 1 paddy seed	59	2
2 BCP 2 do.	719½	24
3 BCP 3 do.	386½	13
4 BCP 4 do.	668½	22
5 BCP 5 do.	48½	1½
6 Molakolukulu 1834	51½	1½
7 GEB 24	350	12
8 Kamban Samba 6994/1	20	¾
9 Scented varieties of paddy	23	¾
10 Green-manure seeds	507	25
11 Vegetables	12-14 oz.	3
12 Fodder grass slips	15,750 Nos.	2½

Programme of work for 1952-53 of the Rice Research Station, Buchireddipalem.

I. Improvement of local varieties of paddy—

(1) *Pure line selections*.—The yield trials with promising cultures in each of the following varieties :—

- (a) Molakolukulu and secondary selections in BCP 1;
 - (b) Sanna vadlu; and
 - (c) Masipishanam 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.

(4) Multiplication and maintenance of purity of the strains released.

II. *Hybridization*.—(i) Kamban Samba cross-progenies will be under study.

(ii) F. 5s of BCP 2 × Molakolukulu 1834 will be further studied for semi wet conditions.

(iii) The F. 4s of crosses between Co. 4 and other long duration strains will be studied for blast resistance and yield.

(iv) F. 2s of BCP 1 × Co. 4 will be grown for selecting blast resistant and high yielding types.

(v) The promising hybrid progenies of crosses with Iswarikora parent will undergo yield trials.

(vi) Further crosses will be affected between (1) Co. 4 × Pishanam, (2) Co. 4 × Sannavadlu and (3) Co. 4 × BCP 2.

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 (1) under different irrigational treatments, (2) different systems of planting, (3) by planting seedlings raised under wet and semi dry conditions, (4) by manuring different strains with different doses of ammonium sulphate, and (5) by 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 experiment—Phosphatic manurial trials*.—Experiment with bonemeal and superphosphate with 3 levels of P_2O_5 —0 lb., 30 lb. and 45 lb. will be continued for the second year.

VI. *Cultural experiment*.—An experiment with (a) dry ploughing and planting on receipt of water, (b) dry ploughing and application of green leaf and planting, (c) growing green manure puddling and planting, and (d) keeping fallow, puddlings and planting.

Others.—Collection of data for stem-borer attack on bulk crops will be continued.

Other crops—

Pulses.—Horsegram and greengram will be sown in the standing crops of paddy to come up after the harvest of paddy.

Cotton.—Cotton will be grown in rice fallow.

Vegetables.—Vegetables like snake gourd, bitter gourd and ribbed gourd will be grown on a small scale for the supply of seed.

Fodders.—Guinea, thin napier, water grass and panicum antidotale grasses will be maintained for the supply of slips.

Fruit plants.—Mango stones and citrus seed will be sown for propagation.

VII. *Scheme for effective control and test of manure mixtures*.—The scheme for effective control and test of manure mixtures functioned for the second year with a staff of one Assistant Inspector of Fertilizers, one lower division clerk and a peon. The scope of the scheme was extended from

June 1951 to bring the quality of straight fertilizers like ammonium sulphate, superphosphate, oil-cakes, bonemeal, etc., also under control in accordance with amended provisions of the Madras Manure Dealers' Licensing Order, 1949. With the scope of the scheme extended to cover the straight fertilizers also, the jurisdiction of the Assistant Inspector of Fertilizers was reduced to cover only three districts, Guntur, Nellore and Kurnool. A brief account of the work done under the scheme is detailed below :—

- (1) Number of depots inspected—358.
- (2) Number of oil mills inspected—324.
- (3) Number of bone mills inspected—2.
- (4) Number of manure mixing firms inspected—4.
- (5) Number of samples drawn and sent for analysis—53.
- (6) Number of samples analysed—40.
- (7) Number of samples found not up to guarantee—6.
- (8) Number of cases in which rebate of sale price was ordered—5.
- (9) Number of manure mixing firms marketing mixtures—8.

Even though the scheme to bring the quality of oil-cakes was being enforced since one year, there is no appreciable progress. The millers and merchants in oil-cakes are not enthusiastically co-operating to implement the scheme. After repeated instructions and threats of taking drastic action some millers have only obtained analysis of oil-cakes and they are noting the nitrogen content on the bills. But the actual marking of the prescribed particulars on the bags is not being carried out. Unless the department is vested with adequate and effective powers by enacting a suitable legislation it is impossible to enforce the scheme successfully.

GUNTUR,
2nd September 1952.

T. RANGABRAHMA RAO,
Deputy Director of Agriculture.

ANNEXURE I.

Statement showing the sanctioned strength of staff working in the division as on 30th June 1952 separately both under permanent and temporary.

Name of service.	Number of permanent posts.	Number of temporary posts.	Government Order number and date with Director of Agriculture's endorsement sanctioning the temporary staff for 1952-53.
Gazetted—			
Deputy Director of Agriculture.	1	..	
Non-Gazetted—			
1 Head clerk ..	1	..	
2 Lower division clerks ..	2	..	
3 Typist ..	1	..	
4 Peons ..	4	..	
Temporary establishment—			
1 Assistant Inspector of Fertilizer.	..	1	G.O. No. 2284, Food and Agriculture, dated 28th November 1951, for one year from 13th December 1951 to 12th December 1952, communicated in Director of Agriculture's Endorsement No. MM. 1-997/51, dated 1st December 1951.
2 Lower division clerk ..	..	1	
3 Peon ..	..	1	
Gazetted—			
1 District Agricultural Officer.	1	..	Office of the District Agricultural Officer, Guntur.
2 Additional District Agricultural Officer.	..	1	
Non-Gazetted—			
1 Personal Assistant ..	1	..	Permanent post.
2 Agricultural Demonstrators.	10	..	
3 Additional Agricultural Demonstrators.	..	4	G.O. No. 215, Food and Agriculture, dated 6th June 1952. Director of Agriculture's No. A. 1-695/52, dated 12th June 1952.
			Permanent post.
			Permanent posts.
			G.O. Ms. No. 336, Food and Agriculture, dated 6th March 1952. Director of Agriculture's Endorsement No. L. 2-28/52, dated 15th March 1952.

Government Order number and date with Director of Agriculture's endorsement sanctioning the temporary staff for 1952-53.

Number of permanent posts. Number of temporary posts.

Office of the District Agricultural Officer, Guntur—cont.

Non-Gazetted—cont.

4 Special Agricultural Demonstrator for H.S. 9 Tobacco Scheme.

5 Special Agricultural Demonstrators for loans.

6 Plant Protection Assistant.

7 Typist

8 C. 1 and 336-B Cotton Scheme.

9 Demonstration maistris comprehensive schemes.

C. 1 Cotton Scheme

Plant Protection Scheme.

Bee-keeping Scheme

Intensive Manuring Scheme.

10 Jeep driver

11 Peons

G.O. Ms. No. 1249, Food, and Agriculture, dated 30th July 1952. Director of Agriculture's No. D. Dis. D. 607/51, dated 5th August 1952.

G.O. No. 215, Food and Agriculture, dated 6th June 1952. Director of Agriculture's No. A. 1-695/52, dated 12th June 1952.

G.O. Ms. No. 102, Food and Agriculture, dated 14th March 1952. Director of Agriculture's No. D. Dis. L. 2237/51, dated 29th March 1952.

G.O. No. 471, Food and Agriculture, dated 21st March 1952. Director of Agriculture's No. D. Dis. V. 251/52, dated 28th March 1952.

G.O. Ms. No. 187, Food and Agriculture, dated 13th February 1952. Director of Agriculture's No. D. Dis. V. 251/52, dated 22nd February 1952.

G.O. No. 110, Food and Agriculture, dated 17th March 1952. Director of Agriculture's No. D. Dis. E. 99/52, dated 24th March 1952.

G.O. No. 187, Food and Agriculture, dated 13th February 1952. Director of Agriculture's No. D. Dis. Y. 150/52, dated 22nd February 1952.

G.O. Ms. No. 102, Food and Agriculture, dated 14th March 1952. Director of Agriculture's No. D. Dis. 2237/51, dated 29th March 1952.

G.O. Ms. No. 579, Food and Agriculture, dated 1st April 1952. Director of Agriculture's No. A. 1-695/52, dated 12th June 1952.

G.O. No. 215, Food and Agriculture, dated 6th June 1952. Director of Agriculture's No. A. 1-695/52, dated 12th June 1952.

G.O. Ms. No. 507, dated 25th March 1952. Director of Agriculture's No. SSE. 2-205/52, dated 7th April 1952.

Permanent posts.

Office of the District Agricultural Officer, Nellore.

District Agricultural Officer. Fourteen posts of Subordinates.

Upper Five Additional Agricultural Demonstrators.

Eleven Special Agricultural Demonstrators.

Two Plant Protection Assistants.

Forty-one Fieldmen

One Upper division clerk and three lower division clerk and one Typist under Basic Additional staff.

One upper division clerk Three lower division clerks under comprehensive scheme.

One lower division clerk (under loans).

Twenty-six lower division clerks in depots (under comprehensive Scheme).

Two upper division clerks and 11 lower division clerks under intensive manuring scheme.

Forty-nine Demonstration maistris under comprehensive scheme.

Two Demonstration maistris under Plant Protection Assistants.

Three Demonstration maistris under Propagandists.

Forty-five Demonstration maistris under intensive manuring scheme.

One upper division clerk and one lower division clerk (under State Trading Schemes).

G.O. No. 336, dated 6th March 1952; Director of Agriculture's Endorsement L. 2. 28/52, dated 18th March 1952.

G.O. No. 215, dated 6th June 1952. Director of Agriculture's Endorsement No. 695/52, dated 12th June 1952.

G.O. No. 102, dated 14th March 1952; Director of Agriculture's Endorsement No. L. 2. 237/52, dated 29th March 1952.

G.O. No. 110, dated 17th March 1952; Director of Agriculture's Endorsement No. E. 99/52, dated 24th March 1952.

G.O. No. 471, dated 21st March 1952; Director of Agriculture's Endorsement No. V. 257/52, dated 28th March 1952.

G.O. No. 110, dated 17th March 1952; Director of Agriculture's Endorsement No. E. 99/52, dated 24th March 1952.

G.O. No. 554, dated 29th March 1952; Director of Agriculture's Endorsement No. V. 260/52, dated 5th April 1952.

G.O. No. 110, dated 17th March 1952; Director of Agriculture's Endorsement No. E. 99/52, dated 24th March 1952.

G.O. No. 215, dated 6th June 1952; Director of Agriculture's Endorsement No. 695/52, dated 12th June 1952.

G.O. No. 110, dated 17th March 1952; Director of Agriculture's Endorsement No. E. 99/52, dated 24th March 1952.

G.O. No. 102, dated 14th March 1952; Director of Agriculture's Endorsement No. L. 2. 237, dated 29th March 1952.

G.O. Ms. No. 475, dated 1st November 1951; Director of Agriculture's Endorsement No.

G.O. No. 215, dated 6th June 1952; Director of Agriculture's Endorsement No. 695/52, dated 12th June 1952.

G.O. No. 1897, dated 26th September 1951; Director of Agriculture's Endorsement No. JJ. 180/51, dated 24th March 1952.

Government Order number and date with Director of Agriculture's endorsement sanctioning the temporary staff for 1952-53.

Number of temporary posts.

Number of permanent posts.

District Agricultural Officer's Office, Kurnool.

Madras Agricultural Service (District Agricultural Officer).	..	..	..	..
Madras Agricultural Subordinate Services (Agricultural Demonstrators).	10	4	G.O. No. 336, Food and Agriculture, dated 6th March to 31st March 1952.	..
Plant Protection Assistants.	..	2	G.O. No. 102, Food and Agriculture, dated 14th March to 31st March 1952.	..
Plant Protection Assistant's Demonstration maistris.	..	2	Do.	..
Madras Ministerial Service basic staff.	2	..	G.O. No. 471, Food and Agriculture, dated 21st to 31st March 1952.	..
Comprehensive Schemes ..	..	..	G.O. No. 110, Food and Agriculture, dated 1st April 1952 to 31st March 1953.	..
A. Accountant	..	..	G.O. No. 1887, dated 1st October 1951 to 31st August 1952.	..
Seed Development Scheme Depot clerks.	..	..	G.O. No. 110, Food and Agriculture, dated 1st April 1952 to 31st March 1953.	..
Fieldmen	..	17	Do.	..
Demonstration maistris ..	..	30	Do.	..
Peons	3	..	Do.	..

Office of the Assistant Cotton Specialist, Agricultural Research Station, Nandyal.

White Northern Scheme.

Gazetted—	..	1	G.O. No. 2054, Development, dated 10th May 1952, communicated in Director of Agriculture's Y. No. 261/52, dated 20th May 1952, up to 24th June 1953.	..
1 Assistant Cotton Specialist.	..	..	..	..
Non-Gazetted—	..	2	Do.	..
1 Upper Subordinates	..	5	Do.	..
2 Fieldmen	..	1	Do.	..
3 Typist clerk	..	2	Do.	..
4 Peons	..	..	..	..
Farm Managers	2	..	..	..
Cotton Assistants	2	..	..	..

Agricultural Research Station, Nandyal.

Millet Assistant	1	..	..	..
Fieldmen	2	..	..	..
Farm clerk	1	..	..	..
Store-keeper	..	1	G.O. No. 1904, Food and Agriculture, dated 27th February 1951, for one year from 30th September 1951 communicated in Director of Agriculture's V. No. 1923/51, dated 18th October 1951.	..
Laboratory attenders ..	2	..	..	..
Peon	1	..	..	..

Office of the Senior Science Assistant, Rice Research Station, Buchireddipalem.

Senior Assistant	1	..	..	..
Second Assistant	1	..	..	..
Fieldmen	..	2	G.O. Ms. No. 327, Food and Agriculture, dated 6th March 1952; Director of Agriculture's Endorsement No. D. Dia. X. 225/52, dated 12th March 1952 from 1st April 1951 to 31st March 1952.	..
Lower division clerk ..	..	1	..	..
Peon	..	1	..	..

Office of the Assistant Cotton Specialist, Agricultural Research Station, Lam Post office.

Gazetted—	..	1	G.O. Ms. No. 1199, Food and Agriculture, dated 9th June 1951, communicated in Director of Agriculture's D. Dia. No. 178/50, dated 16th June 1951, up to 31st March 1954.	..
Assistant Cotton Specialist..	..	..	..	..
Non-Gazetted—	..	2	G.O. Ms. No. 1199, Food and Agriculture, dated 9th June 1951, communicated in Director of Agriculture's Endorsement D. Dia. No. 178/50, dated 16th June 1951, up to 31st March 1954.	..
Upper subordinates ..	4	..	..	..
Fieldmen	4	2	Do.	..
Farm clerk	1	..	..	..
Store-keeper	1	..	..	..
Typist-clerk	..	1	G.O. Ms. No. 1199, Food and Agriculture, dated 9th June 1951, communicated in Director of Agriculture's Endorsement D. Dia. No. 178/50, dated 16th June 1951, up to 31st March 1954.	..
Peon	1	2	Do.	..

ANNEXURE II.

Programme of district work for the year 1952-53.

1. Nellore District.

1 Enrolling subscribers for Padipantalu 13,000.

2 Paddy (a) Seed Farms—

Special primary	700 acres.
Secondary	2,520 acres.

Total ..	3,220 acres.
----------	--------------

(b) Trials, observation and demonstration plots—

(i) Demonstration plots (varietal)—

Strains Co. 26, Co. 25, BDP 1, BCP 2, SR 26B, MTU 15, MTU 9, BCP 3, ADT 22.

(ii) Observation plots—

Strains MTU 19 × GEB 24.

6991/1, 6993/4 × BCP 1, BCP 2.

CO 13 × Local (Kesari).

ADT 22 × Local.

PTB 15, MTU 16 × BCP 2 (swamp paddy).

(c) Green Manure—

Seed production areas.

Green leaf manure areas.

Dry land.	Garden land.	Wet land.	Total.	Dry land.	Garden land.	Wet land.	Total.
9,400	600	18,900	28,900	130,900	18,400	43,200	192,500

Sesbania Speciosa.

Planting on paddy field bunds for 4,560 acres.

Green leaf.

3 Chulam (a) Seed farms—Nil.

(b) Observation plots—M. 47/3, Co. 11., Co. 12 Vs. Local.

4 Cumbu (a) Seed farms—Nil.

(b) Observation plots—PT 863 × Local.

5 Ragi (Chodi)—(a) Seed farm—

Variety.	Acres.	Seed bags to be procured
AKP I	20	60 bags.

(b) Trials.—H. 1 × Local in pyru Season.

6 Tenai (Korra)—(a) Seed farm.

Variety.	Area.	Seed bags to be procured.
H. 2	20	40 bags.

(b) Trials—H.1. and H.2. against Local in Podili and Darsi.

7 Varagu (Arika)—

(a) Seed farms—Nil.

(b) Trials—PS 1 × local.

8 Horsegram—

(a) Seed farms—Nil.

(b) Trials—Cultures 76 and 93.

9 Redgram—Nil.

10 & 11 Green and blackgrams—Nil

12 Bengalgram—Nil.

13 Groundnut—(a) Seed farms—

	Strain.	Area in acres.	Number of seed bags to be procured.
Irrigated.	TMV 2	10	50
Unirrigated.	TMV 3	30	90

(b) Trials—Nil.

14 Gingelly—

(a) Seed farms—Nil.

(b) Trials—(1) TMV. 2, TMV. 3 × Local (dry).

(2) TMV 2 × Local (in wet lands after paddy irrigated).

15 Castor—(a) Seed farms—

TMV.3.	Acres.	Seed bags.
	50	50

(b) Trials— Nil.

16 Chillies—Nil.

17 Cotton—As per cotton extension targets and programme.

18 Annual vegetable seeds—

Indigenous kind in lb.	English kind in lb.
35 lb.	7½ lb.

19 Coconuts—

Sides of mhote ramps in wells 8 to 10 trees each.	Sides of road in wet lands, distance in miles.	Number of seedlings in rest of the area.
700	10	550

20 Choice of varieties of perennial vegetables—(Drumstick, curry leaf, arinelli, breadfruit, etc.)

Number of villages.	Number of backyards.
200	1,200

21 Fruits—Mango, citrus, Guava, Sapota, etc. to be supplied as per indents.

22 Fodder grasses in all model farms.

23 Other items of improvements.—The following number of holdings should be tackled in each taluk under the important items of targets. These are based on the assumption that at least six holdings in a village can be tackled.

Number of taluks.	Number of villages in the taluks.	Number of holdings to be tackled.
13	1,673	10,038

Targets.

	D. Ms.	H. Ps.	F. M.	A.D. and D.A.O.	Total.
1 Improved paddy nursery—					
(a) Villages ..	60	20	20	..	100
(b) Number ..	1,500	600	500	..	2,600
2 Green manure for seed production—					
(A) Unirrigated—					
(a) Villages ..	69	3	23	..	95
(b) Area (acres) ..	6,500	550	2,330	..	9,400
(B) Garden lands—					
(a) Villages ..	8	..	4	..	12
(b) Area (acres) ..	400	..	200	..	600
(C) Wet land—					
(a) Villages ..	102	8	60	..	170
(b) Area ..	13,300	723	4,675	..	18,700

	D.Ms.	H.Ps.	F.M.	A.D. and D.A.O.	Total.
3 Green leaf production—					
(A) <i>Unirrigated</i> —					
(a) Villages ..	500	5	140	..	645
(b) Area (acres) ..	26,300	1,500	104,000	..	130,900
(B) <i>Garden land</i> —					
(a) Villages ..	328	10	100	..	438
(c) Area (acres) ..	13,300	500	4,600	..	18,400
(C) <i>Wet land</i> —					
(a) Villages ..	150	..	50	..	200
(b) Area (acres) ..	32,200	..	11,000	..	43,200
4 Compost manufacture—					
(a) Villages ..	75	6	24	..	105
(b) Tons ..	5,259	200	1,818	..	7,277
5 Improved methods of collection of urine and storage of cattle manuring pits—					
(a) Villages ..	1,200	73	400	..	1,673
(b) Number of holdings.	7,200	438	2,400	..	10,038
6 Improved cattle manure pits—					
(a) Number of villages.	1,200	73	400	..	1,673
(b) Number of holdings.	7,200	438	2,400	..	10,038
7 Improved Mhote ramps of wells—					
(a) Number of villages.	..	..	..	..	..
(b) Number ..	..	..	..	..	..
8 Improved cattle yards—					
(a) Number of villages.	1,200	73	400	..	1,673
(b) Number ..	7,200	438	2,400	..	10,038
9 Improved threshing floor and stack yard—					
(a) Villages ..	13	2	..	..	15
(b) Number ..	13	2	..	..	15
10 Planting Palmyra on main boundaries of dry land blocks and fodder grasses and green manure shrubs of all kinds—					
(a) Villages ..	51	2	..	..	51
(b) Area ..	510	20	..	..	530
11 Live fencing with <i>prosopis</i> Kiluvai, Korukapuli—					
(a) Villages ..	51	3	..	..	54
(b) Ryots ..	1,767	53	..	..	1,820
12 Reduction in size and number of bunds—					
(a) Number of villages.	..	2	40	..	43
(b) Number of ryots.	..	10	150	..	160
13 Bee hiving—					
(a) Number .. of villages.	..	..	13	..	13
(b) Number ..	..	..	13	..	13
14 Formation of Agricultural Associations—					
Number ..	..	..	..	230	230
				(by A.D. and D.A.O.)	

	D.Ms.	H. Ps.	F.M.	A. D. and D.A.O.	Total.
15 Improved fowls of all kinds—					
(a) Number of villages.	37	4	13	..	54
(b) Number ..	111	12	39	..	162
16 Fish growing in wells—					
(a) Number of villages.	..	..	13	..	13
(b) Number ..	..	..	13	..	13
17 Contour cultivation—					
(a) Number of villages.	43	10	17	..	70
(b) Area (acres).	100	5	33	..	138
18 Levelling and bunding—					
(a) Number of villages.	260	5	..	..	265
(b) Area (acres).	510	20	..	..	530
19 Demonstration of improved cultivation implements of all kinds—					
(a) Villages ..	260	5	..	..	265
(b) Number ..	510	20	..	..	530
20 Demonstration of improved sowing implements of all kinds—					
Villages and number.	..	..	..	..	..
21 Demonstration of improved inter cultivation implements of all kinds—					
Villages and number.	..	..	..	..	..
22 Demonstration of irrigating implements—					
(a) Number of villages.	150	4	51	..	205
(b) Number ..	299	8	103	..	410
23 Demonstration of Horticultural implements—					
(a) Number of villages.	150	4	51	..	205
(b) Number ..	299	8	103	..	410

Miscellaneous.

24 and 25 Engineering targets (Joint Director of Agriculture's No. G.M.F. No. 54/52, dated 13th June 1952)—

Scheme number.	Units to be supplied during 1952-53.	Total expected in 1952-53.	Acres to be benefited by units supplied in 1952-53.	Total acres to be benefited 1952-53.	Expected additional production due to unit to be supplied in 1952-53.	Total additional production expected up to 1952-53 from 1951-52.
1	5	47	40	376	20	188
2	25	50	125	250	62	125
3	20	20	160	160	80	80
4	2	15	5,000	7,070	755	1,030-75
7	5	6	2,000	2,400	400	480
10	800 tons.	800 tons	..	..	667	667
11	6,000 ..	6,000 ..	1,68,000 acs.	1,68,000 acs.	12,000 tons.	12,000 tons.

26 Exhibitions and fairs number—13.

27 Crop cutting experiments—As per target.

2. Guntur district.

1 Enlistment of subscribers for Padipantalu	10,000
2 Loans (a) Under Intensive Manuring Scheme for purchase of fertilizers. Rs. 6,00,000	
(b) Under A.G.L. and L.I.L. Acts for purchase of seeds and manures. Rs. 1,00,000	
(c) For purchase of implements	Rs. 200
3 Tree-planting—(Minimum number of plants to be planted per village.)	500
4 Rural compost	tons. 4,851
5 Seed farms—	

	ACS.
Paddy	2,015
Cholam	450
Tenai	200
Chillies	10
HS 9 tobacco	60
Green manure	60,800
C 1 and C 2 cotton	800

6 Trials—					
Paddy ..	Rainfed ..	BC 130 ..	..	Guntur, Chirala, Ongole and Sattenapalli.	
	Saline ..	10,038 ..	..	Repalle, Bapatla, Chirala and Ongole.	
		SLO 13 ..	..	Bapatla and Chirala.	
	Submergeable ..	MTU 16 ..	..	Repalle, Tenali, Bapatla and Chirala.	
		AKP 11 and 12 ..	..	Repalle and Chirala.	
		1311 and 1314 ..	..	Do.	
		AKP 2 and 5 ..	..	Narasaraopet and Sattenapalli.	
	First crop (main).	MTU 1 ..	..	Repalle, Bapatla, Chirala and Ongole.	
		CO 25 ..	..	Bapatla, Chirala, Ongole and Sattenapalli.	
Cholam ..	....	N 1 ..	..	Narasaraopet, Sattenapalli, Vinukonda and Ongole.	
		M 47-3 ..	..	Gurazala.	
Cumbu ..	....	PT 862 and 963.	..	Ongole, Narasaraopet Sattenapalli and Vinukonda.	
Ragi ..	Irrigated ..	CO 2 ..	..	Ongole, Vinukonda, Chirala, Bapatla and Repalle.	
		H 1 ..	..	Narasaraopet, Sattenapalli and Vinukonda.	
Varagu ..	....	....	..	....	
Redgram ..	....	....	..	....	
Groundnut ..	....	AH 6481 (TMV 5)	..	Gurazala, Narasaraopet and Sattenapalli.	
Castor ..	....	TMV 2 and 3 ..	..	Gurazala, Sattenapalli, Vinukonda, Narasaraopet and Ongole.	
Chillies ..	....	Scattered block trials with G 1, 1402 and local.	..	Do.	
		Spacing trials ..	..	Do.	
Cotton ..	H 420 ..	....	..	Guntur, Narasaraopet, Sattenapalli, Vinukonda, Gurazala and Ongole.	
	Mocco cotton (perennial).	....	..	....	
	1 or backyard cultivation.	....	..	All taluks.	
		C 1, C 2 and RH 25 (coloured cotton trials).	..	Gurazala and Narasaraopet.	
	P 216 F in paddy	....	..	Guntur, Repalle, Tenali, Bapatla and Chirala.	
	Sugarcane.	CO 449	..	Bapatla taluk.	

Fruits.—Coconut seedlings to be obtained from Oil Seeds Specialist and distributed.

Vegetables.—Seeds of indigenous and English vegetable varieties to be distributed in all taluks as per targets fixed.

7 Improved methods of collection of cattle urine and cattle manure ..	3,000
8 Improved manure pits	3,000
9 Improved Mhote ramps of wells	100
10 Improved cattle yards	100
11 Improved threshing floor and stack yards	100
12 Planting of palmyra nuts on main bunds of dry land blocks and fodder grasses and green leaf yielding plants on all bunds	2,500 acres.
13 Live fencing with prosopis and Kiluvai	600 holdings.
14 Reduction in size of bunds	600 "
15 Hiving of bee-colonies	200 "
16 Formation of Agricultural Advisory Committee	In every village.
17 Improved fowls of all kinds	600
18 Fish growing in wells	200
19 Levelling and bunding	600 acres.
20 Demonstrations with improved—	
(a) Sowing implements	300
(b) Irrigating implements	600
(c) Horticultural implements	400

	Area allotted.	Number allotted.
21 (a) Tractors and bull dozers	11,011	20
(b) Oil engines	224	28
22 Exhibitions and fairs	10	..

23 Improved domestic appliances for 100 houses.
24 Crop sampling experiments—As per programme.

(4) Special problems of Guntur district with work done during 1951-52 and programme for 1952-53—

(i) Arranging paddy seed farms with MTU 7, 12, GEB 24 and BCP 1 in 2,015 acres to yield 16,120 bags of paddy seed.

(ii) One thousand eight hundred and ninety acres of paddy seed farms were run during 1951-52 and 15,120 bags of paddy seed purchased.

(iii) Multiplication of G1 chillies in an area of 10 acres to produce, 4,000 lb. of seed pods.

Ten acres of seed farms were run during 1951-52 and 3,750 lb. of seed pods were purchased.

(iv) Multiplication of H-S 9 Virginia tobacco seed in 60.00 acres to produce 6,000 lb. of seed.

Sixty acres of seed farms were run during 1951-52 and 3,968 lb. of seed was produced.

(v) Running of seed farms with jonna in 45 acres and Tenai in 200 acres to produce 400 and 200 bags of seed respectively.

(vi) Distribution of special loans under the intensive manuring scheme to the tune of 6,00,000 for purchase of fertilizers in paddy areas with assured water supply. Rs. 6,04,100 were distributed during 1951-52.

3. Kurnool district.

- Working of three-year plan.
- Soil water conservation work.
- Land development schemes.
- Distribution of pumpsets.
- Rural compost making.
- Distribution of improved seeds.
- Popularization of chemical manures.
- Control of pests and diseases.
- Increase of vegetable cultivation.
- Tree-planting popularization.
- Enlisting of subscribers and commission agents to Padipantalu.
- Introduction of fruit cultivation.
- Grow More Food Campaign.
- Conducting trial, observation and demonstration plots
- Raising seed farms of all improved strains.
- Co-operation with other departments and conducting propaganda on Nation Building Activities.
- Popularizing Takkavi loans for the purchase of seeds and manures and implements.
- Distribution of departmental literature and pamphlets.

ADMINISTRATION REPORT OF THE DEPUTY DIRECTOR OF
AGRICULTURE, IV DIVISION, CUDDAPAH, FOR 1951-52 (1st
JULY 1951 to 30TH JUNE 1952) (FASLI 1361).

I submit below the administration report of the IVth Division comprising the districts of Cuddapah, Anantapur, Bellary and Chittoor and the Agricultural Research Stations of Hagari, Siruguppa and Panagal Demonstration Farm, Kalahasti for the year 1951-52.

I. *Charge and staff*—(a) *Charge*.—I continued to be in charge of the division throughout the year.

(b) *Staff*.—The period of charge of several officers in charge of districts and of Agricultural Research Stations under my control is given below :—

	Period	
	From	To
(i) District Agricultural Officer, Cuddapah—		
(1) Sri M. Jeevan Rao	1 July 1951	29 February 1952.
(2) Sri A. K. Annaswami Iyer ..	1 March 1952	30 June 1952,
(ii) District Agricultural Officer, Anantapur—		
(1) Sri A. B. Adishesha Reddy	..	throughout the year.
(iii) District Agricultural Officer, Bellary—		
(1) Sri K. Subba Rao	..	throughout the year.
(iv) District Agricultural Officer, Chittoor—		
(1) Sri V. Rama Rao	1 July 1951	16 July 1951.
(2) „ E. G. Sivaswami,	17 July 1951	to date
(v) Superintendent, Agricultural Research Station Hagari—		
(1) Sri S. Ramachandra Rao continued to be Superintendent	..	throughout the year.
(vi) Agronomist Agricultural Research Station, Siruguppa—		
(1) Sri R. Anantapadmanabha Pillai	1 July 1951 to 9 March 1952	
(2) „ M. Jeevan Rao	10 March 1952 to 9 April 1952	
(3) „ S. V. Ramachandaran	10 April 1952 to 24 June 1952	
(4) „ Rajaratnam Chettiar	25 June 1952	to date
(vii) Assistant Cotton Specialist, Siruguppa—		
(1) Sri A. Raghavan	1 July 1951	16th June 1952
(2) „ K. Sanyanarayanamurthy	17 June 1952	20th June 1952

Subordinate staff—(i) Sri R. Krishnamurthy continued to be Assistant Inspector of Fertilizers in-charge of the scheme for testing manure mixtures throughout the year under report.

(ii) Sri C. Vadimalai continued to be the Farm Manager, Panagal Demonstration Farm, Kalahasti, under my control throughout the year.

(iii) One post of Personal Assistant was attached to each of the four District Agricultural Officers of this division.

(iv) There were nine Agricultural Demonstrators (including sub-taluk of Kamalapuram) in Cuddapah district, ten each of the districts in Chittoor, Anantapur and Bellary (including Sandur) in charge of each taluk.

Besides there were three additional Agricultural Demonstrators for Anantapur, three for Cuddapah, four for Chittoor and four for Bellary, posted to the taluks where the work was intensive. For the H. 1. Cotton seed multiplication Scheme one Special Agricultural Demonstrator continued to work at Guntakal. In addition to the above, two Crop and Plant Protection Assistants, one for Entomology and the other for Mycology were attached to each of the four districts of the division.

(v) Agricultural Engineering Supervisors with necessary staff of foremen, assistant tractor foremen, mechanics, drivers and cleaners continued to work in all of the districts of the division.

(vi) The strength of staff under various categories at the end of the year in each of the districts of the division is given in the appendix.

II. *Grow More Food Campaign*.—To produce more was the main object of the activities of the department. Intensive propaganda was made by the district staff to bring more area under food crops and to increase the acre yield. The object of various Grow More Food schemes and intensive cultivation schemes were explained to the public. According to the three-year growmore food schemes, targets for each district and taluk were fixed and the district staff were given necessary instructions for augmenting the food production by increasing the area and acre yields of food crops under the intensive cultivation schemes. The most important items which received particular attention were—

(i) Multiplication and distribution of improved seeds by running seed farms and procurement.

(ii) Distribution of fertilizers through co-operative societies and tender firms and through loans.

(iii) Land development by mechanized cultivation (reclamation of waste lands by tractor ploughing and bull dozers).

(iv) Supply of oil-engines and pumpsets on hire and hire-purchase system.

(v) Preparation of compost rural and urban.

(vi) Increasing the area under vegetable and subsidiary food crops like sweet potato, tapioca.

(vii) Fertilizer stock also was continued to be stored in agricultural depot, though the sale was transferred to the co-operative societies and tender firms. But propaganda was done among ryots for the liberal application of fertilizers to get increased yields of food-crops. Digging of wells under “Well Subsidy Scheme” and raising of short-term food crops under wells were encouraged. All the concessions granted by the Government in furtherance of Grow More Food campaign were given wide publicity and ryots were induced to avail of the opportunities provided. But the continued unfavourable seasonal conditions retarded the production activities. The work done under each of the schemes in operation is detailed below—

Scheme No. 1—Land Development by Mechanised Cultivation—Hiring of departmental oil-engine units.—Due to successive failure of rains for the past five years there was a great demand from the public for engines and pumpsets. It can be said that the ryots have become more engine-minded. The department was not able to cope up with the increasing demand with the little number of engines at its command.

Number of engines supplied in each district is given below :—

District.	Oil engines		Area irrigated.	Estimated additional production in tons.
	Targetted.	Supplied.		
Anantapur	28	29	232	116
Bellary	14	9	72	36
Cuddapah	29	23	184	92
Chittoor	86	49	392	190
Total ..	157	110	880	440

Scheme No. 2—Distribution of pipes for lift irrigation and arranging installation of electric motors and oil-engines through trade channel.—Pipes of different sizes were stored and supplied at controlled rates, to benefit installation of engines, as follows :—

District.	Number installed.	Acreage covered.	Estimated additional production.
Anantapur ..	25	125	62.5
Bellary ..	10	50	25
Chittoor ..	250	1,250	625
Cuddapah ..	10	50	25
Total ..	295	1,475	737.5

Scheme No. 3—Supply of oil engines and electric motors on hire purchase system.—This scheme is intended to improve irrigation facilities with the help of mechanical appliances by supplying oil-engine pumpsets and electric motor pump sets on hire purchase system, to cultivators. Following were supplied during the year :—

District.	Number of pumpsets supplied.	Area irrigated.	Estimated additional production in tons.
Anantapur	17	136	68
Bellary	18	144	72
Chittoor	157	1,196	598
Cuddapah	110	880	440
Total ..	302	2,356	1,178

Scheme No. 4—Land development by mechanical cultivation—

District.	Number of tractors.	Area ploughed.	Bulldozers.			Estimated additional food production in tons.
			Number.	Area levelled.	Hours worked	
Anantapur ..	4	1,665	7	202	4,382	204
Bellary ..	6	1,909	6	1,817	5,696	753
Chittoor ..	5	5,501	6	416	6,061	120
Cuddapah ..	4	1,078	5	175	2,541	129
Total ..	19	5,153	24	2,610	18,618	1,197

Scheme No. 5—River Pumping Scheme.—Three have been sanctioned in Chittoor district and three sets have been supplied so far.

Scheme No. 6—Soil conservation and contour bunding.—This work is in operation in three places in Bellary and Anantapur and two places in Chittoor districts. Topographical survey was carried out over an area of 198.00 acres. This work is in-charge of the Assistant Agricultural Engineer under the control of the Joint Director of Agriculture. The contour bunding is in progress and an extent of 4800 acres have been bunded so far in Bellary and Anantapur districts and 170 acres in Chittoor district.

Scheme No. 7—Distribution of tractor under hire-purchase system.—One has been supplied in Chittoor district.

Scheme No. 8—Tube wells scheme.—Sinking of tube wells with filter points.—No filter point tube well has been sunk in this division so far.

Scheme No. 9—Distribution of iron and steel material and implements for agricultural purposes.—This is being done through the co-operative agency and approved fabricators. No materials are stocked in the depots.

Scheme Nos. 10 and 11—Distribution of phosphatic manures and ammonium sulphate.—The distribution is being done by the tenderer firms and co-operative societies. The details of distribution and additional production are furnished below :—

Particulars.	Quantity distributed.		Area covered in acres.	Additional paddy.	Quantity produced in tons.			
	TONS.	LB.			Ragi.	Cholam.	Cumbu.	Other.
Ammonium sulphate.	3,084	161	80,598	5,850	84	..	..	40
Phosphatic manure.	273	1,439	8,596	224	5	..	..	4
Total ..	3,357	1,600	89,194	6,074	89	..	..	44

Scheme No. 12—Rural compost making.—For encouraging ryots to dig pits and compost vegetable organic waste material into useful manure a subsidy of Re. 1 per ton was paid to the ryot. The following quantities were prepared during the year.

The subsidy was discontinued from 1st April 1952.

District.	Quantity prepared in tons.	Area covered.	Estimated additional production in tons.
Anantapur	2,310	462	58
Bellary	2,310	460	56
Chittoor	4,620	924	115
Cuddapah	3,235	647	81
Total ..	12,475	2,493	310

Scheme No. 13—Multiplication and distribution of improved paddy seeds.—Improved seeds suitable to the various districts of the division were multiplied in seed farms, primary and secondary, for distribution to ryots. As the season was highly unfavourable crops failed. The open market rate went up very much higher than the village-site price. This division being the deficit area it was found difficult to secure targetted quantities, in spite

of offering premiums. However, large quantities of seeds were secured from surplus districts to meet the increased demand. Particulars of distribution, additional production, etc., are furnished below—

PADDY.

(i) Quantity of improved strains distributed (in tons and lb.)—

Particulars.	Anantapur.	Bellary.	Cuddapah.	Chittoor.
(a) Quantity of improved strains distributed.	98-797	89-778	243-187	449-584
(b) Area covered by (a) above, acres.	5,508	7,684	13,610	25,160
(c) Quantity of green manure seeds distributed.	9-223	10-1,080	26-1,488	35-259
(d) Area covered by (c) above, acres.	742	894	2,389	3,334-87
(e) Quantity of manures of all kinds distributed in tons and lb.	305-1,439	530-2,215	1,725-0	725-0
(f) Area covered by (e) above, acres.	8,092	10,540	43,820	20,300
(g) Cultural improvements ..	..	..	..	..
(h) Area under (a), acres ..	6,783	6,160	65,000	..
(i) Additional quantities of grains produced due to (b), (d), (f) and (h).	1,171-0	1,617-0	5,215-0	180-0

(ii) Seed Multiplication Scheme Paddy—

Particulars.	Anantapur.	Bellary.	Cuddapah.	Chittoor.
1 Area under seed farm in acres.	485	318	826	1,975
2 Quantity purchased in tons and lb.	107-498	376-11	333-2,035	572-1,420
3 Opening balance	80-2,190	10-714	225-1,202	403-925
4 Total quantity distributed ..	98-797	89-778	243-187	449-584
5 Area covered in acres	5,508	7,684	13,610	25,160
6 Closing balance in tons and lb.	99-1,891	29-346	316-810	526-1,761

Scheme No. 14—Distribution of improved millet seeds.—Particulars of various improved millet seeds like ragi, cholam, korra, etc., multiplied, and distributed are given below:—

(a) Ragi—Seed Multiplication Scheme—

Particulars.	Anantapur.	Bellary.	Cuddapah.	Chittoor.
1 Area under seed farm in acres.	59	22	40	56
2 Quantity purchased in tons and lb.	1-806	8-1,480	2-2,012	3-1,471
3 Opening balance	0-1,627	0-1,212	1-1,146	1-5
4 Total quantity distributed ..	0-1,501	1-759	2-961	2-1,178
5 Area covered in acres	300	482	425	1,132
6 Closing balance in tons and lb.	1-932	0-1,870	1-2,197	2-298
7 Additional production	19	18-0	30	30

(b) Jonna—Seed Multiplication Scheme—

Particulars.	Anantapur.	Bellary.	Cuddapah.	Chittoor.
1 Area under seed farm in acres.	349	2,950	1,450	6
2 Quantity purchased in tons and lb.	20-1,577	366-1,440	45-1,001	0-100
3 Opening balance	23-1,962	55-94	103-278	0-500
4 Total quantity distributed ..	31-1,909	74-586	100-1,805	0-593
5 Area covered in acres	3,567	27,449	22,580	40
6 Closing balance in tons and lb.	12-1,630	13-514	47-1,714	0-7
7 Additional production	64	438	501	..

(c) Korra—Seed Multiplication Scheme—

Particulars.	Anantapur.	Bellary.	Cuddapah.	Chittoor.
1 Area under seed farm in acres.	618	413	524	..
2 Quantity purchased in tons and lb.	45-1,963	73-1,083	26-314	..
3 Opening balance	17-2,037	54-1,342	15-2,055	0-200
4 Total quantity distributed ..	50-009	79-1,866	14-1,889	0-194
5 Area covered in acres	22,400	32,082	6,650	20
6 Closing balance in tons and lb.	13,751	8-412	27-483	0-6
7 Additional production	400	456	148	..

Scheme No. 15—Distribution of green manure seeds.—Intensive propaganda was done for green manuring of paddy crops and following quantities are distributed:—

Particulars.	Anantapur.	Bellary.	Cuddapah.	Chittoor.
1 Quantity secured in tons ..	16-1	17-2	30-5	16-4
2 Quantity targetted in tons ..	14	14	14	43
3 Quantity distributed	9-1,381	10-1,680	26-1,288	35-139
4 Area covered in acres	719	894	2,389	2,936
5 Additional production	72	89	239	294

Scheme No. 16—Control of pests and diseases.—With the advent of B.H.C. and D.D.T. products scheme has become very popular and there is increasing demand from ryots for help in the control of pests and diseases affecting their crops. Pesticides were sold at half cost for food crops. Spraying and dusting equipments were supplied free of charge for use. Details of area and crops affected by important pests and diseases which were tackled are given below:—

Particulars.	Anantapur.	Bellary.	Cuddapah.	Chittoor.
1 Number of demonstrations conducted.	402	1,694	815	5,020
2 Quantity of insecticides and fungicides sold.	2-1929	5-1017	18-1949	19-1,314
3 Cost of the above in rupees.	4,857	2,938	23,310	..
4 Area treated in acres	62,983	106,188	58,636	46,106
5 Estimated quantity of food grains saved by plant protection measures (tons-lb.)	1,388	2,754	892	1,719
6 Estimated gain to the ryots in rupees.	102,718	6,30,067	32,70,000	7,80,900

Scheme No. 17.—Particulars of increased or decreased area and yields of Food crops, etc., are furnished below:—

(a) Increased area under food crops in acres—

District.	Paddy.	Ragi.	Cholam.	Cumbu.	Tenai.	Vegetables.	Other millets.	Pulses.
Anantapur	..	12,218	..	6,439	..	301	..	2,651
Bellary	2,763	3,053	..	1,909	..	246	..	..
Cuddapah	..	..	21,200	13,485	3,818	..	..	..
Chittoor	..	16,961	11,813	8,737	716	..	2,014	..
Total	2,763	32,232	33,013	30,570	4,534	547	2,014	2,651

(b) Decrease in area under food crops in acres—

District.	Paddy.	Ragi.	Cholam.	Cumbu.	Tenai.	Vegetables.	Other millets.	Pulses.
Anantapur	31,120	..	5,141	..	6,262	..	..	..
Bellary	..	..	7,958	..	17,919	..	..	..
Cuddapah	15,746	10,826	..	..	..	72	..	..
Chittoor	26,008	..	..	..	..	865	..	..
Total	82,874	10,826	13,099	..	24,181	937	..	..

REMARKS.—There was considerable decrease in area due to unfavourable conditions of the season.

374 ADMINISTRATION REPORTS OF SUBORDINATE OFFICERS OF

(c) *Fresh area brought under irrigation.*—No fresh area was brought under irrigation through any irrigation project. But the following areas were brought under irrigation mainly with the help of new wells sunk and old wells renovated during the period under report :—

District.	Area in acres.		
Anantapur	..	..	390
Bellary	..	..	424
Cuddapah	..	..	1,574
Chittoor	..	..	30
Total	..	..	2,418

(d) *Area under non-food crops diverted to food crops in acres.*—The main non-food crops which have yielded place to food crops are given below :—

District.	Cotton.	Groundnut.	Tobacco.	Gingelly.	Sugarcane.	Chillies.
Anantapur	..	5,059	..	..	..	..
Bellary	6,994	..	..	..	..	..
Cuddapah	..	11,859	..	..	..	..
Chittoor	..	..	..	..	500	..
Total	6,994	16,918	..	..	500	..

(e) *Additional area brought under short-term food crops in acres.*—The advocacy of raising short-term food crops during summer months with limited supply of water in tanks induced the ryots to grow the crops as indicated below :—

District.	Paddy.	Ragi.	Cholam.	Cumbu.	Tenai.
Anantapur	2,231	456	3,803	..	6,490
Bellary	1,340	37	..	800	..
Cuddapah	..	..	..	..	..
Chittoor	..	..	..	..	..
Total	3,571	493	3,803	800	6,490

(f) *Additional area brought under sweet potato and tapioca.*—Intensive propaganda carried on for sweet potato inducing ryots to take to the cultivation coupled with the free supply of vines resulted in bringing the following area under sweet potato during the year :—

District.	Sweet potato.		Tapioca.
	ACS.		ACS.
Anantapur	..	..	..
Bellary	..	160.00	1.00
Cuddapah	..	..	..
Chittoor	..	5.00	1.00
Total	..	165.00	2.00

(g) *Waste lands reclaimed and brought under cultivation and foodgrains produced on this reclaimed area.*—

District.	Area in acres.		Production of food grains in tons.
Anantapur	..	1,665	416
Bellary	..	3,717	650
Cuddapah	..	327	82
Chittoor	..	227	88
Total	..	5,936	1,236

(h) *Quantity of seeds and manures distributed free, area covered and additional quantity of food stuffs produced due to this.*—To uplift the Yanadis in Chittoor district a special scheme for free distribution of seeds and manures which was sanctioned in the previous years was continued during this year also, as per details given below :—

		Distribution of seeds free to Yanadis.		
Details.	Quantity distributed.		Area covered.	Additional quantity of production.
	TONS.	LB.		
Paddy	1	864	77.50	..
Ragi	0	1,109	138.00	..
Horsegram	1	1,871	178.40	..

REMARKS.—Due to adverse seasonal conditions in the district during the year, no additional production was obtained.

(i) *Distribution of seeds free under Rayalaseema Development Board special grant of Rs. 1,000.*—This scheme was in operation in Chittoor district only.

Out of the grant of Rs. 1,000 that was allotted by the District Collector, Chittoor, 20 puddler-cum-tramplers were purchased at Rs. 50 each and 19 were distributed to ryots at half cost.

(j) *Acreage, yield and percentage of increase in the production of crops in this fasli as compared with the last year.*—

Crops.	Area in fasli 1360-61.		Production in fasli 1360-61.		Percentage of	
					Increase.	Decrease.
Paddy	342,529	262,418	235,291	137,819	..	41.4
Ragi	230,028	251,435	143,353	141,243	..	1.5
Cholam	1,180,410	1,200,324	114,980	92,196	..	19.8
Cumbu	368,639	407,209	74,988	61,844	..	17.5
Tenai	735,576	715,929	105,914	87,606	..	17.3

REMARKS.—Due to the unsatisfactory nature of the season there was decrease in yield this year as compared with the last year.

(k) *Number of new wells sunk and old wells renovated.*—

District.	New wells sunk.		Old wells renovated.
Anantapur	..	39	170
Bellary	..	73	42
Cuddapah	..	349	438
Chittoor	..	46	..
Total	..	507	650

(l) The following vegetable seeds were distributed free in various schools through Educational Department :—

District.	Quantity. LB.	Value. RS.
Anantapur	..	..
Chittoor	9½	50
Cuddapah	8½	40
Bellary	..	80

III. *Agricultural Education.*—Agriculture is taught as an optional subject only in London Mission High School, Gooty. All village officers and other Revenue Officers were assembled at convenient centre of each taluk and grow more food schemes and other departmental activities were explained to them. The Agricultural Demonstrators visited village schools and gave proper advice to school teachers regarding cultivation of vegetables and control measures against pests and diseases. Thousands of leaflets on control measures against pests and diseases and on various agricultural subjects were distributed to the ryots. The statement below gives the work done in this direction :—

District.	Visits to schools by district staff.	Lectures delivered.	Exhibitions conducted.	Leaflets distributed.	Villagers "Padipantaku" calendar sold.	Subscribers enlisted for "Krishika Bandhu" and "Mezhichelvam."
Cuddapah ..	66	83	3	10,000	734	4,315
Bellary ..	250	524	5	59,280	872	2,700
Anantapur ..	55	79	21	270,002	809	8,473
Chittoor ..	354	300	5	5,000	1,022	6,484
Total ..	725	986	34	344,282	3,437	21,972

IV. *Seasons.*—Rainfall received during the year in the four districts were as follows :—

District.	Average rainfall. INCH.	Rainfall in 1951-52. INCH.
Anantapur	22.40	18.52
Bellary	22.32	20.99
Cuddapah	27.10	18.32
Chittoor	29.12	25.58

Anantapur district.—A total rainfall of 18.52 inches was received of which 6.92 inches were received in May 1952 end and after. The distribution was bad and the north-east monsoon rain was particularly a failure. Consequently the yield of all crops was affected. Though the south-west monsoon broke in time it did not give sufficient rains in August. The crops raised with the help of early rains suffered consequently. The north-east monsoon rains did not give the usual rains and consequently drought conditions prevailed after November. Due to this Hingari crops like cotton, cholan, horsegram, etc., were very much affected. As many tanks in this district did not receive water-supply the area under paddy crop dwindled down. As the north-east monsoon rains did not give sufficient rainfall and there was only limited supply of water in many wells second crop of paddy and garden crops could not be raised as usual. There was difficulty even for drinking water and wells had to be deepened for the purpose. This was one of the miserable famine years. Military help was sought for deepening drinking wells and famine work undertaken to provide labour besides opening gruel centres.

Bellary district.—The advent of the south-west monsoon in the western taluks in time helped the raising of mungari crops. Similarly hingari crops were also raised in black soils without any delay. But the north-east monsoon which broke early fissled out without giving usual rains. The rains received were unevenly distributed and were not conducive for the crop growth, with the result all late and hingari crops of cotton, groundnut, jonna, etc., gave very poor yields. In general the season was favourable for mungari and early sown crops and highly unfavourable for hingari crops particularly in the eastern taluks.

Cuddapah district.—The south-west monsoon was feeble with a total rainfall of 9.87 inches as against a normal rainfall of 14.5 inches. The irrigation sources in the district particularly tanks and spring channels did not receive water in time and the sowings of paddy were delayed by over a month. Some of the tanks in the district did not receive water and consequently paddy cultivation was not taken up at all. The sowings of dry crop, particularly groundnut and korra were delayed by about a month. The rainfall received during the north-east monsoon was also disappointing recording a total rainfall of only 5.39 inches against the normal of 9.9 inches and did not much augment the water-supply in tanks and spring channels, with the result the paddy crop had to be abandoned after two and a half months growth in certain areas for want of irrigation water. Thus due to insufficient rains received in both the monsoons the yields of crops like groundnut, cotton, korra, cholan, paddy were very low. In short the seasonal conditions during the year was a total failure, resulting in famine conditions. There was no water in wells in many places in Rayachoti taluk, Rajampet taluk, Badvel and Sidhout. Military assistance was sought to deepen wells to alleviate drinking water famine and luckily May 1952 rains, solved this. Famine works were started to provide labour and gruel centres were opened in the famine-affected areas.

Chittoor district.—South-west monsoon was late and gave only 8.96 inches as against 14.65 inches of last year and 14.9 inches of normal year. But the distribution was uneven and erratic. Dry crops were sown to get only little yield. This monsoon did not bring water to tanks. North-west monsoon gave only 4.97 inches as against the normal of 14.7 inches and there was no rains after November to March. As both the monsoons did not give required rainfall, all crops dry as well as wet failed to give satisfactory yields. Some area could not be cropped at all and part of the area cropped had to be abandoned for want of irrigation water. The water-supply in wells also dwindled due to droughty conditions that prevailed for the past four years. In general, seasonal conditions were a total failure. Consequently the area cropped and the yields were very much affected. Only with the help of wells a portion of the crops raised was saved from total failure. Water famine was felt in Chittoor town and many other places as wells also dried up. This was the worst year in the memory of the people. Military assistance was sought to deepen wells to alleviate drinking water famine and luckily May 1952 rains, solved this. Famine works were started to provide labour and gruel centres were opened in the famine-affected areas.

Summary.—The season in general was highly unfavourable for all crops in the districts of Chittoor, Anantapur and Cuddapah resulting in famine conditions. The paddy crop gave fair yield under river-fed areas and a few big tanks which received sufficient supply of water. In Chittoor district and in many tank-fed areas of Cuddapah and Anantapur districts, the paddy crop either failed or gave poor yield.

V. *Demonstration and propaganda.*—(a) The staff engaged for this purpose is furnished below. It is felt that the number of maistries employed is not sufficient. In spite of the fact the season was highly unsatisfactory, the field staff carried out intensive propaganda and conducted a large number of demonstrations for wide adoption of agricultural improvements. Demonstration plots and observation plots were laid in various places to bring home to ryots the efficacy of various improvements—Varietal, cultural and manurial—

Particulars of staff for propaganda.	Number on 1st July 1951.	Number posted during the year.	Number retrenched in the year.	Number on 30th June 1952.
Agricultural Demonstrators	65	1	..	66
Fieldmen	65	12	..	77
Demonstration maistries	119	17	5	131

(b) *Particulars of items of extension works—*

Particulars of demonstration.	Anantapur.	Bellary.	Cuddapah.	Chittoor.
1 Number of Demonstration plots run ..	280	250	253	1,200
2 Number of propaganda meetings held.	476	524	528	701
3 Number of exhibitions conducted ..	21	5	3	5
4 Number of visitors	40,000	8,560	25,000	12,000

(c) *Trial and observations.*—To test the suitability of new varieties observation plots were laid in paddy, cumbu, ragi, korra, cotton, pulses, groundnut, castor and gingelly as per district work programme and the performance of the varieties with reference to local was observed. On an average ten such plots were laid in each crop.

(d) *Exhibition and shows.*—Exhibitions were arranged attractively during important village festivals, cattle shows and jamabandis. Exhibits of seeds of improved crops suitable to the locality, specimen green manure, crops green leaf tree seedlings, insecticides, appliances to control pests and diseases, improved implements, etc., were exhibited. Charts were also put up furnishing useful information. Leaflets and pamphlets were distributed to ryots and various improvements explained to them. These exhibitions attracted a large number of visitors and served a very good purpose as a sort of visual education. The details of exhibitions conducted during the year are furnished below:—

District.	Number held.	Number of visitors.	Expenditure. RS. A. P.
<i>Exhibitions and shows.</i>			
Anantapur	21	40,000	119 12 0
Bellary	5	8,560	480 0 0
Cuddapah	3	25,000	182 0 0
Chittoor	5	12,000	358 0 0
Total ..	34	85,560	1,139 12 0

(e) As a direct result of lectures delivered by the executive staff during their tours enthusiasm of many ryots was roused resulting in the enlistment of the following number of subscribers:—

District.	Number of subscribers enlisted.
Anantapur	8,473
Bellary	2,700
Chittoor	6,484
Cuddapah	4,315
Total ..	21,972

(f) *Agricultural Associations.*—To form a liaison between the ryots and the department Agricultural Advisory Committees were formed in all important villages. District and taluks committees were also formed and old defunct agricultural committees were revived. Particulars are furnished below:—

District.	Number of Agricultural Associations functioning.
Anantapur	59
Bellary	190
Chittoor	79
Cuddapah	103
Total ..	431

(g) *Crop yield competition.*—To rouse the competitive interest and create incentive among the ryots for increasing the production the crop competition scheme sanctioned in G.O. Ms. No 205, Food and Agriculture, dated 13th November 1950, was continued. The ryots were induced to take part in the competition. Particulars of winners and highest yield obtained in each district are given below:—

District.	Name of the ryot (winner of prize).	Acres yield obtained. LB.
Anantapur	Sri P. Rajasekhara Reddy, Talmarla post office, Penukonda taluk.	8,620
Bellary	Sri G. Settappa, Muddapur, Kampli post office, Hospet taluk.	7,220
Cuddapah	Sri C. L. Konda Reddy, Nandimandaram post office, Cuddapah taluk.	10,830
Chittoor	Sri K. Venkatrama Naidu, Kasipentala Village, hamlet of Kalrodapalle, Chandragiri taluk.	8,525

(h) *Model farms.*—One model farm for each taluk was selected in almost all the taluks of the division with the object of demonstrating all the departmental improvements, varietal cultural and manurial in these farms. The subsidy sanctioned last year was withdrawn this year.

VI. *Crop improvements.*—Distribution of improved seeds is the most important item of work of the department and the same has been dealt with for important crops under the Grow More Food Schemes. Every step was taken to produce large quantity of improved seeds and distribute them to the ryots. Particulars of other crops like fruits, vegetables, pulses, oil seeds are furnished below:—

(i) *Cumbu.*—There is no strain in Sajja suitable to this division. Therefore the area under improved strain is very low. A quantity of 1 ton 24 lb. was produced and distributed in Chittoor district only.

(ii) *Fruits*.—Ryots were encouraged to plant fruit trees and a large number of fruit plants was arranged to be supplied. Necessary advice on the proper upkeep and control measures against pests and diseases was given. Particulars of various improvements carried out are given below :—

(a) *Introduction of plants*—

Variety.	Number distributed.					Area covered in acres.				
	Anantapur.	Bellary.	Cuddapah.	Chittoor.	Total.	Anantapur.	Bellary.	Cuddapah.	Chittoor.	Total.
Mango ..	3,729	630	..	911	5,270	93.00	16	..	9	118
Citrus ..	8,400	1,374	25	713	10,512	120	13	1	15	148
Plantains ..	..	..	370	120	490	..	..	..	1	1
Grapevines ..	6	..	..	..	6	1	..	..	..	1
Pineapples ..	..	..	..	..	..	..	..	..	..	..
Cashewnut ..	7,500	500	1,000	..	9,000	20	10	2	..	32
Pomegranate ..	520	..	..	..	520	8	..	..	..	8
Woodapple ..	..	..	..	..	..	..	..	..	..	..
Guava ..	50	..	..	210	260	1	..	..	3	4
Papaya ..	200	..	..	875	1,075	1	..	..	10	11
Cocoanuts ..	244	..	..	100	344	3	..	..	1	4
Others ..	86	90	65	254	495	1	2	1	9	13

(b) *Area under cultural improvements including irrigation*—

District.	Mangoes.	Citrus.	Others.	Total acres.
Anantapur ..	114	276	4	394
Bellary ..	28	66	21	115
Cuddapah ..	..	308	..	308
Chittoor ..	63	153	14	263

(c) *Area under manurial improvements (acres)*—

District.	Mangoes.	Citrus.	Others.	Total acres.
Anantapur ..	2	107	4	113
Bellary ..	10	30	40	80
Cuddapah ..	..	165	..	165
Chittoor ..	21	62	8	91

(d) *Control of pests and diseases in acres*—

District.	Mangoes.	Citrus.	Others.	Total acres.
Anantapur ..	95	247	2	344
Bellary ..	40	156	3	199
Cuddapah ..	150	940	..	1,090
Chittoor ..	177	293	2	472

(iii) *Sugarcane Improvements*.—Ninety per cent of the sugarcane area grown in this division is the variety Co. 419. Co. 449 is being tried to see whether it gives a performance better than Co. 419. The ryots seem to prefer Co. 419. Details of improvements are furnished below :—

District.	Number of demonstrations.	Area covered.
(a) <i>Cultural</i> —		ACS.
Anantapur ..	27	14
Bellary ..	60	5,423
Cuddapah ..	18	36
Chittoor ..	141	720
Total ..	246	6,202

District.	Number of demonstrations.	Area covered.
(b) <i>Varietal</i> —		ACS.
Anantapur ..	61	601
Bellary ..	10	40
Cuddapah ..	1	1
Chittoor ..	49	23
Total ..	121	665

(c) <i>Manurial</i> —						
Anantapur	..	..	..	..	15	52
Bellary	..	..	..	..	150	544
Cuddapah	..	..	..	..	3	5
Chittoor	..	..	..	..	68	1,138
Total					236	1,739

(d) *Control of pests and diseases*—

Anantapur ..	5	7
Bellary ..	80	126
Cuddapah ..	3	3
Chittoor ..	54	324
Total ..	142	460

(e) *Sindhwahe and Improved furnaces*—

Anantapur ..	92	..
Bellary ..	20	..
Cuddapah ..	2	..
Chittoor ..	157	..
Total ..	271	..

(f) *Jaggery manufacture*.—

Anantapur ..	270	..
Bellary ..	73	..
Cuddapah ..	3	..
Chittoor ..	303	..
Total ..	669	..

(iv) *Vegetables*—

(a) *Military schemes*.—Nil.

(b) *Civilian schemes*.—A scheme for production and distribution of vegetable seeds and to make the Panagal Demonstration Farm, Kalahasti, self sufficient sanctioned two years back was continued during this year also. A quantity of 807 lb. of vegetable seeds valued at Rs. 3,102 was distributed through the Department.

A large quantity of seeds was arranged to be obtained from research stations and reliable nurserymen in addition and distributed it to

the public. Growing of vegetables in the compounds and backyards of buildings was encouraged. In the schools also teachers were induced to raise vegetables wherever there was school garden.

District.					Vegetable seeds distributed.
					LB.
Anantapur	..	..	..	..	212
Bellary	..	..	..	..	210
Cuddapah	..	..	..	..	96
Chittoor	..	..	..	..	173
Total ..					691

(c) Increase in vegetable area due to departmental effort and the estimated quantity of vegetables produced in non-scheme areas.—

District.					Area.	Estimated quantity of vegetables produced.
					ACS.	TONS.
Anantapur	..	..	..	..	301	903
Bellary	..	..	..	..	342	435
Cuddapah	..	..	..	..	185	555
Chittoor	..	..	..	..	179	1,500
Total ..					1,007	3393

(v) Quantity of fodder seeds supplied—

Variety.					Quantity.	Area.	Fodder produce.
					TONS. LB.	ACS.	TONS.
Cholam	..	..	..	..	4 870	302	1,188
Pillipesara	..	..	..	..	7 2158	713	2,139
Sunn hemp	..	..	..	..	220 0	6	12
Guinea grass	..	..	..	..	34,750 Slips.	7	88
Kolakattai and Napier grass	..	..	..	..	41,400 ..	4	91

(vi) Pulses.—(a) Important strains under pulses introduced are redgram (Tenkasi) short duration variety, strain No. 2232, 37 and Bengalgram strain 482. Area brought under improved strains is given below :—

District.					Area.
Anantapur	..	..	..	..	110
Bellary	..	..	..	..	117
Cuddapah	..	..	..	..	105
Chittoor	..	..	..	..	..
Total ..					332

(b) Increase in area under pulses and the total estimated quantity produced—

Crop.	Area in acres.				Estimated quantity in production in tons.			
	Ananta-pur.	Bellary.	Cudda-pah.	Chit-toor.	Ananta-pur.	Bellary.	Cudda-pah.	Chit-toor.
Redgram	..	..	..	..	0.1220	..	..	..
Blackgram	..	..	..	..	..	4.90	..	10.00
Green-gram	..	..	..	..	..	..	..	..
Horsegram	..	..	..	..	..	..	..	..

(c) Decrease in area under pulses—

Variety.					Anantapur	Bellary.	Chittoor.	Cuddapah.
Redgram	..	..	..	..	..	567	730	..
Blackgram	..	..	..	..	..	..	..	..
Greengram	..	..	..	..	..	3533	127	..
Bengalgram	..	..	..	..	799	984	512	..
Horsegram	..	..	..	..	..	3664	8340	..

(vii) Chillies—

District.					Normal area.	Quantity of strain distributed.	Estimated Additional production.
					ACS.	LB.	LB.
Anantapur	..	..	..	..	10,700	0-100	..
Bellary	..	..	..	..	1,100	0-1	2-0
Cuddapah	..	..	..	..	6,600	..	..
Chittoor	..	..	..	..	5,440	0-12	6-0
Total ..					23,840	0-113	8-0

(viii) Oil seeds—

(a) Groundnut—

District.	Area under improved strains.	Quantity of improved seeds distributed.		Area covered.	Additional quantity produced.		Additional gain to cultivators.
		TONS.	LB.		TONS.	LB.	
Anantapur	..	7,532	2 250	60	251	0	1,12,950
Bellary	..	4,481	2 473	56	47	1761	22,800
Cuddapah	..	580	0 1,083	11	13	0	6,220
Chittoor	..	14,811	6 624	140	14	0	5,600
Total ..		27,404	11 190	267	325	1,761	1,46,570

T.M.V. 2 and T.M.V. 3 groundnuts were found to come up better than local. Seed farms were run under the above strains and the quantities noted above were produced and distributed to ryots.

(b) Castor.—T.M.V. 2 and T.M.V. 3, Castor were found to come up well. They were produced and distributed to ryots as detailed below :—

District.	Area under improved strains in	Quantity of improved seed distributed.		Area covered.	Additional quantity produced.	Additional gain to cultivators.
		ACS.	TONS-LB.			
Anantapur	..	241	0-908	91	..	..
Bellary	..	20-00	3-0	2-00	..	..
Cuddapah	..	..	..	..	..	..
Chittoor	..	..	..	..	..	..
Total ..		261	3-908	93	..	..

(c) Coconuts.—Ryots were encouraged to grow coconuts particularly near water courses and on broad bunds of wet lands. Indents from each district were collected and sent to the Oil Seeds Specialist for supplying coconut seedlings under the I.C.C. Scheme. Seeds and seedlings distributed during the year are given in the statement below :—

(a) Distribution of seed and seedlings—

District.					Seeds.	Seedlings.
Anantapur	..	..	..	..	..	14
Bellary	..	..	..	..	..	200
Cuddapah	..	..	..	..	250	..
Chittoor	..	..	..	..	..	100
Total					250	314

(d) *Gingelly*.—No strain has been found to be better than local. T.M.V. 2 and T.M.V. 3 gingelly trials are being repeated.

(ix) *Fibres*.—H-1 Cotton is most popular strain and covers over 80 per cent of the area under cotton. 881-F. is just gaining ground as a Mungari variety. American types like H.A. 11, M.A. 2, Lakshmi were tried to fix up suitable types to suitable places. Intensive propaganda was done to increase area and yield of cotton. Growing of cotton in mixture with other crops like ragi, groundnut, onion, cholan, etc., was encouraged. Large quantities of improved seeds 420 and 216-F. for Mungari season were obtained and distributed.

H-1 Cotton Scheme.—For the multiplication and distribution of H-1 cotton seeds for Western zone, this scheme continued to work at Guntakal. A seed farm area of 6,500 acres was arranged to meet the demand of the seed from the districts of Bellary, Anantapur, Cuddapah and Kurnool. Six thousand five hundred bags were procured and distributed. Under the scheme, a sum of Rs. 72,000 was given as advance for cultivation at Rs. 10 per acre to seed farm ryots. This amount was recovered at the time of purchase of seed. The ryots were helped in the disposal of the seed farm lint. The seed farm lint fetched a premium of Rs. 18 per Naga of half a Bombay candy. Quantities of improved seeds distributed in each district area, covered, etc., are given below:—

District.	Quantity of seeds of strains distributed.	Area covered.	Additional quantity of kappas production.	Additional gain to cultivators.
	TONS-LB.	ACS.	TONS-LB.	RS.
Anantapur	109-1,150	6,235	22-720	65,500
Bellary	128-805	23,334	520-1,900	3,70,000
Cuddapah	134-1,050	41,867	21-2,200	32,040
Kurnool	36-301	2,500	..	..
Total	408-1,066	37,936	565-340	4,64,540

Gogu.—This is a minor crop here and mostly grown as greens and rarely for fibre.

(x) *Tobacco*.—There is no scheme under Virginia tobacco tokra scheme, or tobacco seed multiplication scheme in operation in this division. Desi type tobacco is raised and particulars of area and yield are given below:—

Desi Tobacco.			
District.	Normal area.	Area in the year.	Acres yield of cured leaf.
	ACS.	ACS.	LB.
Anantapur	3,290	2,370	..
Bellary	3,034	1,568	250
Cuddapah	1,720	850	1,500
Chittoor	380	19	800
Total	8,424	4,807	2,550

(xi) *Pyrethrum*.—The crop is not grown in this division.

VII. *Tree-planting*.—Intensive propaganda was done for planting of green leaf yielding trees, cuttings and other trees of economic importance in all vacant sites, porambokes, tanks and field bunds. Nurseries were raised in large number, sufficiently a head to supply seedlings to ryots. The tree-planting week was celebrated with the active co-operation of the Revenue Department, Forest, Agricultural Associations and private individuals.

The following were the particulars of seedlings, cuttings, etc., planted during the week and after:—

District.	Seed sown.	Seedlings transplanted.	Cuttings and stumps planted.
Anantapur	362,400	332,075	..
Bellary	141,782	314,096	1,215
Cuddapah	53,460	203,206	4,650
Chittoor	..	462,961	248,073
Total	562,642	1,312,338	252,938

VIII. *Manures*.—Intensive propaganda was done regarding the proper collection and conservation of cattle dung, urine and other organic matter. Manufacture of rural compost and municipal compost were encouraged. Ryots were induced to use compost manufactured by municipalities and panchayats. The quantity manufactured under rural subsidy scheme is given under the intensive scheme. Particulars of other manures and systems adopted are given below:—

Particulars.	Number of places of manufacture.	Quantity produced.	Quantity used by ryots.	Estimated increase in production.
		TONS.	TONS.	TONS.
(a) <i>Urban compost</i> — By municipalities and panchayat boards.	47	14,299	12,249	296
(b) <i>Cattle manure</i> — (1) Number of pits newly started	..	..	..	10,371
(2) Number of pits newly improved	..	..	..	7,139
Total	..	..	..	17,510
(c) <i>Byre System</i> — (1) Number started	..	..	..	302
(2) Number improved	..	..	..	312
Total	..	..	..	614
(d) <i>Loose Box System</i> — (1) Number started	..	..	..	173
(2) Number improved	..	..	..	788
Total	..	..	..	961

IX. *Agricultural implements—Tools and machinery*.—Intensive propaganda was continued regarding the use of iron ploughs, labour saving implements, horticultural tools, oil engines, tractors, etc., and they were arranged to be supplied on hire or for cash. The details of sales, hire, demonstrations are furnished below:—

Particulars.	Number sold.			
	Anantapur.	Bellary.	Chittoor.	Cuddapah.
1 Tractors	..	..	..	..
2 Ploughs (heavy, medium and light).	203	5	12	10
3 Other implements	..	..	7	..
4 Horticultural tools and appliances.	..	..	..	4
5 Spare parts	143	..	..	30
6 Sugarcane mills	1	..	1	..
7 Fabricated implements	..	..	..	20
8 Water lifts	..	..	..	..

Particulars.	Number hired out.			
	Anantapur.	Bellary.	Chittoor.	Cuddapah.
1 Tractors	..	..	..	9
2 Ploughs (heavy, medium and light).	..	..	..	..
3 Other implements	..	..	2	..
4 Horticultural tools and appliances.	..	..	..	..
5 Spare parts	..	..	927	..
6 Sugarcane mills	..	..	..	..
7 Fabricated implements	..	..	..	..
8 Water lifts	..	..	..	..

Particulars.	Number of demonstrations conducted.			
	Anantapur.	Bellary.	Chittoor.	Cuddapah.
1 Tractors	..	28	..	..
2 Ploughs (heavy, medium and light).	445	270	1,573	1,258
3 Other implements	206	406	1,015	356
4 Horticultural tools and appliances.	..	28	7	215
5 Spare parts	..	..	..	..
6 Sugarcane mills	..	..	27	2
7 Fabricated implements	..	..	..	..
8 Water lifts	..	12	..	48

X. *Soil conservation work.*—Improved methods to prevent soil erosion to conserve soil moisture were widely advocated. Dry farming methods adopted are given below :—

Operation.	Number of demonstrations.				
	Anantapur.	Bellary.	Cuddapah.	Chittoor.	Total.
(a) Terracing	8	1	..	2	11
(b) Levelling	53	158	55	25	291
(c) Bunding with bund farmers.	..	201	..	74	275
(d) Construction of split ways and check-dams.	36	13	28	4	81
(e) Hedge planting of aloes, etc.	5	200	..	14	219
(f) Contour ploughing ..	..	420	356	70	846
(g) Strip cropping	..	15	..	..	15
(h) Silt trapping	..	..	..	..	..
(i) Field embankment ..	158	158	..	..	316
(j) Contour bunding ..	111	158	247	240	756

Operation.	Area covered acres.				
	Anantapur.	Bellary.	Cuddapah.	Chittoor.	Total.
(a) Terracing	40	3	..	7.75	50.75
(b) Levelling	158	108	179	118.95	563.95
(c) Bunding with bund farmers.	..	980	..	40.00	1,020
(d) Construction of split ways and check-dams.	201	24.00	148	80.00	381
(e) Hedge planting of aloes, etc.	176	5	48	17.00	456
(f) Contour ploughing ..	948	62,972	1,298	134.57	65,352.57
(g) Strip cropping	..	50	..	..	50
(h) Silt trapping	42	..	..	..	42
(i) Field embankment ..	4	..	..	..	4
(j) Contour bunding ..	425	234	1,057	509.65	2,225.65

XI. *Subsidiary industry.*—There is little scope for the expansion of apiculture in this division except in Chittoor district due to paucity of Bee-pasturage and extremes of temperature. However propaganda was done for hiving up bees and advice was given on the proper maintenance of bees. The progress of work in this direction is given below :—

The special scheme for bee-keeping sanctioned in Chittoor district was continued with some modification. The post of bee worker and Bees boy was retrenched and three demonstration maistries were sanctioned for helping the public in the proper maintenance of bee-hives.

Bee-keeping.

Particulars.	Anantapur.	Bellary.	Cuddapah.	Chittoor.	Total.
1 Number of hives during the year.	2	..	..	89	91
2 Progressive total ..	..	..	..	0.95	0.95
3 Quantity of honey produced in lb.	..	..	..	..	..

XII. *Special schemes—Plant Quarantine and Pest Act.*—Five consignments of plants containing 49 citrus and 24 mango plants intended for export to places outside the Madras State to Mysore, Bangalore, Nagpur, etc., were examined in Cuddapah district, fumigated with hydrocyaned gas and phytosanitary certificates were issued. Pest Act prohibiting the use of oil-cakes to melon crop grown in the river-bed of Pennar in Siddhout and Cuddapah taluks continued to be in force during the year. Twenty-three cases for infringements of the provisions of the Act were filed in the judicial courts and eight persons were sentenced to pay a fine of Re. 1 each and the remaining cases are pending disposal.

XIII. *Rural Welfare Scheme.*—The scheme continued to work with an area of operating three firkas. The fieldman and maistries sanctioned exclusively for the scheme were placed under the administrative control of the Rural Welfare Officer. The Agricultural Demonstrator prepared a programme of work for the development area in consultation with Rural Welfare Officer and guided him in the agricultural development of the centre. This area was given special attention with reference to supply of seeds, manures, implements, loans, plant protection work, etc. The District Agricultural officers attended the monthly meetings held and took interest in all the deliberations.

State Trading Scheme.—Fertilizers continued to be stored in the depots though sale was being attended by co-operative societies and tender firms. They have not completely taken the stocks from the departmental depots. There are stocks in many depots yet to be taken over.

XIV. *Loans.*—Large number of special loans was granted to deserving ryots by this department for the purchase of seeds and manures and for the purchase of implements. Intensive manuring scheme where in special loan free of interest limited to Rs. 200 at Rs. 25 per acre for the purchase of chemical manures was extended to the portion of the districts of Chittoor, Cuddapah and Bellary. Particulars are furnished below :—

District.	Number of loans.			Value of loans in rupees.		
	Seeds and manure.	Intensive cultivation.	Implements.	Seeds and manure.	Intensive cultivation.	Implements.
Anantapur ..	923	..	74	1,00,000	..	3,400
Bellary ..	1,420	..	3	1,69,690	..	300
Chittoor ..	1,814	197	27	1,70,000	29,580	1,400
Cuddapah ..	2,018	756	3	2,28,710	98,550	300
Total ..	6,175	953	107	6,68,400	1,28,130	7,400

XV. *Work through other agencies*.—All the departments wholeheartedly co-operated in carrying through the 'Grow More Food Campaign'. The nature of the co-operation is given below :—

(a) *Education Department*.—Schools were allowed to be used for propaganda and demonstration of improvement of agriculture, vacant sites in their compounds were allowed to be used for raising vegetables and green leaf manure plants.

(b) *Co-operative Department*.—Groundnut cake purchased from the mills were sold to the ryots through the co-operative stores. Similarly chemical fertilizers handed to the department for distribution were made available to ryots.

(c) *Forest Department*.—The department co-operated in making forest green leaf available to the cultivators. Seeds of various economic trees were collected and distributed for tree-planting.

(d) *Veterinary Department*.—Full contact with these department officers were maintained and arrangements for supply of good, pedigree bulls and sheep and supply of eggs of improved breeds of poultry were made.

(e) *Revenue Department*.—This department co-operated in making the Grow More Food Campaign and Vanamahotsava a success. It helped in the matter of procurement of seeds, in assigning waste lands and porambores to enthusiastic ryots, for raising green manures, food and vegetable crops. Ryots were enabled to sink wells with the help of subsidies and also to renovate old wells. Village headmen were helpful in assessing the true requirements of their villages of the requirements of implements of seeds, etc. 10,000 copies of life-history and control of millet grasshopper were got printed from the Cuddapah Collector's discretionary grants and distributed in advance of the millet growing season to the ryots concerned.

(f) *Public Works Department*.—Irrigation problems were discussed their technical assistance obtained on all occasions.

(g) *Highways Department*.—They co-operated to the tree-planting week and also advised liberally on any matter in their province.

(h) *Public Department*.—Vegetables and food crops were made to be raised by the Yanadis in Chittoor district by way of free supply of seeds through this department.

(i) *Quasi-official bodies*.—The Food Production Committee, Rayalseema Development Board, Cotton and Groundnut Market Committee, Firka Development Committee, District Agricultural Associations were the main quasi-official bodies with which the department was interested. The help of these bodies was enlisted to push through the various agricultural schemes for increased productions of compost and planting seedlings during Vanamahotsava work supplied from this department.

XVI. *New items*.—(a) *Paddy crop yield competition*.—This was introduced last year. This has raised enthusiasm in the minds of ryots. As a result of its working reported in the body of the report a large number of ryots will be enrolled for the competition in the ensuing year.

(b) *Planting of Glyricidia seedlings 6 feet apart on some of the bunds of paddy lands at the time of transplanting and planting of sesbania speciosa in the field margin or border of wet land in order to meet the green leaf and green manure requirements of the ryots from the bunds of his own fields is also taken up. A start is made in the above direction and the progress will be watched.*

(c) *Paddy exchange in Chittoor district*.—The purpose of the scheme was to spread the area under improved strains by helping the ryots to get improved varieties in exchange for grain. But the scheme did not work as there was practically no grain available with most of the ryots for exchange as the season was a big failure.

(d) *Cotton extension work*.—With the object of increasing cotton production raising of cotton with groundnut, ragi, chillies, onions and other crops in mixture was raised in large extents. But due to failure of rains the growth of cotton in mixture was not quite satisfactory. However vigorous propaganda is carried out to increase the area and yield of cotton in all possible ways.

(e) *Model farm*.—Selection has been done as per Government Order. The subsidy granted by the Government previously was withdrawn this year.

Selection of model farms at the rate of one for each taluk was done in all the four districts of Anantapur, Bellary, Cuddapah and Chittoor to advocate departmental improvements and serve as a means of visual education to the farmers as per G.O. Ms. No. 235, Food Production, dated 30th November 1950. The maximum cost of concessions given to a registered model farmer was limited to Rs. 250. The scheme which was continued up to 30th November 1952 in G.O. No. 539, Food and Agriculture, (Food Production), dated 7th December 1951, was wound up as per G.O. Ms. No. 223, Food and Agriculture, (Food Production) dated 10th June 1952, since the Government of India discontinued their subsidy. On account of severe droughty conditions for the past four years in the districts of Anantapur, Cuddapah and Chittoor, the full benefits of the scheme could not be derived and its importance however was explained to the ryots who appreciated the idea behind the scheme.

XVII. *Salient features of activities and achievements*.—The procurement of large quantities of seeds in the deficit districts of this division at a time when the season has failed, in the face of abnormal prices prevailing in the market is a big achievement to be taken note of. Various quantities of seeds distributed are furnished under the paddy and millet schemes. The area covered under the improved strains is furnished in statement No. I enclosed. Supplying of tractors, bull dozers, oil engines under hire and hire-purchase system and pipes under droughty conditions that prevailed during the year was a boon to the ryots in bringing large extents under the tractor plough and in saving the crops from failure.

The plant protection work, particularly against pests and diseases of mangoes, chillies, turmeric, brinjals and cereal crops and betel vines was very beneficial to the ryots. A large quantity of pesicides was also sold. This work is becoming very popular.

XVIII. *Scheme for the control and test of manure mixtures*.—The scheme was extended for one more year up to 9th October 1952 in G.O. Ms. No. 2284, Food and Agriculture, dated 28th November 1951. The Assistant Inspector of Fertilizers, Cuddapah, toured for 269 days in the year, inspected 636 depots and took the following samples :—

(i) Straight fertilizers	..	..	..	..	..	49
(ii) Manure mixtures	..	..	..	..	..	35
						—
Total	..					84
						—

The scope of the scheme was extended to straight fertilizers also as per G.O. No. 1826, Food and Agriculture, dated 15th September 1951. The work with regard to enforcement of quality control has been extended to straight fertilizers.

XIX. Madras Manure Dealers Licensing Order.—Total number of manure licences issued and renewed are furnished below :—

		Number of new licences issued.	Number of licences renewed.
Anantapur	..	29	130
Bellary	..	53	154
Cuddapah	..	65	174
Chittoor	..	44	81
Total ..	191	539	

The licence fees under Madras Manure Dealers Licensing Order has been reduced to Rs. 10 in G.O. Ms. No. 787, Food and Agriculture, dated 8th May 1952.

XX. Dry Farming Scheme.—Details on the practical application of results of completed dry farming scheme of the Indian Council of Agricultural Research showing the extent to which the useful results have been brought to the notice of the cultivators and taken up by them in practice during the year 1951-52 are furnished in the statement No. 2. The economic advantages which the cultivators have realized by the adoption of the improved practices are also shown in the statement to the extent possible in terms of increased area, increased yield and increased income.

XXI. Administration and supervision.—During the year under report I toured for 242 days with 158 night halts and visited 239 villages. I undertook the office inspection of all the offices in my jurisdiction, viz., four offices of the District Agricultural Officers, (fifth) office of the Superintendent, Agricultural Research Station, Hagari, (sixth) office of the Agronomist, Agricultural Research Station, Siruguppa, (seventh), office of the Assistant Cotton Specialist, Siruguppa, and (eighth) Farm Manager, Panagal Demonstration Farm, Kalahasti. I also undertook 44 depot inspections of Agricultural Demonstrators and also inspected the fieldwork done by maistries, fieldmen and Agricultural Demonstrators. I conducted enquiries into complaints received from the public against the departmental staff. I also investigated into the shortages found during audit. I guided the district staff and supervised the work connected with the special schemes and carrying out of the programme of work. Whenever the district work is inspected inspection notes were duly issued. Programme of each district for 1951-52 was chalked out. Two Local Cotton Committee Meetings (Westerns) were conducted. Over 730 manure licences were issued and renewed under Madras Manure Dealers Licensing Order. The above are some of the important items of work. Special report on the inspection of offices made is enclosed.

XXII. Programme of work.—The programme of district work chalked out for each district for 1952-53 will be followed. This has been communicated to the District Agricultural Officers with the approval of the Director of Agriculture.

XXIII. Agricultural Research Station.—Work done in each of the Agricultural Research Stations along with the programme of work is appended.

STATEMENT No. I.

Area under improved strains crops (acres).
(Vide paragraph XVII.)

Crop.	Anantapur district.			Bellary district.			Cuddapah district.			Chittoor district.		
	Departmental.	Natural.	Total.	Departmental.	Natural.	Total.	Departmental.	Natural.	Total.	Departmental.	Natural.	Total.
1 Paddy ..	5,508	30,000	35,508	7,684	16,800	24,484	13,610	35,000	48,610	25,160	26,040	51,200
2 Chulam ..	3,567	25,000	28,567	27,449	243,312	270,761	23,580	51,400	74,980	40	925	965
3 Ragi ..	300	10,000	10,300	482	278	760	453	3,100	3,553	1,132	26,093	27,225
4 Cumbu ..	..	..	..	..	..	..	..	..	..	..	..	..
5 Korra ..	22,400	16,000	38,400	33,082	154,990	188,072	6,650	12,450	19,100	20	..	20
6 Cotton ..	6,235	30,000	36,235	23,334	232,800	256,134	41,867	6,200	48,067	2,500	..	2,500
7 Sugarcane ..	..	5,000	5,000	..	12,562	12,562	..	..	..	23	16,400	16,423
8 Groundnut ..	60	7,472	7,532	56	4,481	4,537	11	569	580	140	14,621	14,761
9 Green manure	712	750	1,462	894	5,000	5,894	2,389	2,230	4,619	3,335	5,512	8,847

STATEMENT No. 2.

Statement giving economic advantage in terms of increased area of production due to the application of results of dry farming, research (in 1951-52).

(Vide paragraph XX.)

Improvements.	Area extended.				Increased yield per acre (average for four districts).	Total increased yield for the year.	Value of extra income for the year on the total area.	Remarks.
	Bellary area.	Cuddapah area.	Anantapur area.	Total area.				
(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)	(10)
	ACS.	ACS.	ACS.	ACS.			RS.	
1 Bunding with bund formers.	960	1,735	875	..	3,670	20 lb. in millets and cotton.	6,400 Areas under cotton and millets are taken as 50:50 millets in value at Rs. 400 per ton and cotton at Rs. 550 per kandy of kapas.	
2 Wide spacing of crops	20,000	..	2,140	..	22,140	..	22,140	A saving of seeds at Re. 1 per acre.
3 Cultivation of improved strains of millets—								
(a) Jonna ..	123,340	80,000	43,582	120,000	366,922	20 lb. per acre. 6,178 tons at Rs. 400 a ton.	2,471,200 Grain valued.	
(b) Korra ..	215,253	8,000	40,494	25,000	318,747			
(c) Ragi ..	3,876	1,600	837	..	6,313			
	372,468	89,600	84,913	145,000	6,91,982			

4 Periodical manuring—

(a) F.Y.M. under improved system in tons.	22,240	7,965	35,610	..	65,815			
(b) Composting with waste vegetable matter.	2,344	3,222	2,774	15,000	23,390			
Total ..	24,584	11,187	38,384	15,000	89,155	1/50 ton per acre.	7,14,800	Applied at the rates of 3 to 4 tons per acre. Two and a half per cent manure applied may be taken as increased yield.

5 Conotur cultivation..	50,000	2,600	29,575	10,000	92,175	1/250 ton per acre.	1,47,600	Grains evaluated at Rs. 400 per ton.
-------------------------	--------	-------	--------	--------	--------	---------------------	----------	--------------------------------------

6 Permanent field bunds—

(a) Construction of spill ways and check dams and gully plugging.	3,130	850	846	..	4,826			
(b) Hedge planting ..	21	..	399	..	420			
	3,151	850	1,245	..	5,426	1/100 ton ..	120,800	
						Grand total ..	34,08,540	8,402 tons millets, 46 candies cotton.

ANNUAL ADMINISTRATION REPORT FOR THE YEAR 1951-52—
SPECIAL REPORT ON ADMINISTRATION AND SUPERVISION
—IV DIVISION, CUDDAPAH.

(Vide paragraph 21)

1. Number of offices which are required to be inspected or audited during the year—Eight offices.

2. Number actually inspected or audited during the year—All the 8 offices were inspected.

3. Reasons for not completing the scheduled number prescribed for the year—Nil.

4. General remarks on adequacy of tours, audits, inspection and on the efficiency and discipline noticed as a result of their inspections.—The following offices were inspected during the year :—

Offices of the District Agricultural Officers, Anantapur, Bellary, Cuddapah and Chittoor, Office of the Agronomist, Agricultural Research Station, Siruguppa, Office of the Assistant Cotton Specialist, Siruguppa, Office of the Superintendent, Agricultural Research Station, Hagari, and the Farm Manager, Panagal Demonstration Farm, Kalahasti.

All the District Agricultural Officers have put in enough number of tour days and have done satisfactory propaganda with regard to development of agriculture in villages. On account of special drive by the executive staff much enthusiasm was created in the rural folk regarding Vanamahotsava or tree-planting. Various advantages that flow from tree planting was specially brought home to them and bias was created in them towards growing more number of green leaf trees. Agricultural Engineering activities have developed considerably machine-mindedness in the ryots whose clamour for more number of tractors, etc., we are not able to meet.

Audit was done by the internal audit staff of the Director of Agriculture.

The system of Tottenham with regard to office procedure is in vogue in all the offices inspected. General defects noticed are enumerated below :—

Destruction of records was not brought up to date in the offices of the District Agricultural Officers, Bellary, Chittoor and Cuddapah. Entries and leave account was not posted up to date in service registers. There were some omissions in posting columns 8 and 9 in personal registers. Delay in submission of detailed countersigned contingent bills were noticed in the office of the District Agricultural Officers, Bellary, Anantapur and Engineering bills in Chittoor. Many of the closed files were not handed over to the records. The work in the Engineering section of the offices of District Agricultural Officers, Bellary and Chittoor were in heavy arrears. Necessary instructions were issued to the District Agricultural Officers in the inspection notes to rectify all the defects. Some of minor defects or omissions noticed during the inspections were got filled up or rectified then and there during inspection. Much of my time was engrossed in conducting enquiries. Discipline in the districts and Research Stations have been maintained satisfactorily. Wherever slackness was noticed required action has been taken to pull the staff.

Staff under District Agricultural Officers, Deputy Director of Agriculture and Agricultural Research Stations in IV Division, Cuddapah.

Category of staff.	Agricultural Research Stations.											
	Anantapur.			Bellary.			Cuddapah.			Chittoor.		
	Agronomist, Siruguppa.			Agronomist, Siruguppa.			Agronomist, Siruguppa.			Agronomist, Siruguppa.		
	Assistant Cotton Specialist, Siruguppa.			Assistant Cotton Specialist, Siruguppa.			Assistant Cotton Specialist, Siruguppa.			Assistant Cotton Specialist, Siruguppa.		
	Kalabasti.			Kalabasti.			Kalabasti.			Kalabasti.		
1 Madras Agricultural Service	(1)			(1)			(1)			(1)		
2 Madras Agricultural Sub-service—												
(a) Personal Assistant to District Agricultural Officers.	(2)	1		(2)	1		(2)	1		(2)	1	
(b) Agricultural Demonstrators	(3)			(3)			(3)			(3)		
(c) Plant Protection Assistants	(4)			(4)			(4)			(4)		
(d) Farm Managers	(5)			(5)			(5)			(5)		
(e) Assistants	(6)			(6)			(6)			(6)		
(f) Fieldmen	(7)			(7)			(7)			(7)		
3 Madras Ministerial Service—												
(a) Upper division clerks	(8)			(8)			(8)			(8)		
(b) Lower division clerks	(9)			(9)			(9)			(9)		
(c) Storekeepers	(10)			(10)			(10)			(10)		
(d) Typist	(11)			(11)			(11)			(11)		
4 Madras Inferior Service—												
Peons	(12)			(12)			(12)			(12)		
5 Agricultural Engineering Section—												
(a) Agricultural Engineering Supervisors.	(13)			(13)			(13)			(13)		
(b) Foremen and mechanics	(14)			(14)			(14)			(14)		
(c) Tractor and oil engine, pumpset drivers.	(15)			(15)			(15)			(15)		
(d) Lorry and Jeep drivers	(16)			(16)			(16)			(16)		
(e) Cleaners	(17)			(17)			(17)			(17)		

AGRICULTURAL RESEARCH STATION.

There are two Agricultural Research Stations in Bellary district, one at Hagari about 12 miles from Bellary and the other at Siruguppa about 35 miles from Bellary in charge of gazetted officers. In both the stations research work, agronomic experiments, seed multiplication work are undertaken with special reference to cotton, cholam, korra crops which are the important crops of the tract, both under dry and project conditions. There is one Panagal demonstration farm in charge of a single farm manager at Kalahasti in Chittoor district. A brief review of work done during the year in each of the farms by the officers under my control is furnished below :—

1. *Summary of work done by the Superintendent, Agricultural Research Station, Hagari in 1951-52—Agronomic experiments.*—The rotation experiment was continued and the previous results were corroborated. Rotation of crops was found much better than no rotation. A pulse crop was found to benefit the succeeding crop more than fallow. The groundnut cake experiments on cotton and jonna and superphosphate experiments 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 both earliness and increased yield in jonna. The co-ordinated crop weather scheme was continued as per programme.

Under crop improvement, in setaria, eleven cultures were under yield trials and 17 cultures were under preliminary yield trials. Out of the former H.K. 336 were prominent and in the latter 15 cultures gave higher yields than control H. 2. Fifty-one single plants were under study from which 170 promising single plants were carried forward.

In sorghum, nine cultures were under yield trials and 31 cultures were under preliminary yield trials. The sorghum crop had been poor and the results erratic. The trials will be repeated. Three hundred and eighty-five cross progenies were under observation of which 36 promising cultures are carried forward.

Minor crops—Safflower.—Twelve cultures and five bulks were under yield trials. Two hundred single plants were secured from the cultivator's fields for further study.

The following seed materials were transferred to the district work officers during the year for seed purposes :—

Particulars.	Quantity.
1 Korra seed	2,929 lb.
2 Jonna seed	20,653 „
3 Ragi seed	702 „
4 Onion seed	213 „
5 Safflower	26 „
6 Prosopis pods	1,250 „
7 Do. seed	1,372 „
8 Economic plant seed	213 „
9 Grass seeds	20 „
10 Seedlings of economic plants	2,075 Nos.
11 Grass slips	9,245 „

Summary of programme of work for 1952-53—Agronomic and manurial experiments.—The rotation experiment and the four manurial experiments will be continued as per approved programme.

Crop improvement—Sorghum.—The comparative yield trials of 9 cultures and preliminary yield trials of 31 cultures will be repeated. The 36 cross progenies selected for further study will be under observation. In addition, 12 F₂₃ also will be studied in detail.

Setaria.—The eleven cultures under yield trials and seventeen cultures under preliminary yield trials will be again under trials in the coming season. In addition, 170 single plants selected for further study will be under observation.

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

Ragi.—Two cultures E.C. 4573 and E.C. 4310 received from the Millet Specialist, will be under observation along with H. 1 for their performance. In addition, multiplication of seed of H. 1 and Co. 1 ragi strains will be continued as usual.

Minor crops—Safflower.—The trial of the twelve apparently pure cultures and five bulks will be continued. In addition, 200 new single plant cultures secured from the cultivator's fields during the season will be under study. The Oil Seeds Specialist requested the Director of Agriculture to secure extra provincial types also for observation. They will be studied if received.

Onions.—The six types of onion found to be promising will be compared with local for their yields.

Seed multiplication of the standard strains of sorghum, setaria, cotton and ragi will be continued. Seeds of economic plants and a few indigenous vegetables also will be collected for sale and distribution.

Growing of glycidia on as large a scale as possible and compost making are two important items which are on hand and will receive continued careful attention.

2. *Summary of work done by the Agronomist, Agricultural Research Station, Siruguppa, in 1951-52.*—The chemical investigations on the effect of light and heavy irrigation on the black soils were continued during the year 1951-52 and it was found that no injurious salts rise up due to irrigation.

The agronomical work conducted in this station consisted in the cropping of the farm under project condition with a definite rotations to a specific duty of water and also in the conduct of certain experiments to determine the suitable varieties of crops for the tract, their optimum manurial requirements, economical rotations and introduction of new crops. The results are summarized as follows :—

(i) *Paddy trials.*—As a result of series of trials conducted to find out a suitable variety for the January-May and October-March season, Co. 13 and A.D.T. 18 were found suitable for the former and Co. 2, A.S.D. 5, A.D.T. 18 for the latter season.

Sugarcane observation trials.—Five Coimbatore varieties were tried of which Co. 475 gave the maximum yield of 32 tons.

Wheat.—Naked wheat C. 253 of pusa was found promising and gave an acre yield of 734 lb. and glumed wheat has given the maximum yield of 1,890 lb. per acre.

Groundnut.—T.M.V. 2 (bunch type), T.M.V. 3 (spreading type) were found suitable for the tract.

Ragi.—K. 1 ragi gave the higher yield during the year.

Jonna.—Tenkasi jonna culture 8378 fared well this year.

Rotation trials.—The rotation green manure followed by glumed wheat, groundnut, redgram mixture, jonna, cotton is found to be the most economical rotation both in deep and shallow soils.

(ii) *Entomological experiments.*—The control of the cholam fly *Atherigona indica* was studied by conducting four kinds of trials, namely, (a) manurial, (b) flooding, (c) insecticidal and (d) cultural methods of control. The ravages of the fly can be averted to some extent by adopting high seed rate and subsequently thinning the affected plants.

For finding out the ways and means of controlling the pests on cotton, viz., jassids, boll worms and aphids and thrips on onions, experiments were conducted newly this year.

(iii) *Introduction of new crops.*—Castor, gingelly, soya bean, perennial mung, hibiscus sabdariffa were introduced newly this year.

Grasses.—To find out the most suitable grass, water grass, guinea grass, elephant grass and panicum antidotale were studied during the year.

(iv) A total quantity of 26,442 lb. of improved seeds of different varieties were distributed from the farm for sowing.

(v) The value of green manure crops *Sesbania speciosa* and *Gliricidia maculata* was demonstrated to the ryots by growing them on the fringe of field bunds in wet land and on road sides, respectively on the farm.

(vi) *Bagavadi farm.*—Crops grown at the station were encouraged to be grown.

Programme of work for the year 1951-52.—(i) Fundamental studies on the physico-chemical reactions of black soils to light and heavy irrigations to be continued.

(ii) The study on the effect of the fertility of the deep dry irrigated black soils to irrigation to be continued.

(iii) Green manure experiment to assess the optimum dose of green manure for black soils with daincha to be continued.

(iv) Soil moisture studies to be continued.

(v) Trials of superphosphate on paddy in single crop paddy area to be continued.

(vi) *Manurial experiment on cotton.*—The study of the use of ammonium sulphate in alkaline soils will be continued under the control of the Assistant Cotton Specialist, Siruguppa.

(vii) Manurial experiment on korra with 0, 10, 20 lb. of phosphorous pentoxide each in combination with 20, 40 and 60 lb. of nitrogen to be continued.

(viii) The following varietal trials will be continued :—

Redgram.—Varieties Odgir, Jagudam, M. 39, 72, 37 and 2900.

Ragi.—Strains Co. 1, K. 1, P. 1, H. 1, A.K.P. 6 and E.C. 4601 under Millet staff.

Korra.—Varieties H.K. 289, Co. 1, Co. 2, H. 1 and N. 1 under Millet staff.

Jonna observation trial.—The varieties A.S. 8356, 8360, 8362, 8363, 8364, 8369, 8373, 3878, A.S. 7436, A.S. 7437, M. 47-3, B.j., N.j. and Co. 9 under Millet staff.

Castor.—Varieties T.M.V. 1, 2 and 3.

Gingelly.—Varieties T.M.V. 1, 2 and 3.

Groundnut bunch.—Varieties, local, T.M.V. 2, A.H. 4218, A.H. 4515, A.H. 4111.

Groundnut spreading.—Varieties local, T.M.V. 1, T.M.V. 3, A.H. 334 and A.H. 4354.

Late season paddy.—Short duration paddy strains ADT. 18, MTU. 15, in two series at fortnightly intervals. Long duration paddy varieties Co. 2, ASD. 5 and Eswarkora cross progenies cultures.

Double-crop area.—February-April season varieties Co. 20, MTU. 15, ADT. 18, Co. 13, 8364 (Pallasannavadlu culture).

Sugarcane varietal trials.—The effect of ratooning of the five varieties Co. 419, Co. 467, Co. 475, Co. 527 will be studied.

Rotational trials.—Four-year and three-year course rotation trials to be continued both in shallow and deep soils in randomized plots replicated six times.

3. *Miscellaneous observation and multiplication of vegetable seeds, etc.*—Summary of work done by the Assistant Cotton Specialist, Agricultural Research Station, Siruguppa, in 1951-52—(a) *Cambodia Cotton Breeding Scheme in the Ceded Districts of Madras State for 1951-52.*—The scheme was started with two objectives : (i) to evolve staple American type suitable for an irrigated 'rabi' crop in the area to be brought under the Tungabhadra Project and (ii) to breed for a remunerative bio-type of the American group for the rain-fed zones not served by the project. Breeding trials are therefore carried on for irrigated conditions at Siruguppa and for the rain-fed conditions at Hagari and Nandyal. Following items of work were carried out in each place :—

(A) *Siruguppa (irrigated)*—(i) *Bulk yield trials.*—Twenty extra-provincial types were tested in two sets of yield trials with H.A. 11 and M.A. 2 as controls. In both the sets, the yield data were not significant. In the first set, Glx. Co. 2-9-3 (Laxmi) gave twenty-two per cent numerically more kapas yield than H.A. 11, besides combining superior fibre characters. In the second set, I.H. type 125 × Co. 2 and I.H. type 170 × Co. 2 were promising for yield. In general, the Surat back-crosses were found to be better ginners and longer linted types than either H.A. 11 or M.A. 2.

(ii) *Compact family blocks.*—A total of thirty-seven families were tested in three sets of compact family blocks and corresponding bulk tests. As many as twenty-one of these were found to be pure for economic characters. It was seen that M.A. 2 responded well for re-selection specially for yield. Following were some such re-selections : 2701, 2703, 2817 and 2820. Among the pure families, the following seven were outstanding for all the three economic characters. They are 1821-1-1 of B.C. 68 origin, 2204, 2196, 2834, 3036, all derived from B.C. 134 × C.W.; 2999 re-selection from B.C. 134 × Co. 2 and 4128 a derivative of Glx. Co. 2-5 × Co. 4 × H.A. 11.

(iii) *Progeny row studies.*—Four hundred and ninety-seven cultures were sown in seven sets, based on the field observations recorded, three hundred and twenty of these were found to be desirable and examination of these in the laboratory revealed that fifty-eight of them were significantly better than control in yield, while nineteen of these combined in addition superior lint length and ginning per cent. These productive types were either direct selections or crosses involving adaptable types like H.A. 11, M.A. 2 and Glx. Co. 2-9-3. High ginning was invariably noticed in the derivatives of Surat back-crosses, while increased lint length was a common feature in crosses of Coimbatore origin.

(iv) *Non-replicated rows*.—Out of one hundred and twenty-one cultures sown, only thirty-one were desirable and were examined in the laboratory. It was seen that better adaptability was noticed in Coimbatore types, when they were crossed with the adaptable types like H.A. 11 and M.A. 2. Besides thirty-nine fresh types were tested in small observation plots, with the exception of 'Laxmi' all the others lacked adaptability. A culture of Greek origin 14×6 was noteworthy for the high degree of resistance it exhibited for thrip attack.

(v) *Hybrid studies*.—One hundred and fifty-seven crosses in F. 2 study and one hundred and nine in F. 1's study were raised and seventy-seven in F. 2's and fifty-five in F. 1's were found to be promising. These were mainly crosses involving 2196 and 1821-1-1 as parents, hence large improvements were noticed regarding blackarm and jassid resistance in these crosses. In addition to blackarm resistance, crosses involving 2196 combined productivity as well.

(B) *Hagari and Nandyal (unirrigated)*—(i) *Bulk yield tests*.—Twenty cultures were tested for yield at the two centres of trial with deshi standards. At Nandyal, due to adverse seasonal conditions, the yield levels were very low, while at Hagari, Glx. Co. 2-9-3 (Laxmi) was found to be good. Culture 320 of M.A. 2 origin was also promising at both places.

(ii) *Compact family blocks*.—Among the thirty-one families tested at Hagari and twenty-five at Nandyal, culture 467 was outstandingly good at both the centres. Besides, 569 and 579 at Hagari and 327, 574 at Nandyal were promising at the respective centres.

(iii) *Progeny row studies*.—At Hagari, out of a total of one hundred and forty-eight cultures tested, seven were desirable for carrying forward, while at Nandyal, out of one hundred and seventy-six cultures tested as many as nine merited further trial in family blocks.

(C) *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. From the data obtained from twelve centres of trials, it was seen that Laxmi in general has recorded fifty-one per cent increased kapas yield over the control.

During the year under report, the results of the various breeding trials have been encouraging and were consistent with the past experience. In the coming season the trials will be conducted on similar lines as in the previous season with the advanced material on hand.

Programme of work for 1951-52—A. Irrigated trials at Siruguppa.—(i) Replicated bulk trials of American cottons found prolific during previous years and fresh arrivals.

(ii) Study of promising cultures in family blocks and conducting bulk yield trials of the families sown simultaneously.

(iii) Study of selected plants from observation plots, prolific bulks, etc., in progeny rows.

(iv) Study of cultures selected from second generation crosses, back-crosses and from outside centres in non-replicated observation rows.

(v) Selection of types from first generation crosses and back-crosses.

(vi) Effecting fresh crosses and back-crosses.

(vii) Isolation of cultures resistant to black-arm and jassids.

B. Unirrigated trials at Hagari and Nandyal.—(i) Replicated bulk tests of American cotton found productive during last season.

(ii) Trials of fresh material received.

(iii) Study of cultures in family block and 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 centres.

C. District yield trials.—(i) Trial of promising cultures under rainfed conditions in the ryot's holdings.

(ii) Trial of cultures under irrigated conditions.

Hingari Jonna Scheme at Siruguppa—Object.—Briefly, the object of the Hingari jonna scheme is to find out a variety of Hingari jonna suitable for the irrigated black soils of the Tungabhadra Project area.

A. Hingari jonna trials—(i) *Comparative trials*.—Eight promising cultures of the previous season were tried in one cent plots under comparative trials replicated four times. The cultures were grouped in two sets based on duration and tested against M. 47-3 and H-1. The first set comprised of three late types, viz., N. 15, P.B. 3, R and S.M. 1, while in the second set five short duration types, viz., M. 35-1, M. 31-3, M. 9, S.I. 2, P.B. 2 R and P.B. 10 R were included. The yield data on statistical analysis proved non-significant for grain as well as straw in both the sets. The increases in yields of grain and straw ranged from 3 to 40 per cent and 4 to 20 per cent, respectively.

(ii) *Bulk yield trials*.—Seventy-two promising cultures carried forward from previous year's bulk trials and non-replicated trials were raised in six sets in two series. The first series comprised of twenty-five short duration types tried in two sets with M. 47-3 as the standard. The second series consisted of forty-seven late types and these were tried in four sets with H. 1 as control. In the short duration series, three types, viz., S.M. 102, S.M. 109 and S.M. 112 were found to be significantly superior to M. 47-3 the standard. In the long duration series, only four types, viz., J. 756-1-3; J. 724-3-3-3; P.B. 7 R and S.M. 65 have registered significantly superior grain yields than the control H. 1.

(iii) *Progeny row studies*.—Forty-one cultures were tested against M. 47-3 in replicated progeny row trials. Of these, as many as fourteen cultures were found to be promising from the grain yield point of view and for straw yield alone, twenty-six of them were classed as superiors to the control.

(iv) *Hybrid studies*.—Three hundred and eighty-two crosses involving eighty-five combinations representing F. 1, F. 2, F. 3, F. 4, F. 5 and F. 6 generations were raised in non-replicated plots along with the parents to study their genetic behaviour and resistance status to the 'Atherigona' fly pest in the next higher generations. These were examined in detail for all the economic characters and such of those combinations which exhibited higher mean values than their parental values were carried forward for further study. In addition, one hundred and forty-three new crosses involving thirty-three combinations were built up during this season.

(v) *Fresh arrivals*.—Eighty-three fresh collections made from the districts were raised in non-replicated observation plots with H. 1 and M. 47-3 as controls to study their adaptability for the Tungabhadra Project area. It

was observed that thirty-seven cultures were found to be promising grain yielders. These comprised of twenty-six types from Bellary district, ten from Kurnool district and one from Anantapur district.

(vi) *Cholam fly resistance studies*.—Forty sorghum types comprising of provincial, extra-provincial and of foreign origin received from Coimbatore were sown in non-replicated rows along with H. 1 and M. 47-3 as the standards to study their resistance status to 'Atherigona indica' under Siruguppa conditions. None of the types under study exhibited complete immunity to the fly pest but only three types, viz., Co. 7, Co. 8 and Co. 12 from Coimbatore have indicated their high resistance status.

B. Korra trials—(i) *Bulk yield trials*.—Twenty-three re-selections were tried in two sets under bulk trials with N. 1 as the standard. It was found that only one selection, viz., K. 123 registered significantly superior grain yield than the control and twelve of them were equals. In the case of straw, none were superior, while eight of them were equal yielders to the control.

(ii) *Row yield trials*.—Seventy-five cultures were raised in three sets under replicated progeny row studies to compare their yields with N. 1. It was observed that only K. 191 was classed as significantly superior grain yielder, while as many as forty-eight were equals. In the case of straw, S.M. 41 was superior to N. 1, and thirty-seven of them were equals.

(iii) *Non-replicated trials*.—Out of one hundred and sixty-seven cultures tested against N. 1 in non-replicated observation plots, only forty-five cultures have registered numerically higher grain yields than the standard and seventeen of these were found to be good straw yielders as well.

Programme of work for the year 1952-53.—A. *Mungari jonna trials*.—

(i) Trial of fresh types in non-replicated plots received from the Millet Specialist, Coimbatore, and the promising ones of the last season.

(ii) Making fresh collections to find out the possibility of introducing new types from other provinces like Bombay and Hyderabad.

B. Korra trials.—(i) Replicated bulk trials of types found prolific during the previous years and fresh arrivals if any.

(ii) Making fresh collections from the districts for trial under the irrigated conditions at Siruguppa.

C. Ragi trials.—(i) Replicated bulk trial of types received from Millet Specialist, Coimbatore, and of the types found promising in the previous year both in 'Kharif' and 'rabi' seasons.

(ii) Making fresh collections in the districts for further trial in the coming year.

D. Hingari jonna trials.—(i) Replicated bulk trials of types found prolific during the previous years and fresh arrivals if any.

(ii) Study of promising cultures in family blocks and conducting bulk yield trials of the families sown.

(iii) Study of selected plants from observation plots, prolific bulks, higher generations of crosses, etc., in progeny rows.

(iv) Study of cultures selected from higher generation of crosses in non-replicated plots.

(v) Selection of types from F. 1's and other hybrid progenies.

(vi) Collections of types from the districts of Madras, Bombay and Hyderabad, where jowar is being raised in an extensive area.

4. *Panagal Demonstration Farm, Kalahasti*.—Improved methods suitable to the locality are tried and demonstrated for the benefit of the surrounding ryots. Improved seeds of paddy, millets suitable to the tract and vegetable are multiplied and supplied. There is no research work undertaken and it is in charge of a single farm manager.

During the year, season in Chittoor district in particular, was a failure. Both the south-west monsoon and north-east monsoon did not bring the normal rains. Consequently there was inadequate water-supply in tank and wells resulting in the failure of crops. However, Kalahasti got good rains in the last week of May 1952, and all crops, paddy, vegetables and dry crops were sown taking advantage of the rains which will come to harvest in the next fasli. During the year following quantities of seeds were produced and supplied :—

	LB.
Co. 2 Ragi	3,011
Co. 2 Cumbu	704
Co. 1 Korra	92
Red gram	62
TMV2 Groundnut	2,205
Paddy	438
Miscellaneous	772

REMARKS.—Production was low due to failure of rains.

Vegetable scheme.—With a view to run the farm self-supporting, vegetable scheme continued to be worked during the year 1951-52. The object of the scheme is to multiply Indian vegetable seeds and to distribute the seeds to the public. Area under vegetable crops had to be limited to 5.78 acres due to inadequate water-supply from the well. Ripe fruits were collected, seed extracted and a total quantity of 573 lb. of seeds supplied to the Agricultural Demonstrators of the division as follows :—

	LB.
Bendai	212
Cluster beans	321
Tomato seeds	6
Cowpea	33
Brinjal	1
Red gogu seeds	3

REMARKS.—Production was low due to failure of rain.

STATEMENT OF RECEIPTS AND EXPENDITURE.

(i) *Financial year*.

(a) *Expenditure*.—(Under 40, d. Agricultural Demonstration and Propaganda—I. Ordinary areas—Experimental Cultivation—Demonstration charges).

	RS.	A.	P.	RS.	A.	P.
D 1-4 <i>Demonstration charges</i> .—Farm inclusive of dearness allowance and leave wages for permanent Mazdoors on the Farm ..	4,195	14	6	4,195	14	6

D 1-8 Other charges—		BS.	A.	P.	RS.	A.	P.
Purchase of live stock	..	990	0	0			
Repairs to cart	..	30	0	0			
		1,020	0	0	1,020	0	0
Grand total	..				5,215	14	6

(b) Receipts (XXIX. Agriculture)—		RS.	A.	P.
Value of farm produce sold	..	841	15	6
Value of farm produce transferred.		3,529	6	0
Miscellaneous receipts	..	156	0	0
Rent on buildings (for F.M. only).		132	0	0
Total	..	4,659	5	6

CUDDAPAH,
11th August 1952.

M. OBIADULLAH SHAH,
Deputy Director of Agriculture.

ADMINISTRATION REPORT OF THE DEPUTY DIRECTOR OF
AGRICULTURE, VELLORE, FOR THE YEAR 1951-52 ENDING
30TH JUNE 1952, V DIVISION, VELLORE.

The Administration Report of the Fifth Regional Division comprising of Salem, North Arcot and Chingleput districts, inclusive of Madras City is as follows.

I. Charge.—I, Sri G. Sakharama Rao, continued to be in charge of the division throughout the period.

There were no changes in the personnel of the District Agricultural Officers in this division. Sri S. M. Sulaiman Sahib continued to be in charge of Salem district throughout the year. Sri R. Alagia Manavalan and Sri K. L. Ramakrishna Rao continued to hold charge of North Arcot and Chingleput districts, respectively, throughout the period. The latter was also in charge of the Madras City Vegetable Scheme.

The District Agricultural Officers were assisted by a Personal Assistant in each district generally of the cadre of a senior Agricultural Demonstrator and a ministerial staff in office work and by Agricultural Demonstrators at one for each taluk with requisite fieldmen and demonstration maistries to assist them in district work. Besides, Additional Agricultural Demonstrators continued to work in heavy taluks having the largest area under food crops for intensive work.

Two Plant Protection Assistants, one for Mycology and one for Entomology for each district, were continued this year also to attend exclusively to crop and Plant Protection work and control of pests and diseases in the districts. Three Agricultural Demonstrators were also working in Madras City for giving technical advice with regard to raising of vegetables in the bungalow compounds.

II. War efforts.—Though there was no war, the conditions entailed by scarcity of food commodities, high cost of living and soaring upward trend in prices necessitated the carrying on propaganda on a war-level against hoarding and profiteering. All efforts directed towards increased production had to be regarded as emergent as on a "War Basis."

III. Grow More Food Campaign.—This was the mainstay and main pre-occupation of the departmental endeavours. The three-year Plan of intensive production was continued. The various schemes in operation during the year and the quantities of estimated additional food production by the implementation of these schemes are given hereunder:—

(i) Land development by mechanical cultivation and installation of pumpsets.—The Special Agricultural Engineering staff attached to the Agricultural Department continued to function and attended to tractor ploughing, levelling and reclamation by bulldozer, rendering technical advice to ryots in the matter of installation, upkeep and maintenance of oil engines and pumpsets, sinking of wells and mechanized cultivation. On account of the activities of this section the ryot population has become machine minded. Due to continuous failure of monsoons the demand for oil engines and pumpsets is ever on the increase.

The following are the details of work turned out under the above scheme :—

- Number of tractors used for ploughing—25.
- Number of tractors used for pumping—Nil.
- Number of bulldozers—13.
- Area ploughed with tractors—
 - (a) Virgin lands—655.50 acres.
 - (b) Cultivated lands—2,393.23 acres.
 - (c) Harrowing—286.35 acres.
- Area levelled—1,693.75 acres.
- Estimated additional production of foodgrains—1,031 tons.
- Number of oil engines and petrol pumpsets hired—132.
- Area irrigated by the above—963 acres.
- Number of petrol pumpsets sold to ryots—Nil.

Though tractor ploughing continued to be popular with ryots the continuous failure of monsoon and the consequent lack of adequate soil moisture precluded the tractors from being put to their fullest use. There was, however, heavy demand for oil engine pumpsets as also rush for the purchase of pumpsets under hire purchase system due to adverse seasonal conditions.

(ii) *Production and distribution of compost.*—The Municipalities and Major Panchayats continued operating the scheme :—

- Number of Municipalities and Panchayats, manufacturing compost—61.
- Quantity of compost produced—37,530 tons.
- Quantity of compost applied to crops—23,168 tons.
- Estimated increase in production of foodgrains—837 tons, 1,121 lb.

(iii) *Rural compost making.*—In order to infuse more interest to prepare compost out of the organic vegetable waste in the villages to augment their manure supplies, propaganda on such composting was continued and the response was very encouraging. As an impetus for this, subsidy at the rate of Re. 1 per ton of final compost made was also paid. This scheme was made more popular by celebrating the “compost week” during the Gandhi Jayanti and by offering prizes to the top-ranking villages in production :—

- Number of villages where compost was manufactured—1,804.
- Number of compost pits opened—3,695.
- Quantity of compost manufactured in tons—15,038.5.
- Quantity of compost applied to crops—12,520.5.
- Estimated additional production of foodgrains—307 tons, 896 lb.
- Subsidy paid to ryots—Rs. 11,888-4-0.

(iv) *State trading scheme for purchase and sale of manures, seeds, iron and steel (Scheme No. 5).*—The scheme continued with the following modifications as during the last year, that the department was almost free from the work of purchase and distribution of manures, iron and steel, consequent on the transfer of the scheme to the Co-operative department but fertilizers were continued to be received from clearing agents stocked at Taluk headquarters and released to the co-operative societies and tender firms from time to time. Iron and steel allotments were made to the controlled stockists and the distribution to recognized fabricators and co-operative fabricating concerns by the Joint Director of Agriculture for converting into agricultural implements.

The progress attained in the working of the State Trading Scheme is furnished in the Appendix I.

(v) *Comprehensive scheme for the multiplication and distribution of improved seeds of paddy, millets, pulses, groundnut, gingelly and green manures.*—The comprehensive scheme and the old Five-year Plan assumed an altered form and fitted into the intensive cultivation scheme with the three-year plan in vogue.

(vi) *Control of pests and diseases (Scheme No. 9).*—The two Plant Protection Assistants, one each for Entomology and Mycology were actively continuing their work of adopting and explaining the prophylactic control measures for the various pests and diseases. They were assisted in the field work by one Demonstration maistri for each. The Plant Protection Assistants also attended to the calls of bee-keepers and also in the fumigation of parcels of plants received from abroad.

The major pests that appeared and controlled in each district are noted below :—

Chingleput district—Pests.—Stem-borers, case worms, jassids, scotophora bugs, army worm on paddy, nursery thrips on ragi, *Epilachna*, borers on vegetables, surulpuchi on groundnut, leaf caterpillars and hoppers on fruit trees.

Diseases.—Blast on paddy, dieback and canker on citrus, mottling folio cellosis on citrus and leaf spot on mango trees.

North Arcot district—Pests.—Green and white jassids, stem-borer and black bug, army worm, fieldrats, rice hispa and paddy thrips, cut worms and earhead thrips on ragi, cholam mite and earhead bug. Red hairy caterpillar on groundnut, hopper of mango trees. *Epilachna* beetle and lace wing bug on vegetable.

Diseases.—More of prophylactic methods were used to ward off any incident by pretreating the seeds of paddy and cholam.

Salem district—Pests.—Jassid on paddy appeared on epidemic form. Thrips on chillies, mango hoppers, *Amsacta* on groundnut were the major pests.

Diseases.—Fruit rot on chillies, folio cellosis and dieback on citrus, wilt on betel vines, preventive measures were adopted in respect of early blight on potatoes rust on coffee—*Helminthosporium* and blast on paddy—Importance was given to seed treatment of cholam and paddy.

- (1) Demonstrations conducted (number)—2,597.
- (2) Quantity of pesticides sold (tons)—98 tons 342 lb.
- (3) Area covered by sales—50,887.04 acres and 6,617 trees.
- (4) Approximate quantity of foodstuffs saved—3,385 tons 39 lb.

The concessional sale of pesticides and fungicides for food crops at half cost was continued this year also and this was popular with ryots. The Pest Act on Red Hairy Caterpillar Pest of Dry Crops in North Arcot district continued to be in force during the year. There was an outbreak of this pest in parts of this district, which was successfully controlled both by mechanical methods and use of chemicals. The Act was extended up to 31st December 1952.

(vii) *Increasing of production of vegetables in urban centres (Scheme No. 11)—Civil scheme.*—This scheme received great momentum during the year. Every bungalow owner in the Madras City took keen interest to grow vegetables in the compound and sought the help of the department. Residents have become vegetable minded to produce their own vegetables and be self-sufficient in their requirements. The special vegetable scheme with three Agricultural Demonstrators continued their activities during the year. Large number of calls from City growers for advice on cultivation of vegetables were

attended to. Besides disposal of seeds, pesticides were also sold and manures distributed to the vegetable growers. The importance of growing vegetable was impressed upon the public at large, productive demonstrations on cultural, manurial, varietal and pest control activities by the Agricultural Demonstrators. Economic types of indigenous and exotic varieties were tried and introduced in the City gardens.

The following are the activities during the year under report :—

- (1) Quantity of vegetable seeds sold—2,659 lb. 2 oz.
- (2) Quantity of vegetable seeds transferred—184 lb. 7½ oz.
- (3) Quantity of vegetable seeds issued free—127 lb. 10 oz.
- (4) Quantity of pesticides sold—2,394 lb. 15 oz.
- (5) Quantity of manures sold—2 tons and 836 lb.
- (6) Number of kitchen gardens visited—4,854.
- (7) Number of demonstrations conducted—1,591.
- (8) Area of vegetable gardens including market gardens—843 acres.
- (9) Production of vegetables in tons—2,529.
- (10) Number of vegetable seedlings sold—70,029.
- (11) Pest control demonstrations conducted—479.

Vegetable Seed Production Scheme, Kothambakkam.—During the year Vegetable Seed Production Scheme sanctioned by G.O. Ms. No. 681, Food and Agriculture, dated 6th April 1951, was started at the Victory Farm, Kothambakkam, for production of vegetable seeds for sale to ryots at Madras City and round about as also to other districts, on demand. Total area of 6-7 acres during early season and 8-5 acres during winter and summer seasons were sown with different kinds of vegetables as per cropping scheme given by this department. The services of a trained maistri was provided to attend to this work. Due to continuous drought and unfavourable seasonal conditions the quantity of vegetable seeds produced was not up to expectation, but at any rate, the target fixed in the Government Order was, however, attained. By 30th June 1952 a quantity of 409 lb. of vegetable seeds of various types worth Rs. 1,919-12-9 have been purchased from the said scheme farm and some more quantities of summer vegetable seeds are yet to be purchased.

(viii) *Free distribution of vegetable seeds to schools and land colonization societies.*—In furtherance of the activities of the department to grow more vegetables, vegetable seeds were issued free to schools and land colonization societies :—

Quantity of seeds distributed—232 lb. 3½ oz.

Estimated area grown—199.25 acres.

Additional estimated production—296 tons 1,920 lb.

(ix) *Short-term food production of subsidiary food crops.*—To step up the production of supplementary food crops on a large scale, propaganda was continued in the extension of sweet potato and tapioca which was supplied to the ryots at half the cost—

Free supply of sweet potato vines—357,200.

Free supply of tapioca—172,496.

Area covered by sweet potato—47.80 acres.

Additional production estimated—115 tons 280 lb.

IV. Season and its effects on crops—

Rainfall.		Salem district.	North Arcot district.	Chingleput district.
		INCHES.	INCHES.	INCHES.
1 South-west monsoon	.. ..	11.90	15.43	9.87
2 North-east monsoon	.. ..	14.23	8.98	9.10
3 Hot weather	.. ..	10.02	6.59	13.97
		36.15	31.00	32.94

North Arcot district.—Though the south-west monsoon has been favourable in the commencement it was disappointing during the latter period. The north-east monsoon was a total failure. The harvest of dry crops of groundnut and millets was affected adversely on this account in many places. The failure of rains during the north-east monsoon and in the subsequent period of dry weather during this fifth year of succession aggravated the situation resulting in the complete drying up of all irrigation tanks and wells. Deepening of existing wells and sinking of new wells became a regular feature. The area under cultivation both under paddy and millets has gone down considerably below the normal while there was also remission in the case of dry crops which failed in major parts of the district. The Government, in recognition of the adverse seasonal conditions prevailing in the district heading to a serious state of affairs, have postponed by one year the collection of instalments due under the hire-purchase system. The result of the grow more food activities of the department mainly with reference to improved seed distribution, green manuring, planting of sesbania and other green leaf plants, cotton extension work, intensive manuring, etc., should have been spectacular and beneficial to ryots but for the set back due to failure of monsoons and consequent economic depression of the ryots.

Salem district.—The south-west monsoon period affected adversely the summer crops and delayed the preparatory cultivation of the main dry sowings. There was more concentration of rains during September-October and part of November, with a subsequent dry spell extending from December to the end of March. This was again not conducive to the samba crop excepting cholam and ragi. Salem being a well irrigated area, the agricultural prosperity of the district depends upon the nature of springs. At no part of the year, the wells in this district were having the full supply due to the depletion of subterranean springs by the prevalence of unfavourable seasonal conditions for the fifth year in succession.

Chingleput district.—The south-west monsoon was not only belated but also gave meagre showers to take up dry sowing and start wet cultivation successfully. The rains received were untimely and unevenly distributed. North-east monsoon was similarly much delayed and was a thorough failure thereby defeating all the efforts put up by the cultivators to grow maximum area and produce the highest yield. Hot weather rains though delayed until the end of May, it gave good encouragement for raising short term swarnavari paddy crop in June over a very large area. Almost all the tanks and wells received full supply of water and this was the only redeeming feature which was responsible for declaring the district as “non-scarcity stricken area”. This being the fifth year of monsoon failing in succession in the district even the capacities of wells went low and the ryots were put to great expense and trouble in further deepening of wells and construction of inner wells, installing of more powerful water pumps to cope up with the demand of water-supply of the crops. In spite of best efforts it was very difficult to keep the crops in satisfactory condition. Hence it is to be considered that agriculturally it was not a prosperous year.

V. *Propaganda and demonstration.*—This was the most important item of extension work during the year. The Agricultural Demonstrators, Additional Agricultural Demonstrators and their field staff were doing active propaganda under each item of improvement for which a detailed programme had been prepared in advance, so that the target fixed under the various grow more food schemes may be attained with increased food production so that the goal of self-sufficiency might be reached within the period fixed by the Central Government. For intensifying the work, the district targets were split up taluk and firkawise so that the progress under each item of improvement might be watched carefully. The area under seed farms and spread of strains could not be reached in full due to adverse seasonal conditions thereby hampering the procurement work of the required quantities of improved seeds. But this was made up by importing improved seeds from surplus areas thereby building up the required stock for further distribution. Similarly the targets attained under the intensive manuring scheme was low due to the failure of the north-east monsoon and non-availability of water in tanks.

There was, however, good progress under plant protection work and the ryots were made to realise the importance and the methods of saving their crops in cases of pest outbreak.

A noteworthy feature of the work during the period was the extension of sesbania green manuring work by planting the seedlings on the fringes of paddy crops. This was becoming very popular in Chingleput district while the efforts were not lacking on the part of the district staff in the other two districts though the achievement was not up to the mark.

As in the last year, the progress under the subsidized rural compost scheme was more encouraging.

Another noteworthy feature of propaganda during the year was the organization of village agricultural associations and taluk advisory committees while the old defunct ones were revived. These associations were made use of in intensifying propaganda and demonstration work and popularizing improved seeds, manures and extension of sesbania green manuring work.

The various publications printed during the year under grow more food schemes particularly those published by the Special Propaganda Officer, Food Production, Board of Revenue, were distributed to the public in large numbers and the achievements of the department was brought home to the ryots in general through such publications. The Agricultural Exhibitions held on the occasion of the Park Fair Exhibitions at Madras and the Swadeshi Industrial and Agricultural Exhibition at Salem imparted immense educative value to the huge crowds who witnessed them.

The crop yield competition on paddy was continued during the year under report. The response from the ryots in all the three districts was very encouraging. But due to some complications which arose in the actual harvest of some plots, the declaration of the prize winners for the year was stayed by Government in their Memorandum No. F.P. IV 19379/52, dated 5th July 1952, of the Food and Agriculture (Food Production) Department, Madras.

Though the adverse seasonal conditions stood in the way, yet the Agricultural Propaganda was continued with the same zeal to the best satisfaction with the complete co-operation of the ryot public and officers of other departments.

Model farms.—With the idea of demonstrating all the items of improvements in a central place to serve as an ocular demonstration, subsidized model farms were continued to be run one in each taluk. But before this

scheme was completely worked out to a successful end the Government withdrew the scheme in G.O. Ms. No. 223, Food and Agriculture (Food Production), dated 10th June 1952.

Grow more food journals.—Active propaganda to enrol more subscribers for the 'Mezhichelvam' journal was continued. The response was encouraging in spite of the enhancement of the rate of subscription from Rs. 1-8-0 to Rs. 2-4-0 per year. The total number of subscribers for this journal during the period was 14,765.

Crops.

(i) Paddy—

- (a) Quantity of improved seeds distributed—1,384 tons 1,024 lb.
- (b) Area covered by (a)—65,706 acres.
- (c) Quantity of green manure seeds distributed—116 tons 1,161 lb.
- (d) Area covered by (c)—9,392 acres.
- (e) Quantity of phosphatic manures distributed—8,855 tons 840 lb.
- (f) Area covered by (e)—228,507 acres.
- (g) Cultural improvements, economic planting and reduction in seed rate by raising cent nurseries—7,250.
- (h) Area covered by (g)—11,133 acres.
- (i) Additional quantity of rice produced due to (a) to (h)—17,969 tons.

(ii) Seed multiplication schemes—

Places—

- Salem—10 taluks.
- North Arcot—11 taluks.
- Chingleput—7 taluks.

(a) Paddy—

- (1) Extent of seed farms arranged—9,304 acres.
- (2) Quantity of seed produced—994 tons 594 lb.
- (3) Opening balance—1,239 tons 77½ lb.
- (4) Quantity sold—1,384 tons 1,024 lb.
- (5) Area covered—65,706 acres.
- (6) Closing balance—1,855 tons 1,181 lb.

(b) Millets—Ragi, cambu, etc.—

- (1) Quantity of improved strains distributed—24 tons 625 lb.
- (2) Area covered—5,512 acres.
- (3) Quantity of phosphatic and other manures distributed—Nil.
- (4) Area covered by (3)—Nil.
- (5) Additional quantity of millets produced due to (1) to (4)—88 tons 730 lb.

Seed multiplication scheme—Millets—

- (1) Extent of seed farms arranged—1,327 acres 50 cents.
- (2) Quantity produced and received from outside—12 tons 519 lb.
- (3) Opening balance—14 tons 414 lb.
- (4) Total quantity distributed—22 tons 1,025 lb.
- (5) Area covered—5,512 acres.
- (6) Closing balance—2 tons 1,297 lb. (North Arcot district only).

(c) *Fruits—*

Kind or variety.	Number distributed.	Area covered. ACS.
Mangoes	2,079	89.50
Malta lemons	1,305	29.00
Cheeni, limes and citrus	1,996	71.00
Plantains	3,200	4.40
Other kinds	9,017	85.15

(iii) *Cultural and other improvements—*

Kinds of improvements.	Area under.		
	Mangoes.	Citrus.	Others.
1 Cultural	123	149.00	95
2 Manurial	..	89.00	..
3 Irrigation	55	89.00	..
4 Pests and diseases in trees	1,387	5,746.00	196

Sugarcane—

Nature of improvements.	Number of demonstrations.	Area. ACS.
1 Cultural	1,028	527.95
2 Varietal	175	653.65
3 Manurial	826	488.00
4 Jaggery making	186	..
5 Sindwahe furnace	376	..

A special staff working under the Sugarcane Liaison Officers was also engaged in advocating improvements in the cultivation of sugarcane trial of new varieties to increase the cane yield.

(iv) *Vegetables—*

- (1) Total quantity of vegetable seed supplied—4,918.5 lb
- (2) Number of seedlings sold—70,029.
- (3) Increase in area due to departmental efforts—1,503.25 acres.
- (4) Estimated production—3,522 tons 680 lb.

(v) *Fodder—*

- (1) Normal area in acres—6,300.
- (2) Additional area brought under fodder including natural spread—522.70 acres.
- (3) Estimated quantity of fodder produced—25,154 tons 1,620 lb.
- (4) Quantity of fodder seeds supplied—1 ton 450½ lb.
- (5) Number of grass slips supplied—19,400.

NB.—In addition to the above a quantity of 2 tons 2,159 lb. of sunnhemp seeds and 21 tons 1,864½ lb. of Pilipecara seeds were sown both for fodder and green-manure purpose.

(vi) *Pulses—*

	Red gram.	Horsegram.
1 Area of seed farms arranged	52 acres	3.5 acres
2 Quantity produced	513 lb.	130 lb.
3 Opening balance	166 "	100 "
4 Quantity distributed	666 "	130 "
5 Closing balance	312 "	..
6 Target of seed farm fixed	200 acres	..

NOTE.—Seed farm for horsegram was arranged in Salem district only.

Redgram seeds—

- (1) Quantity distributed—666 lb.
- (2) Area covered—112 acres.

Chillies—

- (1) Normal area in acres—206,000.
- (2) Quantity of strains distributed—93 lb.
- (3) Area covered—40 acres.
- (4) Seed farm arranged in Salem district only—1.50 acres.
- (5) Quantity of seeds procured in Salem district—2 lb.

NOTE.—Trials conducted—Trial of culture 1492 versus 398 failed in all the taluks due to adverse seasonal conditions.

(vii) *Oil seeds—*

	Area under improved strains.		Quantity of seeds sold.	Area covered.		Additional quantity produced.
	A.	C.		A.	C.	
Groundnut	4,573.00	..	1,173 185	188.4	..	3 1,240
Gingelly	3,813.00	..	0 235½	49.5	..	0 141
Castor	23.00	..	72 32	51.25	..	200 350
Coconuts	18.00	..	2,265 seedlings	10.00	..	..

Seed Multiplication Scheme—Oil seeds—Seed farms arranged (Salem and Chingleput only).—

	Area in acres.	Groundnut.		Gingelly.
		T.	LB.	LB.
Quantity produced	..	2	433	36½
Opening balance	..	1	1,530	271
Quantity sold	..	1	1,713	200½
Area covered	..	..	..	..
Closing balance	..	3	1,228	107

During the year a zonal scheme for seed multiplication for oil seeds began operating in an area of 50 acres of land taken on lease in Salem district. One upper subordinate working under the Oil Seeds Specialist, Coimbatore, is put in charge of the scheme.

(viii) *Fibres.*—No special scheme was introduced in North Arcot and Chingleput districts. The intensive cotton cultivation scheme continued to be worked during the year. Intercropping with groundnut, ragi and chillies was advocated. Groundnut-cotton was tried under rainfed conditions while chilli-cotton and cotton-ragi mixture were tried under irrigated conditions. Cotton extension scheme was in operation during the year in all the three districts. The various concessions granted under this scheme were widely published. The work done during the year is given below:—

	Salem district.		North Arcot district.		Chingleput district.	
	T.	LB.	T.	LB.	T.	LB.
(a) Quantity of Uganda 1, Co. 2, H 4.0 and K 5 seeds received during 1951-52.	62	1,020	..	..	..	..
(b) Quantity distributed	29	880	23	2,151	0	148
(c) Area covered by (b) in acres	..	4,020	5.8	75.74	20	367.5
(d) Area manured with ammonium sulphate in acres.	..	447	..	..	..	..

Cotton Pilot Scheme—Salem district.—A Pilot scheme for growing K 5 Karunganni cotton for feeding the intensive Khadi centre at Puliyankurichi in Attur taluk was proposed during the year and was approved by Government in their G.O. Ms. No. 863, dated 22nd August 1951, by empowering

the grant of takkavi loans of Rs. 120 per individual for meeting the cultivation expenses such as tractor ploughing, sowing after cultivation, harvesting, etc., at the rate of Rs. 40 per acre. A block of 100 acres of poramboke land in Anayampatti village of Attur taluk situated within the area of operation of the rural welfare scheme was selected with a view to produce 100 pothies of cotton at one pothie per acre. The Cotton Extension Officer inspected the plot and suggested modification for the Pilot scheme so that the scope of results, if found successful, could be extended to the vast stretch of area available with a view to expand the cultivation of American and Desi types of cotton.

Tractor ploughing could be taken up only during the end of August 1951 due to the late receipt of sanction. Two tractors were engaged with two mould board ploughs and the entire area of 100 acres broken up. This was followed by one or two ploughings with country plough in succession in addition to harrowing certain plots. The seeds were sown broadcast and covered up with country plough as drill sowing was rendered impossible due to lateness of the season and as a consequence a higher seed rate of 25 lb. per acre was used. As suggested by the Cotton Extension Officer, 25 bags of K 5 Karunganni seeds which has a medium staple length of 7/8 inch and which can be used for spinning 50s warp was obtained from the Assistant Cotton Specialist, Tiruppur, and distributed.

There was heavy downpour of rain during the sowing month of October but the rains during the growth period were inadequate with the result that the growth got stunted and symptoms of withering with consequential shedding of flowers and bolls was noticed in the month of January 1952. This had resulted in the depression in yield. As against a target of 100 pothies, the block yielded 16 pothies in all. This yield compared very favourably with the yields obtained for dry cottons anywhere in the district.

The Cotton Extension Officer and the Director of Agriculture felt that the scheme will have to be given a trial for one more year under normal conditions and recommended its continuance to Government. Another block of 100 acres with similar climatic and soil conditions have been earmarked in consultation with the Revenue authorities in Navalur village and the sanction of Government is awaited for implementing the scheme.

(ix) *Gogu*.—Nil. Small quantities of kasi gogu was supplied to all the three districts from Sriakulam district for exploratory trials.

(x) *Tobacco*.—This is grown only in Salem district over an area of 5,000 acres annually. The variety grown is the one used for cherroot making and chewing purposes.

(xi) *Pyrethrum*.—This is not grown anywhere in this division.

(xii) *Tree-planting*.—The celebration of Vanamahotsava Week was conducted with much more enthusiasm during the year during the first week of July 1951 but tree-planting was continued till the end of September 1951. The public co-operated well in the celebration. The following quantities of seeds and seedlings were distributed on the occasion :—

1 Seedlings planted	.. ..	979,644
2 Stumps planted	.. ..	317,164
3 Nurseries raised	.. ..	1,234
4 Seeds of economic importance collected and distributed.		5,867 lb.

Fruits plants and coconut seedlings were also distributed at concessional rates for the occasion.

(xiii) *Cattle Manure Preservation*—

1 Number of new pits dug	.. ..	4,663
2 Number of old pits renovated	.. ..	7,037
3 Dry earth sheds newly constructed.	.. ..	5,283
4 Old dry earth shed renovated	.. ..	3,743
5 Loose box system introduced	.. ..	98
6 Loose box system renovated	.. ..	34
7 Byre system of collecting urine of cattle	.. ..	324

(xiv) *Green manure*—

Kind of seed.	Quantity distributed.		Area.
	T.	LB.	
1 Daincha		4 602	384.75
2 Sunnhemp		90 1,417	6,270.85
3 Kalingi		12 1,568	1,042.75
4 Indigo		9 310	1,134.50
5 Pillipesara		30 2,047	2,423.80
6 Sesbania		0 599	2,113.87

(xv) *Agricultural implements and machinery*—

Demonstrations conducted.		Area covered.
1 Ploughing demonstrations	.. ..	3,478.90 acres.
2 Working of ridge plough	.. ..	210.05 "
3 Working of buckscraper	.. ..	276.75 "
4 Working of triangular harrows	.. ..	104.00 "
5 Working of junior hoe	.. ..	21.00 "
6 Working of bund former	.. ..	161.98 "
7 Working of wetland puddler	.. ..	64.00 "
8 Working of green manure trampler.	.. ..	13.00 "
9 Working of H.M. Guntaka	.. ..	32.20 "
10 Working of mhote wheels	.. ..	163 Nos.
11 Working of turmeric polisher	.. ..	..
12 Working of honey extractor	.. ..	423 Nos.
13 Working of other implements	.. ..	66.1 acres.

VI. *Area under improved strains of crops (in acres)*—

Crop.	Departmental spread.	Natural spread.	Total.
Paddy	 55,615	236,783	292,398
Cholam	 1,196	4,274	5,470
Ragi	 3,301.50	29,140	32,441.50
Cumbu	 1,344	4,740	6,084
Tenai	 41.50	101	142.50
Redgram	 62.50	301	363.50
Groundnut	 183.40	2,981	3,167.40
Gingelly	 50.50	230	280.50
Cotton	 24,323	23,077	47,400
Green manure	 11,895	15,387	27,282
Pulses	 1.00	..	1.00

NOTE.—The figures furnished above under natural spread are exclusive of Chingleput district as the same are not received from the District Agricultural Officer, Chingleput.

VII. *Subsidiary industries*—

Number of colonies introduced—148.

Progressive total—791.

Quantity of honey produced—2,770 lb.

Sago manufacture.—Sago is manufactured from tapioca in Salem district only. Eighteen new sago factories were started during the year bringing the total number of factories now working to 92. There was slump in the market price which ranged from Rs. 60 to Rs. 65 per bag of 200 lb. while last year the prices ranged from Rs. 80 to Rs. 85. The bigger sized sago finds a market in Calcutta while Bombay markets go in for smaller sized sago grains.

VIII. Pests and diseases.—This has been dealt with under Scheme 9.

IX. Exhibitions and shows.—Number of exhibitions held, 32. Expenditure incurred Rs. 4,473-11-0 which includes Rs. 2,976-7-0 being the expenditure met by the Special Propaganda Officer, Food Production, for this department during the Park Fair Exhibition.

These exhibitions were arranged during important occasions on account of which huge crowds of villagers from far and wide availed of the occasion and appreciated work of the department.

X. Work through other agencies—

1. Agricultural associations started—190.
2. Progressive total—266.
3. Total number of members—9,825.
4. Number of meetings held—877.

Education.—Vegetable seeds were issued free to various institutions for raising crops in their compounds. The quantity issued is detailed under Scheme XII.

Special lectures on agriculture were delivered by the Agricultural Demonstrator, Wallajah, for the Basic Training School at Arcot. The Agricultural Demonstrator, Tiruppattur, was permitted in Government Memorandum No. Rt. 339, Food and Agriculture, dated 6th June 1952, to deliver a course of 40 lectures to the High School students of Nattarampalle where agriculture was the subject newly introduced. The classes commenced in June 1952. Training classes were conducted by the Agricultural Demonstrators in firkas centres to train Revenue officials in agricultural methods.

Forest.—The services of this department were availed to get seeds of economic important plants and stumps for planting during Tree Planting Week. The ryots were also induced to contact Forest department for green leaf for application to their lands whenever necessary.

Revenue.—Co-operation of the Revenue authorities was taken for the procurement of paddy seeds. The village officers and Revenue Inspectors of the taluks were addressed at various centres on the assessment of yield with regard to grow more food schemes. The Efficiency Officer was assisted in his inspection in the district. Training classes for explaining the Revenue officials in the recording of improvements introduced in the village and assessing the extra production of food crops were held by the District Agricultural Officers in different centres as per programme given by the Collectors of each district. This is being carried on successfully. The Food Committee meetings were regularly attended to.

Veterinary.—Poultry farming as a side industry in agriculture was encouraged in places where ryots were interested in poultry rearing. The Veterinary department was good enough to supply eggs and birds of suitable varieties wherever demand was created.

Co-operative Department.—There was a closer contact with the Co-operative department in view of the distribution of fertilizers and iron and steel having been entrusted to them. Joint and collaborate attention was paid to the co-operative land colonization schemes by departmental inspections, supply of seed and by rendering all technical help and advice.

Fisheries.—This department was encouraging pisciculture in the holdings of enthusiastic cultivators and the Fisheries department was able to supply the necessary varieties of fish to suit different localities.

XI. Rural welfare work.—Introduction.—The continued to receive special attention in all the 44 villages included in the scheme. The fieldman and maistris transferred to the Revenue department to work in this area continued their activities throughout the year. A further complement of two fieldmen and six maistris were also posted for this work.

The table below gives the items of work done in the centres of Chingleput, North Arcot and Salem districts :—

Chingleput district—Tiruvallur taluk.—The Rural Development work was operated in three firkas, viz., Tiruvallur, Mappedu and Pondur in Tiruvallur taluk. The administration control of special fieldman and demonstration maistri sanctioned was transferred to Revenue department. Extensive propaganda was carried out in all the firkas to carry out intensive cultivation adopting improved methods advocated by this department. The progress of work done on Rural Development firkas in Tiruvallur taluk during 1951-52 :—

1. Amount of compost subsidy paid—Rs. 390.
2. Compost prepared—257.
3. Sale of improved seeds—
Paddy—48.73 tons.
Ragi—168 lb.
Gingelly—33 lb.
4. Loan disbursed for purchase of seeds and manures—Rs. 18,254.
5. Sale of green manure seeds—3 tons 823½ lb.
6. Sale of pesticides—9.258 tons.
7. (a) Manure pit—138.
(b) Dry earth shed—102.
(c) Compost pit dug—108.
(d) Compost used—149 tons.
(e) Iron plough demonstration—38.
(f) Area under green manure crops—279½ acres.
(g) Tapioca cutting planted—24,000.
(h) Area under cotton crop—174½ acres.
(i) Pest control by spraying and dusting—684½.
(j) Cotton trial plot—2.
(k) Sesbania seed collected—130 lb.
(l) Nursery raised (sesbania)—13 places.
(m) Cent Nursery raised—115.
(n) Fruit plants planted—49.
(o) Economic planting of paddy—151 acres.
(p) Green leaf yielding plants and cuttings planted—12,544.
(q) Area covered by sesbania planting—332 acres.
(r) Demonstration plots laid—8.25 acres.

North Arcot district—Polur taluk.—Rural Development work in the firkas of Kalasapakkam and Kadaladi in Polur taluk and Turinchapuram in Tiruvannamalai taluk was continued during the year under report. Work on the various items of improvements detailed below had been carried out. A special fieldman assisted by two maistris attended to the different items of departmental work in each of the three firkas. The rural welfare committee meetings were conducted every month and the agricultural problems of the tract were discussed with the members of the committee and action taken to solve them. Special priority was shown in giving effect to grow more food aids in the firka development area. The special staff of three fieldmen and six maistris are under the control of the Collector and functioned from May 1952.

Names of firkas—(1) Kalasapakkam, (2) Kadaladi and (3) Thirunjavuram.

(a) Quantity of improved seeds distributed—						TONS.	LB.
Paddy	..	..	..	..	..	25	62
Millets	..	..	..	..	..	0	724
Pulses	..	..	..	..	..	0	20
Cotton seeds	..	..	..	..	..	1	504
Green manure seeds	..	..	..	..	..	4	136
(b) Demonstrations conducted with iron ploughs						155 Nos.	
Bund farmer	..	..	..	..	..	2 Nos.	
Puddler	..	..	..	..	..	Nil.	
Thin nurseries	..	..	..	..	..	19 Nos.	
Manure pits opened	..	..	..	..	..	76 Nos.	
Rectification of old pits	..	..	..	..	..	151 Nos.	
Spreading litter in the cattle shed	..	..	..	..	..	157 Nos.	
(c) Rural compost making—							
Quantity prepared	..	..	..	..	..	823 tons.	
Amount of subsidy paid	..	..	..	..	..	Rs. 303-6-0	
(d) Planting of green leaf trees—							
Seeds distributed	..	..	..	..	..	21 lb. 8 oz.	
Seedlings planted	..	..	..	..	..	38,546 Nos.	
Cuttings	..	..	..	..	..	180 Nos.	
(e) Vegetable seeds distributed—							
Seeds distributed	..	..	..	..	..	2 lb. 1 oz.	
Area covered	..	..	..	..	..	16 acres.	
(f) Miscellaneous—							
Fodder grass	..	..	..	..	..	7 acres.	
Fodder crops (including guinea grass)	..	..	..	..	..	2,400 slips	(2 acres).
Exhibition shows held	..	..	..	..	..	Nil.	
Number of demonstration plots laid	..	..	..	..	..	150 Nos.	
Number of propaganda meetings held	..	..	..	..	..	90 Nos.	
Number of magic lantern shows conducted	..	..	..	..	..	25 Nos.	
Takkavi loan amount disbursed	..	..	..	..	..	Rs. 13,160.	

Salem district—Attur taluk.—This continued to receive special attention throughout the year. During the previous year the scheme was extended to 44 villages including the hamlets in the firkas of Veeraganur, Gangavalli and Talaivasal in Attur taluk. The fieldman transferred to the Revenue department continued throughout the year assisting the Rural Welfare Officer. A further compliment of six maistris at two for each firka were also posted to assist the fieldman.

To serve as a standing ocular demonstration of all the improved methods in the successful cultivation of all crops the model farms for the two taluks were located and functioning within the area of operation at the Rural Welfare scheme. A cotton pilot scheme for encouraging Khadi Production was operating in the village of Anayampatti in a 100-acre block.

The table below gives the items of work done in these two centres:—

Serial number and nature of work.	Veerapandy.	Gangavalli.
1 Rural composting	696 tons.	1,200 tons.
2 New manure pits dug	170 Nos.	198 Nos.
3 Rectification of old pits	214 Nos.	249 Nos.
4 Spreading litter in cattle shed	106 Nos.	433 Nos.
5 Bund forming and other methods	32.70 acres.	47.10 acres.
6 Demonstrations with ploughs and imple- ments.	63/120.00 acres.	88/53.95
7 Seed farms arranged—		
Paddy	77.00 acres.	160.00 acres.
Cholam	12.00	26.00
Ragi	5.00	8.00
Cumbu	1.00	18.00
Groundnut	6.00	..
Pulses	0.50	..
Green manures	12.00	40.00
8 Quantity of improved seeds distributed—	TONS. LB.	TONS. LB.
Paddy	1—1123	3—979
Cholam	0—322	0—784
Ragi	0—150	0—50
Tenai	0—20	..
Cumbu	0—52	0—107
Pulses	0—28	..
Groundnut	0—167	..
Green manures	0—500	0—769
Cotton	0—1573	2—268
9 Quantity of seeds procured—		
Paddy	0.2215	2.30
Cholam	..	..
Ragi	..	..
Cumbu	..	..
Groundnut	..	..
10 Quantity of manures distributed— No separate figures available.		
11 Tree planting—		
Nurseries raised	32 beds.	54 beds.
Stumps planted	5,718	6,248
Seedlings planted	7,900	3,007
12 Quantity of vegetable seeds distributed—	1 lb. 3 oz.	3 lb. 2 oz.
13 Number of bee hives introduced	10	
Quantity of honey extracted	13 lb.	
Number of colonies cleaned	18	

XII. Crop-war targets fixed and attained in 1951-52—

Crops.	North Arcot district.		Salem district.		Chingleput district.	
	Target fixed.	Attained.	Target fixed.	Attained.	Target fixed.	Attained.
1 Paddy —acres	2,520	5,419	1,470-00	1,627-00	2,300	2,258 7
2 Cholam	450	300	1,000-00	321-00	Nil.	Nil.
3 Ragi	125	125	310-00	263-00	115	59-5
4 Cumbu	50	50	225-00	286-25	Nil.	Nil.
5 Groundnut	Nil.	Nil.	Nil.	51-00	75	1-50
6 Gingelly	Nil.	Nil.	Nil.	Nil.	31	..
7 Green manure	3,000	2,500	1,500-00	260-00	3,000	86
8 Tenai	Nil.	Nil.	25-00	17-75	Nil.	Nil.
9 Pulses	Nil.	Nil.	210-00	53-00	Nil.	Nil.

REMARKS.—Due to the late onset of the south-west monsoon coupled with the partial failure of north-east monsoon targets fixed could not be attained. Due to this, inspite of attaining the target in the organizing of the seed farm the procurement of seed farm produce was very much affected.

XIII. Loans—

Name of loans.	Number of loans granted.	Total amount.
		RS.
1 Loans for purchase of implements	37	2,550
2 Loans for purchase of seeds and manures.	4,690	4,90,520
3 Intensive manuring scheme	1,050	1,29,940
Total ..	5,777	6,23,010

Additional information called for in Director of Agriculture's X-3-PdI No. 88/50, dated 14th August 1950—

- 1 Number of demonstration plots conducted—1,439.
- 2 Propaganda meetings conducted—791.
- 3 Number of exhibitions conducted—32.
- 4 Loans sanctioned—
Number—5,777.
Amount—Rs. 6,23,010.

XIV. Other miscellaneous items—(1) Crop yield competition on paddy.—

This is the second year when these crop competitions were continued. The working of the scheme has roused a mass enthusiasm amongst the ryot public towards stepping up production.

Number of entrants for the crop yield competition—3,425.

Number of plots harvested—315.

Though the district prize was awarded to the highest producer in Chingleput district, the announcement of the result of the competition is withheld as ordered in Memorandum No. F.P. IV 19377/52, dated 5th July 1952, from the Food and Agriculture (Food Production) Department, Madras.

(2) Reclamation of waste lands.—During the year series of experiments for reclaiming the saline and waterlogged Padava lands in Vallur village in Ponneri taluk were conducted by treating the land with sand, lime compost and

cattle manure in different proportions as suggested by the Government Agricultural Chemist, Coimbatore. Three blocks of heavy clay soil, medium soil and light soil were selected and in each block of 16 plots of 20 cents each were laid. The treatments were given as per the detailed scheme. Vadan samba paddy seeds were sown under dry conditions. The germination and initial growth was satisfactory though in patches. Due to the failure of rains subsequently the results were inconclusive.

(3) River pumping scheme.—Two river pumping schemes, one at Pinayur and the other at Nelvoy in Chingleput district were started during the year. In the former three high power oil engines were fitted in and water pumped from the Palar river. A total area of 140 acres was benefited by this scheme with an increased production of 140 tons of foodgrains. At Nelvoy six low power oil engine pumpsets were installed at the first instance but on concessional hire basis to the Nelvoy Agricultural Farming and Co-operative Society who undertook to run the scheme. These low power oil engine pumpsets were later on changed to high power engines to command an area of 200 acres of wet area which gave an additional production of 200 tons of food grains.

Both these schemes are under experimental stages and it will take at least one more season to estimate the effectiveness of such schemes. However, the ryots are very enthusiastic in starting similar schemes in other villages adjoining the Palar basin. These will be taken up for consideration when the existing two schemes prove a complete success.

XV. A brief review of district work.—Intensive propaganda was carried on as in previous years and all the grow more food aids were brought home to as many ryots as possible. Actual field demonstrations were conducted to impress upon ryots, the definite advantages of following departmental suggestions. The use of improved implements, improved seeds, proper manuring, timely control of pests and diseases, etc., have become popular. Steps to improve the resources of manure were attended to in particular and a number of panchayats and municipalities have taken up to night-soil composting by Bangalore process; and improved composting of waste vegetable matter and farm refuse have been widely put into practice and the payment of subsidy proved as a successful incentive in the campaign. Though the failure of the season proved a great handicap, green manure work was carried on to the extent possible. Due to intensive propaganda ryots are fast realizing the value of green manure. Planting of Glyricidia on field and channel bunds in compounds, etc., has become popular and is fast spreading; sesbania was planted in paddy fields and in sugarcane and plantain gardens. Plants in the sugarcane and plantain gardens were more luxuriant than those in paddy. The growing of sesbania in late samba paddy and in navarai paddy was not satisfactory. The spread of this useful variety of plant as the only cheap green manure for paddy is programmed to be given priority with a view to cover the entire paddy area in two to three years. Trials were laid out for all the major cultivated crops and a number of conclusions arrived at.

Grant of interest-free takkavi loans and loans for the purchase of implements and supply of irrigation units through hire-purchase system were also some of the main items of district work. Adequate arrangements were also made to stock heavy quantities of improved seeds of paddy to meet the demand. Paddy seeds were got from other surplus districts to supplement the poor stocks held in the district. Mechanical cultivation with tractors, bull dozers, etc., had become very popular and the demand for the same was increasing. Departmental units of oil engine pumpsets were hired to ryots who were in urgent need of them.

In order to promote a healthy competition among ryots in increasing food production, crop competition was continued during this year also for long and short term paddy crops.

The cotton extension programme received all the impetus it deserved. Uganda 1, H 420 and P. 216 F cotton seeds were distributed extensively and encouragement and facilities of takkavi loans were also provided for manuring the irrigated crops with ammonium sulphate. The progress was not as satisfactory as expected due to adverse seasonal conditions.

The introduction of grafts and seedlings of improved varieties of fruits was pushed on in conformity with the planting materials supplied by Government farms. The demand for coconut seedlings from the Government nurseries was very heavy.

The special staff for Plant Protection continued to register satisfactory progress in covering almost all crops and launched a successful campaign against epidemics wherever they occurred thus preventing the spread of the pest further. The Plant Protection staff also attended to Phyto Sanitary work by taking delivery of parcels containing plants, bulbs and seeds received from overseas on behalf of Government depots and fumigating them. They also issued Phyto Sanitary certificates on plants and seeds material exported to other countries.

Both rural and urban composting were made popular both by propaganda and by offering subsidies for rural compost manufacture. The progress was encouraging and there were many more municipalities and major panchayats that came into the fold for composting night-soil and rubbish.

The Engineering staff continued to make satisfactory progress by ploughing extensive areas of virgin and cultivated lands with tractors and levelling undulated areas with the bull dozers. The target fixed for bull dozer operations was exceeded by over 3 per cent in Salem district. Oil engines and pumpsets were hired out and pipes were sold to satisfy all applicants for installing pumpsets of their own.

Model farms were run in almost all taluks in the division as an effective limb of agricultural extension work. But before these could show their usefulness this scheme was withdrawn.

The work of forming agricultural associations and taluk committees and that of enrolling subscribers for the Agricultural Journal continue to receive special attention.

Special problems of the division.—The districts in this division are depending mostly on the rains for carrying on the agricultural operations. Continuous failure of monsoon for five years in succession is one of the most important factors limiting the agricultural activities.

A liberal grant of loans, if not subsidies, for digging more wells and deepening the existing wells preferably in the shape of providing the services of more power-boring sets, air compressors, etc., with necessary technical staff will be very helpful. There appears to be further scope for starting river pumping schemes in all the districts of this division. This may be explored, grant of permits for baling Cauvery water for irrigation may be liberalized. The grant of oil engines under hire-purchase system may be increased and the supply of electrical energy may be increased in all the villages.

In view of the existence of a vast area of over 80,000 acres of even and fertile cultivable waste land in the district of Salem where the water-table is comparatively high and dependable, colonization schemes may be started in order to bring this vast area under cultivation of food crops. An agricultural station to study the comparative economy in the cost of cultivation of mechanized and ordinary methods may be started in this area. The possibilities of starting a Government-run demonstration-cum-seed farm on a commercial scale may be explored so that the produce obtained can be distributed for seed purposes in place of the existing arrangements for running seed farms for paddy, millets, etc., in the ryots' holdings.

VELLORE,
24th August 1952.

G. SAKHARAMA RAO,
Deputy Director of Agriculture.

APPENDIX I. State Trading Schemes.

	Departmental sales.		Transfer to co-operative societies.	
	TONS.	LB.	TONS.	LB.
1. Iron and steel sold (cart tyres, G.C. sheets, H.C. rounds, zinc sheets, etc.)	83	1,359	..	..
2. Miscellaneous implements like jaggery pans, plough shares, crowbars, mhote wheels, mammaties, etc.	900	Nos.	..	..
3. Cané crushers	15	Nos.	..	..
4. Chemical fertilisers—				
(a) Ammonium sulphate	..	11,106	995	
(b) Superphosphate, ammonium phosphate, etc. ..	..	902	1,218	

APPENDIX II.

Statement of charges of office of the Regional Deputy Director of Agriculture, V Division, Vellore, for fasli year 1st July 1951 to 30th June 1952.

	RS.	A.	P.
40. Agriculture—B. Superintendence—			
B 1. Pay of Officers	4,680	0	0
B 2. Pay of Establishment	4,311	9	0
Dearness Allowance	2,942	13	0
B 3. Allowances—Travelling allowance	4,191	13	0
House rent allowances	647	5	0
B 4. Contingencies—			
Rents	630	0	0
Service Postage and Telegram charges	1,200	4	0
Tour charges	116	5	6
Other contingencies	336	4	7
Dearness allowance to menials	216	0	0
Total	19,272	6	1

APPENDIX III.

Statement showing the strength of staff under various categories under
Regional Deputy Director of Agriculture, V Division, Vellore.

Name of service and post.	Number of sanctioned posts.	
	Permanent.	Temporary.
1. Madras Agricultural Service—		
Regional Deputy Director of Agriculture	1	..
District Agricultural Officers	3	..
2. Madras Agricultural Subordinate Services—		
1. Upper Subordinates	25	29
2. Fieldmen	..	86
3. Demonstration maistries	25	116
3. Madras Ministerial Services—		
Upper division clerks	1	12
Lower division clerks	14	76
Typists	1	3
Store-keepers	1	3
4. Engineering Section—		
Agricultural Engineering Supervisors	1	3
Foremen	..	2
Assistant foreman	..	3
Senior mechanics	..	2
Tractor drivers	..	25
Oil engine and pumpset drivers	..	135
Jeep drivers	..	3
Lorry drivers	..	4
Tractor and lorry cleaners	..	22
5. Madras Inferior Service (peons)	12	4

ANNUAL ADMINISTRATION REPORT OF DEPUTY DIRECTOR OF AGRICULTURE, TANJORE REGION, FOR 1951-52 (FASLI 1361).

Charge and staff.—I continued to be as Deputy Director of Agriculture, Tanjore, throughout the year under report.

The District Agricultural Officers who were in charge of several districts in this region were listed below :—

Tanjore—

Sri K. S. Krishnamurthi Iyer from 1st July 1951 to 9th March 1952

Sri K. Krishnan from 10th March 1952 to 30th June 1952.

Pattukkottai—Janab U. B. Mohammed Abbas throughout the year.

Tiruchirappalli—

Sri T. S. Francis from 1st July 1951 to 1st February 1952.

Sri P. S. Athmarama Iyer, Personal Assistant in full additional charge of District Agricultural Officer from 2nd February 1952 to 29th February 1952.

Sri T. S. Francis from 1st March 1952 to 30th June 1952.

Cuddalore—Sri A. Ramadas throughout the year.

The control of the Agricultural Research Stations, Aduthurai, Palur and Pattukkottai, continued to be with the Deputy Director of Agriculture, Tanjore.

Aduthurai—Sri K. Ramaswami throughout the year.

Palur—

Sri R. Vaidyanathan, Senior Farm Manager, in full additional charge of Superintendent from 1st July 1951 to 31st August 1951.

Sri M. Rayappa Pillai from 1st September 1951 to 30th June 1952.

Pattukkottai—Sri S. Lakshmanan, Farm Manager, throughout the year.

I took charge of the administrative control of Coconut Nursery Assistant in charge of Coconut Nursery Section, Agricultural Research Station, Pattukkottai, with effect from 10th February 1952 from the Oil Seed Specialist, Coimbatore. During the year under report, a new post of Assistant Inspector of Fertilizers was created and placed under the administrative and technical control of Deputy Director of Agriculture, Tanjore. The jurisdiction of the Assistant Inspector of Fertilizer, Tanjore, extends all over the Tanjore region.

Sri S. S. Parthasarathy took charge of that post on 4th December 1951 and is continuing.

During this year, a scheme was sanctioned for sinking of 100 tube wells in the Delta region, in order to help the ryots to raise cotton in summer rice fallows and for the early raising of kuruyai seedlings. A post of Assistant Agricultural Engineer was sanctioned with necessary subordinate staff and with headquarters at Mayuram. Sri K. Natarajan took charge of the post on 3rd January 1952 and is continuing. The administrative control of the Assistant Agricultural Engineer (Tube Well Scheme) is with the Deputy Director of Agriculture.

Intensive Manuring Scheme was again introduced, with a target to sanction Rs. 18 lakhs as interest-free loan to ryots for the purchase of chemical manures. The Additional District Agricultural Officers who were in charge of Intensive Manuring Scheme in Tanjore, Pattukkottai and Tiruchirappalli are listed below :—

Tanjore—

Sri K. Krishnan from 17th May 1951 to 29th August 1951.

Sri P. S. Venkatasubramanyam from 30th August 1951 to 5th November 1951.

Sri S. Muthuswamy Iyer from 6th November 1951 to 30th November 1951.

Pattukkottai—

Sri M. J. David from 21st May 1951 to 11th July 1951.

Sri M. Mukundan from 12th July 1951 to 30th November 1951.

Tiruchirappalli—Sri K. H. Subramaniam from 18th May 1951 to 30th November 1951.

The administrative control of Sugarcane Inspectors, Pugalur and Nellikuppam, continued to be in my control. The following are the officers who held charge of these post during the period :—

Pugalur—Sri K. H. Subramaniam from 7th December 1951 to 31st May 1952.

Nellikuppam—

Sri M. Mukundan from 7th December 1951 to 18th March 1952 forenoon.

Sri M. J. David from 18th March 1952 afternoon to 23rd June 1952.

A large scale looting of sugarcane bundles from loaded wagons proceeding to Nellikuppam Railway station was reported. Armed guards were provided during the crushing season to prevent pilfering. The Sugarcane Inspector, Nellikuppam, reported that there was no pilfering after the provision of armed guards. The leading cane growers estimated that they have gained approximately 2 tons per acre after the provision of armed guards.

Season.—The rainfall in the three districts in this region from 1st July 1951 to 30th June 1952 was as follows :—

District.	1949-50. INCHES.	1950-51. INCHES.	1951-52. INCHES.	Average. INCHES.
Tanjore	34.44	38.57	31.68	34.90
Tiruchirappalli	29.96	29.07	31.78	30.27
South Arcot	31.25	32.67	35.77	33.23

Due to the early commencement of south-west monsoon, water was let in in the irrigation channels on 20th June 1951, roughly a fortnight earlier than the previous year, which helped in timely kuruvai cultivation in delta areas. But, south-west monsoon was not generally satisfactory in South Arcot district, at the latter portion of the season. In deltaic areas, incidence of jassids, swarming caterpillar of paddy and sclerotial attack were reported. The showers in the month of October and November—a time when kuruvai comes to harvest, were detrimental to kuruvai, hampering harvest and drying, in spite of which, kuruvai recorded the normal yield. The north-east monsoon was a partial failure in this region. The few showers in February interfered with samba harvest, sowing of cotton, pulses and green manure, in rice fallows. By September, the water-level in Mettur Reservoir fell down; consequently water was allowed in biweekly turns in irrigation channels.

Incidence of soorai and stem borer were also reported. These unfavourable conditions affected the samba. With particular reference to the main food crop of paddy, in general, the kuruvai or the first crop of deltaic areas, recorded the normal yield, while the untimely rains and inadequate supply of water from Mettur Reservoir, at the fag end of the samba season together with the large scale incidence of pest attack resulted in lowering of the yield of samba by about 10 per cent and thaladi by about 15 to 20 per cent. Due to the partial failure of the north-east monsoon, the sugarcane crops and dry crops in Tiruchirappalli district dried, South Arcot district suffered a lot due to the failure of both monsoons and the abnormal hot weather season, the water-level in the wells fell down. In some places, the crops dried while in some other places, it was saved by lift irrigation. With the fall in water-level in the wells, there was an increased demand for pipes. On the whole, once again in succession to the preceding five years, the season proved to be unfavourable to the agriculturists.

Grow More Food Schemes—Targets and Achievements.

Details.	Tanjore.	Tiruchi-rappalli.	South Arcot.	Total.
I Scheme No. 1.—Land development by mechanical cultivation installation of oil engine pump sets—				
Number of sets to be distributed ..	22	23	59	104
Number of sets actually distributed.	16	22	49	87
Area to be benefited	176	184	472	832
Area actually benefited	128	176	392	696
Additional production aimed—Tons.	88	92	236	416
Additional production achieved—Tons.	64	88	196	348
Scheme No. 2.—Supply of electric motor pumping units through trade channel—				
Number of sets to be distributed ..	25	154	201	376
Number of sets actually distributed.	140	399	133	672
Area to be benefited	125	750	1,005	1,880
Area actually benefited	700	1,995	685	3,380
Additional production aimed—Tons.	62½	375	502½	940
Additional production achieved—Tons.	350	997½	332½	1,680
Scheme No. 3 (a).—Supply of oil engine pump sets through Central Agricultural Engineering Store and Supply Centre—				
Number of sets to be distributed ..	55	45	150	250
Number of sets actually distributed.	39	30	147	216
Area to be benefited	440	360	1,200	2,000
Area actually benefited	312	240	1,176	1,728
Additional production aimed—Tons.	220	180	600	1,000
Additional production achieved—Tons.	156	120	588	864
Scheme No. 3 (b).—Supply of electric pump sets through Central Agricultural Engineering Store and supply Centre—				
Number of sets to be distributed ..	8	10	20	38
Number of sets actually distributed.	7	..	6	13
Area to be benefited	40	50	100	190
Area actually benefited	35	..	30	65
Additional production aimed—Tons.	20	25	50	95
Additional production achieved—Tons.	17½	..	15	32½
Scheme No. 4.—Land reclamation and mechanical cultivation with tractors and Bull dozers—				
Number of units on hand	11	13	14	38
Area to be tackled in (acres) ..	6,000	4,400	3,900	14,300
Area actually tackled	5,317	2,774	3,132	11,223
Additional production aimed—Tons.	490	315	300	1,105
Additional production achieved—Tons.	133	199½	188	520½
Scheme No. 5.—Installation of River Pumping Units—Nil.				
Scheme No. 6.—Soil conservation and Contour Bunding—Nil.				
Scheme No. 7.—Scheme for the distribution of tractors under hire-purchase system—Nil.				
Scheme No. 8.—Tube wells Scheme—Sinking of tube wells with filter points—Nil.				
Scheme No. 9.—Scheme for the distribution of Agricultural implements and tools—Nil.				

Details.	Tanjore.	Pattukottai.	Tiruchi-rappalli.	South Arcot.	Total.
Scheme No. 10—Scheme for the subsidized distribution of Phosphatic Fertilisers—					
Quantity to be distributed ..	594	593	2,970	594	4,751
Quantity actually distributed ..	1,666½	1,036	753	120	3,575
Area to be covered ..	16,632	16,604	83,160	16,632	133,028½
Area actually covered ..	46,662	29,008	21,084	3,360	100,114
Additional production aimed ..	495	494	2,475	495	3,959
Additional production achieved ..	1,389	863	628	100	2,980
Scheme No. 11—Scheme for the distribution of ammonium sulphate—					
Quantity proposed to be distributed.	3,950	3,950	13,650	2,600	24,150
Quantity actually distributed ..	2,894	2,090	7,861	1,365	14,210
Area to be covered ..	110,600	110,600	382,200	72,800	676,200
Area actually covered ..	81,032	58,520	220,108	38,220	397,880
Additional production aimed ..	7,900	7,900	27,300	5,200	48,300
Additional production achieved ..	5,788	4,180	15,722	2,730	28,420
Scheme No. 12—Scheme for Rural compost making subsidized scheme—					
Quantity to be prepared ..	4,158	4,158	3,234	4,620	16,170
Quantity actually prepared ..	4,839	5,327	6,368	3,615	20,147
Quantity to be utilized ..	4,158	4,158	3,234	4,620	16,170
Quantity actually utilized ..	3,120	3,281	3,288	5,399	15,088
Area to be covered ..	832	831	647	924	3,234
Area actually covered ..	624	656	658	1,080	3,018
Additional production aimed ..	104	104	81	116	405
Additional production achieved ..	78	82	82	135	377
Scheme No. 13—Purchase and distribution of Green Manure Seeds—					
Area of seed farm to be organized.	5,500	3,000	1,000	3,000	12,500
Area of seed farm actually organized.	..	..	..	..	..
Quantity of seeds to be procured.	5,500	3,000	1,000	3,000	12,500
Quantity of seeds actually procured.	Nil.	2,983	434	1,370	4,787
Quantity of seeds to be distributed.	5,500	3,000	1,000	3,000	12,500
Quantity of seeds actually distributed.	5,778½	2,313	672	1,126	9,889½
Area to be covered ..	37,605	20,555	5,120	16,000	79,280
Area actually covered ..	40,450	16,191	3,360	5,630	65,631
Additional production aimed ..	5,050	2,750	731	2,229	10,760
Additional production achieved ..	5,393	2,159	480	894	8,836
Scheme No. 14—Scheme for the distribution of improved paddy seeds—					
Area of seed farm to be organized	1,700	1,450	1,470	2,310	6,930
Area of seed farm actually organized.	1,680	2,295	1,883	1,823	7,681
Quantity of seeds to be procured.	12,467	10,633	9,220	13,860	46,180
Quantity of seeds actually procured.	23,489	17,985	12,044	8,309	61,827
Quantity of seeds to be distributed	14,000	8,000	8,780	13,200	43,980
Quantity of seeds actually distributed.	15,320	7,219	9,176	7,883	39,598
Area to be benefited ..	53,000	32,000	35,120	52,800	175,920
Area actually benefited ..	61,280	28,876	36,704	31,532	158,392
Additional production aimed ..	3,000	1,714	1,880	2,821	9,423
Additional production achieved ..	3,283	1,547	1,966	1,689	8,485
Scheme No. 15—Purchase and distribution of millet seeds—					
Area of seed farm to be organized ..	..	..	450	450	900
Area of seed farm actually organized.	..	..	291	172	463
Quantity of seeds to be procured ..	..	..	900	900	1,800
Quantity of seeds actually procured.	..	..	210	78	297
Quantity of seeds to be distributed ..	..	..	1,031	563	1,594
Quantity of seeds actually distributed.	..	..	188	77	265
Area to be covered ..	..	..	18,000	11,000	29,000
Area actually covered ..	..	..	2,973	2,268	5,241
Additional production aimed ..	..	..	1,156	724	1,880
Additional production achieved ..	..	..	174	151	325

Details.	Tanjore.	Pattukottai.	Tiruchi-rappalli.	South Arcot.	Total.
Scheme No. 16.—Purchase and distribution of pulses seeds—					
Area of seed farm to be organized ..	..	..	200	200	400
Area of seed farm actually organized.	..	..	34	11	45
Quantity of seeds to be procured.	..	..	100	100	200
Quantity of seeds actually procured.	..	..	2	½	2½
Quantity of seeds to be distributed ..	..	..	100	100	200
Quantity of seeds actually distributed.	..	..	2	1/3	2-1/3
Area to be covered ..	..	..	1,500	1,500	3,000
Area actually covered ..	..	..	34	5	39
Additional production aimed ..	..	..	50	50	100
Additional production achieved ..	..	..	1	..	1
Scheme No. 17.—Distribution of vegetable seeds at concessional rates—					
Amount to be spent ..	200	200	150	60	610
Amount actually spent ..	199-15-3	150	150	52-8-0	552-7-3
Scheme No. 18.—Distribution of short-term food crops at concessional rates—					
Amount to be spent ..	350	1,000	500	750	2,600
Amount actually spent ..	350	840-3-0	500	761-13-0	2,452

Grow More Food Schemes Review.—The total estimated additional production against the target, was as follows:—

	Tanjore.	Tiruchi-rappalli.	South Arcot.	Total.
Total additional production estimated (tons).	30,391½	34,660	13,331½	78,383
Total additional production achieved (tons).	25,482½	20,458	6,928½	52,869

In the scheme, land development by mechanical cultivation installation of oil engine pump sets, the number of sets actually distributed was 87 against the target of 104. The oil engine sets on hand were fully utilized. In the scheme, supply of electric motor pump sets, the number actually distributed was 672 against the target of 376, the additional production being 1,680 tons against 940 tons targetted, the increase being in all the districts. There was keen demand for the supply of electric motor pump sets. Two hundred and ten oil engine sets and 13 electric motor pump sets were distributed against the targets of 250 and 38 respectively, benefitting an area of 1,793 acres. Under the scheme, land reclamation and mechanical cultivation by tractors and bull dozers, 11,223 acres were tackled against 14,300 acres targetted. There was keen demand for departmental tractors and bull dozers and the units on hand were utilized to the maximum use. Three thousand five hundred and seventy-five and a half tons of superphosphate and 14,210 tons of ammonium sulphate were distributed against the targets 4,751 tons and 24,150 tons respectively, additional production being 31,400 tons. The ryots took advantage of the Intensive Manuring Scheme for the purchase of chemical manures on loan. The quantity of rural compost distributed was 15,088 tons against the target of 16,170 tons. In the scheme for the distribution of green manure seeds the achievement fell below the target, the quantity of seeds distributed was 9,889½ bags against the target of 12,500 bags. Tanjore division exceeded the target and Pattukkottai came next. The work done was poor in Tiruchi and South Arcot districts. This fall on the target was due to the fall in procurement consequent on partial failure of north-east monsoon in Tiruchirappalli and South Arcot districts and due to the revision of policy of the department regarding green manure. In the case of paddy and millet seeds also, the achievement fell below the target. This is mainly due to the partial failure of south-west monsoon and north-east monsoon in Tiruchirappalli and South Arcot districts, paucity of water-supply to samba

crop in Tanjore district and the pest attack. Once again in succession of the preceding four years, the season proved to be unfavourable to the ryot, in spite of which, the work on Grow More Food schemes was taken up with firm decision to achieve the targets and pushed through.

Salient points—(1) Intensive Manuring Scheme.—With a view to encourage the use of chemical fertilizers and to help the ryots to purchase their requirements, intensive manuring scheme was again introduced this year. Under the scheme interest-free loan was sanctioned up to a maximum of Rs. 200 to a single ryot, recoverable in one instalment soon after the harvest. A special staff of three additional District Agricultural Officers with necessary executive and clerical staff was appointed in Tanjore and Tiruchirappalli districts. The loan sanctioned under this scheme was as follows :—

	Tanjore.	Pattukkottai.	Tiruchirappalli.	South Arcot.
Targetted amount to be sanctioned	Rs. 8½ lakhs.	Rs. 6 lakhs.	Rs. 3½ lakhs.	Rs. 2 lakhs.
Amount actually disbursed ..	Rs. 5,73,740	Rs. 4,91,340	Rs. 3,50,000	Rs. 1,25,510
Quantity of Ammonium Sulphate distributed.	2,552	1,011	758	258
Quantity of Super Phosphate distributed.	1,757	558	165	109

The scheme was very popular and the ryots availed of the concession to the maximum extent. With the result of the introduction of this scheme, the ryots began to manure the kuruvai crop, which was not the usual practice.

(2) Crop Yield Competition.—The scheme for the conduct of Crop Yield Competition, was again introduced during this year. The competition was extended to all kinds of varieties of paddy, and started from firka level. This scheme invoked considerable interest among the ryots, and they became enthusiastic. There were more than 4,000 entrants. The adjudging of District and Regional prize winners is in progress.

The results of 1950-51 Crop Yield Competition were as follows :—

Name of the district.	Maximum yield. LB.
Tanjore	10,852
Pattukkottai	9,494.4
Tiruchirappalli	9,117
South Arcot	7,666

The regional prize was awarded to Mr. N. Swaminatha Athiamar, of Vadaver, Nannilam taluk, Tanjore district.

(3) Honorary Propagandists Scheme.—In four taluks in Tiruchirappalli district of my region, the scheme was introduced as a trial. Four Propagandists, at one per taluk, were appointed for effecting propaganda and demonstrations on improved Scientific Agricultural practices. Ryots, who were adopting the improved agricultural practices on departmental advice, and who had the necessary influence in the villages around them were selected and given definite items of work and certain number of villages were also assigned to them; besides this, a demonstration maistry was posted to each Honorary Propagandist. These Honorary Propagandists were given an honorarium of Rs. 50 each per month. Considerable difficulty was experienced in selecting suitable persons and the persons so selected have tendered their resignation after some period. So, the scheme was given up. The work of the propagandists was not up to the expectations.

(4) Registered Model Farms.—Government sanctioned the formation of model farms at the rate of one per taluk. Six model farms in Tanjore, five model farms in Pattukkottai, eight model farms in Tiruchirappalli and six model farms in South Arcot were selected. The model farmer was subsidized up to 25 per cent of the cost of seeds, manure, insecticides and tractor operation. The idea behind this scheme, is to demonstrate the improved methods, to all the ryots, by way of practical experiments. The model farm scheme was put into operation in all the districts. In Tanjore, Pattukkottai and Tiruchirappalli districts, the selection work was completed and agricultural operation were taken up, while in South Arcot district, there were some difficulties in selecting right type of persons. However, model farmers were selected for all the taluks except for Villupuram and Chidambaram. By way of practical work, all the possible improved methods were demonstrated, and the neighbouring ryots were taken round the farm, showed the improvements and given instructions. But, unfortunately, since the expected subsidy was not forthcoming from the centre, the scheme was given up. The scheme was popular among the ryots and useful.

(5) Utilization of rice fallows and Tube Well Scheme.—Cotton cultivation in rice fallows formed one of the major items of work, in the year. P. 216 F cotton, a short duration variety was found suitable for growing in rice fallows even in double-crop lands in delta tract. Sown in January-February soon after harvest of paddy, and harvested before the kuruvai cultivation starts, with proper manuring and irrigation, the P. 216 F cotton yielded 1,200 lb. of kappas per acre, fetching an income of Rs. 450. The expenditure comes to Rs. 150 per acre. The cotton crop does not also depress the yield of succeeding paddy, while the leaves and stalks form a good manure. So, it was decided to take up the scheme in large scale. More than 3,000 maunds of P. 216 F cotton seeds were imported from East Punjab and distribution work was taken up. About 1,800 maunds have so far been distributed. The area covered was as follows :—

District.	Quantity distributed.	Area covered.	
		Pure.	Mixed.
	MDS.		
Tanjore	1,114	1,343	..
Pattukkottai	286	473	194
Tiruchirappalli	108	307	57
South Arcot	286	203	1,210
Total	1,794	2,326	1,461

There is every possibility of extending the area under cotton, in rice fallows. With a view to help the ryots in irrigating cotton and to encourage cotton cultivation, Government were pleased to sanction a Tube Well Scheme, with a target to erect 100 filter points in Tanjore district. Though, the period of sanction for erection of filter point, was fixed as one year, 102 filter points were erected within five months up to 30th June. But, unfortunately, 52 attempts resulted in failure. As the scheme was quite new and all the staff had no previous experience in this line, much difficulty was experienced. Delay in transport of materials and shortage of labour also stood as a cause for the slow progress. In spite of these handicaps, the work was taken up with vigour. The scheme was cheerfully welcomed by the mirasdars in deltaic area; since, this was useful not only to grow a commercial crop like cotton and groundnut, but also to raise kuruvai nursery beforehand. Soon after the receipt of the channel water kuruvai can be transplanted in time. So this scheme brings two-fold advantage.

(6) *Scheme for the distribution of seeds to the interior villages through selected seed farm ryots.*—At the beginning of the year, the scheme was in operation in Tanjore and Tiruchirappalli, as a trial. Under this scheme, one of the seed farm ryots is selected and the distribution of his seed farm produce, to the ryots in nearby villages allotted to him. A commission of Re. 1 per bag of seed sold by him besides the seed farm premium was paid. The scheme was immensely helpful to the ryots in interior parts. So, it was extended to all districts. Ryots have been selected and distribution work will be taken up in due course.

During the year 1950-51, the ryot selected in Tanjore district has distributed 100 bags of Co. 25 paddy seeds and the ryot selected in Tiruchirappalli has distributed 100 bags of Co. 25 paddy seeds. This will cover 1,200 acres.

(7) *Training of other departmental officers.*—In order to get the Revenue subordinates, familiarized with the Grow More Food schemes, the District Agricultural Officers and Agricultural Demonstrators gave lectures on Grow More Food schemes and other Agricultural matters to the village officers and other Revenue officials.

(8) *Sale of chemical manures.*—The sale of chemical manures was completely stopped by the department and it was done through the approved co-operative societies and selected tender firms.

Problems.—(1) Green manuring a very large area of samba and thaladi was a problem to the mirasdars in delta tract. Now, this has been solved by the introduction of *sesbania speciosa*. In attempting to tackle the difficulty in manuring samba, it was found by observations made at Agricultural Research Stations, Aduthurai and Pattukkottai, that it is possible to raise daincha, sunnhemp and *sesbania* in the samba lands, soon after the receipt of channel water. Using a heavy seed rate of 60 lb. per acre, 12 to 20,000 lb. of green manure could be obtained within a short period of 6 to 8 weeks. This invoked considerable interest among the mirasdars, since this practice would greatly solve the problem of green manuring and appreciably increase the yield of samba paddy. Similarly the difficulty in green manuring the thalady is overcome by planting *sesbania* closely around kuruvai field bunds right in the mire. This yields 2 to 3,000 lb. of green leaf matter per acre of field bunds and goes a long way in solving the problem.

(2) Since the introduction of *sesbania speciosa* in a mass scale and as the ryots begin to feel the importance of green manuring, the organization of seed farms in common green manure was given up. So, the procurement of common green manure seeds was not done. The payment of subsidy of Rs. 6-8-0 was stopped. The quantity of *sesbania* seed collected from the 1951-52 crop in the three districts was as follows:—

	BAGS.
Tanjore	165
Pattukkottai	121
Tiruchirappalli	18
South Arcot	14

(3) It is possible to collect large quantities of *sesbania* seeds, by planting the well grown *sesbania* seedlings around the samba field bunds, 6 feet apart. By doing this simple thing, the ryot gets his requirement of seeds and stalks of the plants form a good manure. Similarly, by growing sunnhemp as a mixture with rainfed crops like groundnut and varagu, using a thin seed rate of 1 pound per acre, it is possible to produce large quantities of sunnhemp seeds.

(4) For alkaline soil, the variety of paddy S.R. 26 B is being introduced and it has given satisfaction to the ryots.

(5) It is observed from the trials conducted at Agricultural Research Station, Pattukkottai, that it is possible to raise cotton along the field bunds, to increase the income of the ryot. The P. 216 F plants sown in August 1951 on the bunds of paddy fields, have grown well, with numerous bushy branches having healthy leaves. The trial gave a produce of 30 lb. kappas from the bunds of an acre. The crop not only yielded a good number of bolls per plant, but also, the opening of such bolls was quite satisfactory. The quality of the kappas was good. This is one of the ways to increase the income of the wet land ryots. This is under detailed study.

(6) Baiting with zinc phosphide, setting up of bamboo traps and digging of burrows in field bunds, were advocated to control rat menace. As many as 5,182 rats were actually killed at Agricultural Research Station, Aduthurai, during the last crop season. From this, the seriousness of the attack can be well imagined, at the delta tract.

Crops—

(1) Paddy—

Area of seed farm raised	7,681 acres.
Quantity of improved seeds procured	61,827 bags.
Quantity of improved seeds distributed	39,598 bags.
Area covered	158,392 acres.

(2) Millets—Principally in Tiruchirappalli and South Arcot districts—

Area of seed farm raised	463 acres.
Quantity of seeds procured	297 bags.
Quantity of seeds distributed	265 bags.
Area covered	5,241 acres.

(3) Pulses—

Area of seed farm arranged	45 acres.
Quantity of seeds procured	2½ bags.
Quantity of seeds distributed	2-1/3 bags.
Area covered	39 acres.

(4) Oil seeds—

	Groundnut.	Gingelly.	Castor.
Area of seed farm arranged	52	..	..
Quantity of seeds procured	139 bags	½	..
Quantity of seeds distributed	57	¼	..
Area covered	171 acres	14	..

(5) *Sugarcane.*—The improvements effected in sugarcane cropping were follows:—

Nature of improvement.	Number of demonstration.	Area covered.
Cultural	17	92
Varietal	62	174
Manurial	60	170
Control of pests and diseases.	34	109
Sindwabe and improved furnaces.	595	..
Jaggery manufacture	627	..

The post of one Superintendent, Sugarcane Liaison Farm, Kulittalai, with two Assistants in Tiruchirappalli district and one Superintendent, Sugarcane Liaison Farm, Nellikuppam, with three Assistants in South Arcot district, were continued for sugarcane improvement. The work on multiplying improved strains, control of pest and disease, improved methods of cultivation was carried on. During the year, the posts of Sugarcane Inspectors at one per factory were sanctioned for each of the sugarcane factories at Pugalur and Nellikuppam.

(6) *Coconuts*.—Number of seedlings distributed from the depots was 2,817. The following improvements were advocated. (a) Proper spacing, (b) bunding to prevent erosion, (c) green manuring with *crotalaria*, (d) trenching in fronds waste materials, etc., and (e) removal of rhinoceros beetle and control of stem-bleeding.

(7) *Fibres—Cotton*.—The following improvements were advocated :—
(a) Rising of P. 216 F cotton in rice fallows of delta tract as summer crop.

(b) Sowing of M.U. 1 in irrigated ragi and groundnut as a mixture.

(c) Sowing of cotton in line—10 feet part as mixture in groundnut crop in dry lands.

(d) Increasing the area under cotton sown as pure in December-January season. Scattered block trials of cambodia and karunganni were conducted at Kulittalai and Ariyalur taluks and the results are encouraging.

(8) *Tobacco—Chewing type*.—Tobacco is grown in Vedaranyam tract in Tanjore district and in some villages in Chidambaram taluk in South Arcot district. No improvement was taken up.

(9) *Chillies*.—30 lb. of Guntur chillies seeds and 6,000 seedlings were distributed to cover an area of 81½ acres.

(10) *Vegetable seeds*.—(a) Free distribution of vegetable seeds to schools and colonization societies :—

	RS.	A.	P.
Amount targetted to be spent	610	0	0
Amount actually spent	552	7	3
(b) Total quantity of vegetable seeds distributed	611	lb.	
(packets)	4,838		
(seedlings)	38,522		
Increased area under vegetables	455	acres.	

(11) *Fodders*.—An additional area of 1,146 acres were brought under fodder. About 215,000 slips of various kinds of grasses were distributed, besides the distribution of pillipasara, millet seeds, etc. In the registered model farms, a separate plot was allotted for growing grass, while in the Agricultural Research Stations, the sale price was reduced to Re. 0-2-0 per 100 slips from Re. 0-4-0 per 100 slips. The reduction in sale price was an encouragement to the grass-growers. Municipalities were advised to grow grasses with sewage and the grass farm of Srirangam Municipality was a grand success.

(12) *Fruits*.—(1) The following were issued :—

Mango seedlings—1,124.

Lime, lemon and other citrus varieties—1,949.

Jack seedlings—2,128.

Papaya seedlings—912.

Grape vine cuttings—1,064

Plantain—125.

(2) During the year under report, a scheme for the propagation of promising fruit trees, was introduced. All the mango stones available at the districts were collected and sent to the nearest Agricultural Research Station for raising seedlings and for distribution.

(13) *Green Manure*.—

Quantity of green manure seeds distributed (all kinds of green manure seeds)—9,889½ bags.

Area covered—65,631 acres.

Quantity of green manure seeds procured—4,787 bags.

The department is now advocating the growing of *sesbania speciosa*, a heavy yielding green manure plant and has proposed to reduce the distribution of common green manure seeds. During the National Tree-Planting Week a good number of green leaf yielding seedlings were distributed.

Miscellaneous items—(1) *Manure conservation*.—

Number of manure pits newly opened—4,626.

Number of manure pits renovated—6,071.

Byre system (new)—1,181.

Byre system (renovated)—691.

Loose Box system (new)—440.

Loose Box system (renovated)—Nil.

Dry earth sheds—2,094.

Subsidized scheme for rural compost making was in force and it was an encouragement to the ryots. The municipalities and panchayat boards also took part in this campaign and they have produced appreciable quantity of town compost. They were guided and supervised by the Compost Development Officer working under the control of Inspector of Municipal Councils and Panchayat Boards. A compost week was observed during this week, the District Agricultural Officers and Agricultural Demonstrators gave lectures to the ryots and village officials emphasizing the need and importance of producing more quantity.

(2) *Agricultural implements and tools*.—Except the materials relating to Engineering branch of the department, all other implements have been transferred to co-operative societies. Some unwanted iron materials are held at depots. This is being sold at concessional rates. The implements and tools distributed were as follows :—

Small ploughs—218.

Plough shares—680.

Mammutties—220.

Mhote wheels—39.

Sugarcane crushers—2.

Other implements—366.

There was keen demand for the pipes and fittings due to the failure of north-east monsoon and south-west monsoon, particularly in Tiruchirappalli and South Arcot districts.

(3) *Demonstrations conducted—*

Small ploughs—960.
 Mhote wheels—232.
 Sugarcane crushers—15.
 Horticultural tools—72.
 Setton—41.
 Trampler—7.
 Puddler—4.
 Levelling Board—123.

Demonstration plots laid—

Tanjore	...	...	...	85
Pattukkottai	...	...	...	100
Tiruchirappalli	...	...	...	375
South Arcot	...	...	...	128
Total	...	...	...	688

(4) *Subsidiary Industries—*

Number of bee colonies introduced during the year—239.
 Total number of bee colonies functioning including those started in the previous year—1,342.
 Total quantity of honey extracted—3,884 lb.

(5) *Exhibitions.*—During the year, 25 small-scale exhibitions were conducted, 4 in South Arcot district, 13 in Tiruchirappalli district, 1 in Pattukkottai and 7 in Tanjore. Of this, the exhibition by the Tiruchirappalli Seva Sangam is worth mentioning. More than 50,000 people attended the exhibition. The working of tractors, bull graders, Rotavator, oil-engines and power sprayers, were demonstrated. The preparation of fruit juices and malt extract and the method of growing sesbania along paddy field bunds for manuring thaladi and for seed production, were explained.

(6) *Agricultural Associations.*—With a view to make close contact between the department and ryots, village advisory committees are now being formed. It is proposed to have one committee for each village. This will consist of one or two leading ryots of that village, Member of the Legislative Assembly, village headman or karnam and school teachers, etc. The committee will indent for the requirements of that village, for seeds, manures, pesticides, etc., to the Agricultural Demonstrator who will arrange the necessary supply. So it is possible for the department to suggest the latest improved methods to the ryots through this committee. The committee will work as village agency of the department. The committees are being organized.

(7) *Advances and Loans.*—Besides the grant of loan for the purchase of chemical manures and seeds, a new loan scheme was introduced under this scheme, interest-free loan is sanctioned up to a limit of Rs. 100 per acre of seed farm subject to a maximum of Rs. 12,000 per ryot. This is restricted only to the seed farm ryots in delta area. The progress of the loan scheme was as follows:—

Loan for the purchase of seeds and manures—Rs. 6,12,180.
 Loan for the purchase of implements—Rs. 3,760.
 Loan for the seed farm ryots—Rs. 10,900.

(8) *Agricultural Education.*—The Agricultural Training School at Orathanad (Tanjore district) and Vivekananda Vidyalaya, Thiruppalathurai (Tiruchirappalli district), impart Agricultural Education, besides some of the high schools which have Agriculture as one of the subjects in the "Craft" section. The elementary school at Agricultural Research Station, Palur, was handed over to the District Board, South Arcot district.

(9) *Pest and disease.*—Rat menace was pronounced in the area. The department advocated baiting with zinc phosphide, setting up of bamboo traps and digging of burrows in field bunds. These measures gave very good results. Stem rot occurred in a severe form on kuruvai and appreciably affected the total outturn of yield. Stem-borer and Soorai also appeared in epidemic forms on samba as well as thaladi. The Plant Protection staff were useful in helping the ryots to adopt control measures in time. Seed treatment for paddy seeds, dusting, spraying, etc., were attended to in all the districts. Forty tons, 376 lb. of pesticides and fungicides were sold to the ryots.

(10) *Area under improved strains—*

	Departmental spread.	Natural spread.	Total.
	ACS.	ACS.	ACS.
Paddy ..	158,302	1,389,278	1,547,670
Milleta—Ragi, cholam, cumbu ..	5,241	134,101	139,342
Green manure—Kolingi, daincha, sunhemp, pillipassara and others.	65,631	378,949	444,580
Cotton ..	10,313	31,714	42,027
Groundnut ..	171	4,720	4,891

(11) *Estimated increased area under food-crops and area newly brought under cultivation.*—"G" Return figures are awaited.

(12) *Special features.*—A scheme to divide the work between the Agricultural Demonstrator and Additional Agricultural Demonstrator for getting maximum turnover of work and provide for greater contact with ryots in a taluk is under trial. Under this scheme, the Senior Agricultural Demonstrator is in charge of extension work, while the junior Agricultural Demonstrator (Additional Agricultural Demonstrator) is in charge of depot stocks and office routine items. This is introduced in two taluks in each district.

(13) *Tanjore District Co-operative Cotton Marketing Society, Limited, Aduthurai.*—The Cotton Growers' Co-operative Marketing Society was organized with all cotton growers of Tanjore district as members. A share capital of Rs. 1,00,000 was fixed and about Rs. 20,000 collected. The Hon'ble Minister for Agriculture inaugurated the society. The installation of a ginning factory to gin and market the produce of the members is under progress.

Agricultural Research Station, Aduthurai—Crops—Paddy—(i) *Seed multiplication.*—The seeds of the important Aduthurai strains as well as of a few Coimbatore strains, now popular in this district, were multiplied on a large scale for general distribution. The total production of paddy on the farm amounted to 208,537 lb. of which 145,661 lb. was distributed mostly as "nucleus" seeds for the Primary seed farms run by the department in various districts.

(ii) *Improvement of local varieties by pure line selection.*—The promising cultures of three important rain-fed varieties of Arantangi taluk were under the third year of comparative yield tests. The single plant selections

of the two flood resistant varieties, viz., *Tiruturaipundi kar* and *Kattuvanam* were in observation block. Representative samples of the ryots' unselected seed of *Mattaikuruvai*, an important red-riced short-duration variety of the coastal taluks of Tanjore and South Arcot districts were collected after a survey, and individual plant selections were made therefrom.

Culture No. 10600 is scheduled to be released as a new strain, viz., ADT. 24 (*Poon samba*).

(iii) *Hybridization for crop improvement*.—Numerous hybrid progenies in different stages (F1's, F2's and F3's) of crosses effected with the following specific objects of economic importance were under critical study: (a) to induce seed dormancy in *kuruvai* varieties, (b) to evolve strains with stiff straw so as to avoid premature lodging of the crops under intensive cultivation, (c) to evolve saline resistant *kuruvai* and *samba* strains, (d) to evolve blast-resistant cultures of short, medium and long-duration and (e) to improve the rice qualities of some of the existing strains. Promising selections were carried forward for further progeny tests. A number of fresh crosses involving new parents were also effected mainly for the purposes already mentioned.

(iv) *Crop Weather Studies*.—The All-India Co-ordinated Crop Weather Scheme on Paddy was continued in *kuruvai* and *samba* seasons. Intensive observations on the performance of the two crops in relation to weather data were recorded.

(v) *Manurial experiments*—(a) *Fused phosphates versus ordinary super-phosphate*.—The yield differences due to these two phosphatic manures were not statistically significant. The experiment is to be discontinued as per the Director of Agriculture's orders.

(b) *Farm-yard manure versus farm waste compost*.—The *thaladi* crop showed marked response to both these manures equally, whereas both the manures made no impression in *samba*.

(c) *Direct versus indirect application of super-phosphate*.—Significantly higher yields were obtained by applying super indirectly to the green-manure crop preceding paddy than directly to the paddy crop. All the three leguminous green-manure crops tried, viz., *sesbania speciosa*, sunnhemp and daincha showed marked response to super in direct proportion to the levels of phosphoric acid.

(vi) *Cultural experiments*—(a) *Kuruvai-thaladi Combination of strains*.—The differences in yield between the several combinations were not statistically significant.

(b) *Optimum age of seedlings at transplantation*.—The results were vitiated by a severe incidence of paddy stem-rot (*sclerotium oryzae*) in the case of *kuruvai*. In *samba*, the trend was in favour of younger seedlings, whereas in *thaladi* this factor exhibited no appreciable influence on crop yield.

(c) *Optimum ratio of kuruvai-Ottadan seed rates in "Udu" cultivation*.—This was a new experiment. The results were vitiated by a severe incidence of paddy stem-rot which damaged both *kuruvai* and *ottadan* crops.

(vii) *Plant Protection trials*.—(a) *Soorai* (paddy mealy bug) various control measures such as the scorching of nursery bunds and spraying of D.D.T. and B.H.C. in different dilutions were under trial. In the absence of the incidence of the insect on a pest scale no definite conclusions could be drawn about the comparative efficacies of different treatments.

(b) *Paddy stem-borer*.—Spraying with four different insecticides, viz., B.H.C., D.D.T., Parathion and HETP in different strengths were tried both in the nursery stage and after transplantation. B.H.C. 0.1 per cent gave better results than the rest.

4. *Other crops*—(i) *Cotton*.—Varietal, manurial and cultural trials designed by the Cotton Specialist, Coimbatore, were conducted as in previous years. A large-scale cultivation of the short duration variety P.216 F in rice fallows was attempted for the first time over an area of 17 acres. Despite adverse seasonal conditions the attempt proved to be quite a success and an average acre yield of 645 lb. of seed-cotton over the whole area was obtained.

(ii) *Vegetables and fruits*.—Vegetable cultivation was pursued on an intensive scale and large quantities of seeds and seedlings produced and sold to the public. Mango grafts of superior varieties and seedlings or rooted cuttings as the case may be of fruit plants suited to this tract, e.g., acid lime, Malta lemon, jack, Indian gooseberry, etc., were also produced for sale. A total quantity of 333 lb. of vegetable seeds and 190,917 seedlings of various kinds of vegetables and fruit-trees were disposed of during the year.

(iii) *Coconuts*.—Six thousand six hundred and one ripe nuts and 67 tender nuts were harvested and sold.

(iv) *Green-manure crops*.—The recently introduced method of growing *Sesbania speciosa* on *Kuruvai* field margins to provide green manures for the succeeding *thaladi* was adopted on a large scale over the entire double-crop area and it proved to be a grand success, thus effectively solving the erstwhile difficult problem of green-manuring the second crop. A total quantity of 3,109 lb. of *Sesbania speciosa* seed was collected and mostly distributed to the Agricultural Demonstrators. A large number of seedlings and cuttings of *Gliricidia maculata* was planted on road margins, irrigation channel bunds and suitable field bunds and they have come up very well. A large number of these was also sold to the public.

(v) *Fodders*.—A total number of 9,250 slips of Napier, Guinea and buffalo grass was sold to the public.

(vi) *Pests and diseases*.—All the well-known control measures were vigorously adopted to exterminate field rats which prove to be a menace to paddy cultivation in this delta. A total number of 5,182 rats was actually killed during the crop season in the farm premises by the three different methods adopted, viz., baiting with zinc phosphide, setting up of bamboo traps and digging of burrows in field bunds. 'Stems rot' occurred in a severe form on *kuruvai* and appreciably affected the total outturn. Stem-borer and "soorai" also appeared in epidemic forms in *samba* as well as *thaladi*.

(vii) *Livestock*.—(a) All the animals, in general, maintained good condition. Two *Sindhi* and one *Murrah* breeding-bull kept at stud performed 55, 66 and 29 services respectively.

(b) *Poultry*.—R.I.R. breed of poultry was maintained. One thousand eight hundred and twenty-eight eggs were obtained of which 1,640 were sold to the public for setting. One hundred and thirty chicks were hatched out on the farm.

(c) *Agriculture*.—The number of active colonies during the year varied from six to twelve and a total quantity of 38½ lb. of honey was collected.

(d) *Pisciculture*.—Indigenous varieties of fish obtaining in irrigation canal water were reared in the two seven-cents fish ponds on the farm and a total quantity of 241 lb. of fish was caught and sold.

A few other important features of the year worthy of special mention are the electrification of this farm for working motor pumpsets and the installation of 6 inches bore-well and two filter-point wells all of which proved to be of immense use for the cultivation of cotton and vegetable crops in rice fallows, and growing of green manure crops under irrigation, besides raising early nurseries of kuruvai paddy.

Agricultural Research Station, Palur—(1) *Paddy*.—Paddy was grown on a total area of 19.31 acres in four seasons, namely, *kuruvai*, long duration *samba*, second crop *samba* (*thaladi*) and *navarai*. The average yield of grain per acre was 3,015 lb. in the *kar* season, 3,109 lb. in the *samba* season, 2,150 lb. in the *thaladi* season and 2,644 lb. in the *navarai* season. Considering the inadequate monsoon rains resulting in poor water-supply from the Gadilam river the yields can be considered to be satisfactory. Due to the continuous drought conditions that prevailed during the *thaladi* and *navarai* seasons the yields were adversely affected. The yield of *kar* paddy was reduced due to the untimely rains received during the flowering and ripening periods, of the crops. TKM. 3—Sornavari has recorded the highest yield of 3,811 lb. grain per acre while Co. 25-blast resistant Sirumani, ASD. 5 Karthigai *samba* and ADT. 18 Vella *kuruvai* have recorded the highest acre yields, of 3,254 lb., 2,632 lb. and 3,069 lb. for the *samba*, *thaladi* and *navarai* seasons respectively. PLR. 2 Chitrakali planted in crop competition plot during *kar* season recorded an acre yield of 8,379 lb. of grain. Two selections of Sornavari 2,332 and 2,473 from Tirukuppam were compared with farm strain No. 1251 and it was found that both the Tirukuppam selections yielded more than 10 per cent grain over the farm strain and were a fortnight earlier in duration. During the *navarai* season inter varietal yield trials conducted revealed the following results. Sornavari strains SW. 7 and SW. 1251 fared best while TKM. 4-Sornavari Chingleput, Co. 13 Arupatham Kodai, Adt. 16-Kona *kuruvai* and ADT. 20-hybrid *kuruvai* recorded poor yields; (ii) Vella *kar* culture 10077 recorded higher yield over Co. 18. Vella *kar* Chingleput; (iii) Motta *kar* cultures 10169 and 10178 gave increased yields over Motta *kar* standard and (iv) PLR. 2-Chitrakali was the earliest in duration among long duration strains and gave the poorest yield. A replicated experiments with P_2O_5 at 30 lb. per acre in the form of super phosphate and bone-meal to green manure crop, bone-meal to paddy after green manure and green manure alone without P_2O_5 was conducted in the *samba* season and the yields of green manure in the plots manured with P_2O_5 were higher than those from plots to which P_2O_5 was not applied. As regards yield of paddy no definite conclusions could be drawn since the yields from the several sub-plots were erratic.

(2) *Millets*.—Six short duration (90 days) ragi selection and eighteen medium duration (115 days) ragi selections were compared with AKP. 1 and P. 1 strains respectively during May to September and December to March seasons but none of the selections out yielded the standards. Two hundred fresh single earhead selections were made from a fresh sample of ryot's bulk of ragi for pure line selection work to obtain a better strain over P. 1. In an experiment with ragi AKP. 1 and P. 1. to compare the effect of the age of seed in which December season seed was compared with the previous May season seed the yield differences in both the strains were not

significant. Ragi R. 382 and Varagu A. 117 which were giving consistently highest yields both on the station and in the districts were released as P. 1 ragi and P. 1 varagu. In the manurial experiment in which farm yard manure and compost at 60 lb. nitrogen per acre compared with no manure cropped with ragi, though the yields were in favour of the manures, the differences were not statistically significant.

(3) *Miscellaneous*.—The breeding of long staple cotton financed by the Indian Central Cotton Committee was continued during the year under the control of the Assistant Cotton Specialist, Srivilliputtur. The main object of the scheme is to evolve and isolate a barbadense type or hybrids equivalent to the average imported Egyptian styles suitable for cultivation in the coastal regions of South Arcot districts. Studies on different varieties of sweet potato, tapioca, plantain and *Vendai* were continued. Production of fruit seedlings and plants by grafting, layering, etc., and multiplication of vegetable seeds were in progress.

(4) *Seeds and plants distributed*.—Forty-two thousand six hundred and fifty-seven pounds of paddy seed, 7,632 lb. of ragi seed, 9,552 lb. of vegetable seed, 540 lb. of cumbu seed, 250 lb. of redgram seed, 227 lb. of gingelly seed and 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.

(5) *Poultry*.—The maintenance of white leghorn breed of poultry was continued. The opening balance at the beginning of the year was one cock, nine hens and seven chicks. Six hundred and eighty-two eggs were received during the year of which 118 were hatched in the incubator. Two hundred and forty eggs were sold for table and the rest were sold for breeding. Out of the hatching seven were converted as adults, 36 were sold for breeding and two for table. The stock position of poultry at the end of the year consisted of two cocks and eight hens.

(6) *Training of fieldmen and maistries*.—A course of training was given on the farm for a batch of 25 fieldmen and 23 maistries for a period of six months from July to December under the guidance of an Agricultural Instructor.

(7) *Farm School*.—The elementary school for Juvenile Labourers attached to the farm was continued. Forty-seven boys and 13 girls were on the roll on 1st July 1951. The school was closed down on the afternoon of 31st March 1952, as per G.O. No. 148, Food and Agriculture, dated 5th February 1952, communicated in Director of Agriculture's D. Dis. X. No. 4/109-52, dated 18th February 1952.

Agricultural Research Station, Pattukkottai—Crops—Cereals—Paddy—kuruvai season.—The water in the channel was received on 22nd June 1951, and the *kuruvai* cultivation of paddy was begun in right earnest as soon as the water was received in the channels. Dry nurseries for *kuruvai* were begun to be raised on 6th June 1951 and completed on 1st August 1951. Transplanting of *kuruvai* seedlings could be completed by 22nd August 1951. The *kuruvai* nurseries majority of them dry nurseries, raised under wells sufficiently in advance of the receipt of the channel water were given a basal dressing of farm-yard manure, at 20 tons per acre. The wet

nurseries were manured with 4,000 lb. of green leaf per acre. The seedlings were given a top dressing of 100 lb. of ammonium sulphate per acre, 15 days after sowing. The transplanted fields were given a uniform basal dressing of 4,000 lb. of green leaf per acre and 200 lb. of old indigo seed per acre and 100 lb. of super phosphate per acre. The crop was top dressed with ammonium sulphate at 50 to 100 lb. per acre in the third week of transplantation. Statement No. 2 shows the average yield of paddy crop per acre from 1936-37 onwards. Sesbania seedlings were planted on the bunds all round the kuruvai crop at 4 inches apart for getting enough green manure for thaladi crop. Daincha and sesbania were grown in summer in samba areas with the help of the well water. The crops put on a very good growth with the help of the rains received during the period and they gave sufficient green manure for kuruvai crops. Daincha gave 26,000 lb. of green leaves per acre within two months and sesbania 31,000 lb. within 3½ months.

Samba n.— Sowings of samba nurseries were started on 13th July 1951 and completed on 1st September 1951. The transplanting of samba seedlings were begun in the last week of August and completed on 11th October 1951. Samba nurseries received 4,000 lb. of green leaf per acre as manure as a basal dressing and top dressing of ammonium sulphate at 100 lb. per acre four weeks after sowing. In the case of transplanted fields green manure at the rate of 4,000 lb. per acre and old indigo seed at the rate of 200 lb. per acre and superphosphate at 100 lb. per acre were applied as a basal dressing. Ammonium sulphate was applied in two doses as top dressing at 50 lb. per acre per each dose in the fifth week and a month after from planting. The sunnhemp crop raised in samba field after the receipt of summer rains gave an acre yield of 15,000 lb. Hence it was quite possible to supply green manure to the entire samba area uniformly. Harvesting of samba crop commenced from 27th November 1951. Statement No. 3 gives the yields of samba strains. The strain Co. 25 has been found to give the maximum yield.

During the year 1951-52, 21 cultures of Arantangi varieties of paddy were raised in trial plots in which culture 398, 424 and 936 have given the maximum yields as against kattai vellai, kodai vellai and kaivari samba standard respectively kept as control.

Thaladi season.—Sowings of thaladi nurseries were started on 12th August 1951, and completed on 24th September 1951. The thaladi nurseries received a basal dressing of 4,000 lb. of green leaf per acre and top dressing of 100 lb. of ammonium sulphate per acre in the fourth week after sowing. The transplanted fields were given a basal dressing of 4,000 lb. of green leaf, 200 lb. of old indigo seed and 100 lb. of superphosphate per acre. Green leaves were obtained from the sesbania grown on the kuruvai bunds and also from the trees grown on the fence. The varieties grown in thaladi were Co. 25 and Adt. 8 paddy. Since thaladi planting was commenced as early as September the majority of the area under thaladi was under Co. 25 and only a small area was under Adt. 8. There were attacks of stem borer in late planted crops even though as a control measure the roots of seedlings were dipped in Guesorol 950 before transplantation. The moths were also caught in large numbers by setting of light traps.

Kuruvai varietal trials—Kuruvai season.—This was conducted during the year in a still more modified form as per instructions of the Research

Council. Varieties of almost uniform duration in both short and long duration varieties were compared separately in half a cent plots replicated six times in each case. The following are the varieties compared during the year :—

Short duration varieties.	Long duration varieties.
Adt. 3	Adt. 12
PLR. 2	Adt. 14
Adt. 20	Adt. 16
Adt. 4	Adt. 18
PTB. 10	Co. 10
	Co. 13

Statement No. 5 shows the details and conclusions of the experiment.

Samba varietal trials.—The varieties of samba were classified into long and short duration varieties and varieties of almost uniform duration were compared in each case. The following are the varieties compared in each of the short and long duration varieties :—

Short duration varieties.	Long duration varieties.
Adt. 8	PTB. 15
GEB. 24	Co. 25
ADT. 21	Co. 16
ADT. 22	Adt. 1
Co. 2	Co. 3
ASD. 5	

Statement No. 6 shows the details and conclusions of the experiment. The varieties compared both in kuruvai and samba have all been found to be quite suitable to the tract and hence those varieties have been chosen to find out the comparative merits of the varieties. GEB. 24 being the earliest to mature among the short duration varieties was very badly affected by birds and could not give any yield.

Irrigation experiment.—The modified irrigation experiment for both kuruvai and samba paddy was conducted for the third year. One set of plots to be supplied at an average rate generally adopted in previous years.

Increased rate of supply to another set of plots :

Reduced rate for the third set of plots :

The experiment was conducted to know the maximum yield per unit quantity of water combined with the time of sowing. The data of the results has been sent to the Paddy Specialist, for statistical analysis.

Other cereals—Ragi.—Co. 2 ragi was sown in the nurseries on 18th January 1952 and the same was transplanted on 9th February 1952 over an area of 0.25 acre. Groundnut TMV. 2 was dibbled in between the ragi crop in the third week of planting just after weeding as inter crop. P.216.F. cotton seed was dibbled on the bunds six inches apart in the ragi crop at the time of the transplantation of the seedlings. In the fourth week after planting ragi seedlings were found to be attacked by piricularia in patches. The seedlings were given a spraying of Bourdeaux mixture to arrest the spread of the disease. Even though the crop could not receive sufficient supply of water on account of the drought yet the results obtained are not discouraging.

	Yield per acre.
	LB.
Ragi Co. 2	320
Cotton P.216.F.	20
Groundnut TMV. 2	160

Oil seeds—Groundnut varietal trials.—As per suggestions of the Superintendent, Agricultural Research Station, Tindivanam, five short duration cultures of groundnut were sown in summer in rice fallows in the replicated plots as was done in the last year. The cultures tried were AH.4111, AH.4218, AH. 4515 and AH. 6481 and TMV.2. The crop was sown on 18th March 1952 and harvested on 16th July 1952. Due to drought conditions that prevailed during the season and due to the insufficient supply of water the crop suffered a great deal. It was also affected by surul. It was found that the yield obtained in all the varieties were not only poor but the pods were not of uniform maturity.

Groundnut TMV. 1 in dry lands.—Groundnut TMV. 1 was sown in dry lands in August as a mixture crop with redgram culture 37. The groundnut kernels were dibbled behind the country plough and the redgram seeds were dibbled in lines 8 feet apart east to west. In another field groundnut TMV.1 was sown as a mixture with P.216F cotton over an area of 0.50 acre. In both the fields sunnhemp seeds at the reduced rate of 4 lb. per acre were broadcast and covered before sowing groundnut. The object of sowing sunnhemp seeds is to see whether seeds could be obtained without affecting the main crop. The sunnhemp crop came up nicely and has given 80 lb. of sunnhemp seeds per acre.

		Seed rate.	Area.	Acro yield.
		LB.	ACS.	LB.
P. 216 F. cotton	.. ..	6	0.50	5
Redgram culture 37	.. ..	2	0.50	92
TMV. 1 groundnut	.. ..	56	0.50	536
Sunn hemp seeds	.. ..	4	0.50	80

The groundnut crop suffered due to drought in the early stages of the crop and even a thorough weeding could not be given due to want of moisture. This not only affected the yield of the crop but also increased the charges for harvesting the crop. The redgram plants put on much vegetative growth. The yield was below normal.

Groundnut short duration in rice fallows.—During the year under report 13 acres were sown with groundnut in summer in rice fallows. Irrigation was given by lifting water both from permanent well Nos. 1 and 2 and also from temporary wells dug for the purpose. In addition to this electric motor and pumpset already in the station a portable oil engine was got temporarily with hose pipe arrangements for suction to lift water from temporary wells. Long duration variety TMV.1 was grown in an area of 2.21 acres in the early harvested rice fallows while the short duration variety TMV.2 was sown in an area of 15 acres. The paddy fields were ploughed under optimum moisture conditions and a good tilth formed before the groundnut kernels were dibbled. A seed rate of 100 lb. of kernels per acre was used. The crop came up well in the earlier stages but the continuous drought that prevailed later affected the crop very much. The crop was attacked by surul poochi and to a certain extent controlled by dusting gammaxene 810. In spite of deepening of the temporary wells they could not supply enough water for the crop. The following are the details of the yield and areas of groundnut sown in rice fallows :—

		Area	Field total.
		ACS.	LB.
Groundnut TMV 1	.. ..	2.21	1,095
Groundnut TMV 2	.. ..	12.8	3,396

Cotton P. 216 F. was dibbled in lines 6 feet apart as a mixture with groundnut crop TMV. 1 in rice fallows. Under peculiar drought conditions of the year the crop put on a very stunted growth and was almost a failure. Short duration varieties of groundnut TMV. 2 and AH. 4111 were grown in the orchard block in between the fruit plants in the month of August and AH. 4111 alone during December. Each crop was manured with 10 tons of farm-yard manure per acre before sowing. The seeds were dibbled with the help of the hand hoe using a seed rate of 100 lb. of kernels per acre. The crop came up well and gave the following yields :—

		Yield per acre.	
		August. LB.	December. LB.
AH. 4111	.. ..	950	1,650
TMV. 2	.. ..	618	Nil. (Not grown.)

Coconuts.—The total number of coconut trees in the farm were 119 at the beginning of the year. Most of the trees were non-bearing. During the year under report temporary wells were dug and irrigation was effected for the coconut trees during summer. Coconut husks were buried in trenches formed between the trees for manure. The coconut trees began to yield and the total number of coconuts harvested during the year is 250. During the year under report the gaps between coconut trees and also some of the vacant places in the farm were planted with coconut seedlings. Thus during this year 12 coconut seedlings were planted. In addition to the above 10 coconut seedlings of Andaman variety and 4 Jaffna variety seedlings have been planted during the year on the road sides.

Pulses—Redgram culture 37.—This was sown in dry lands as mixture crop with groundnut TMV. 1 in an area of 0.35 acre. The crop came up well in the early stages but due to adverse conditions of weather later there was much of vegetative growth and a low yield of pods.

Redgram short duration variety.—Short duration variety of redgram otherwise called as Tenkasi variety was sown in the paddy field bunds but due to unexpected profuse growth of sesbania and cotton in the field bunds the crop did not come up well and hence it was a failure.

Greengram culture 62.—An area of 0.50 acre was sown with the crop. The crop came up very well until the flowering stage. When the crop was putting forth pods it was suddenly affected by virulent type of leaf spot disease which was identified by the Government Mycologist as "Circospora Species". Before any remedial measures were taken up the whole crop became almost dried. The pods collected were barren in most of the cases and the seeds got became unfit for seed purposes.

Blackgram.—Blackgram dry land local variety was sown in paddy field bunds to see its performance in this tract. The crop came up well and gave an yield of 23 lb. of blackgram seeds.

Fibre crops.—Sunn hemp was sown as a minor crop in dry lands along with groundnut and cotton mixture. The seed rate used was 4 lb. per acre. The crop came up well and gave an yield of 80 lb. of seeds without any adverse effect on the main crop. Sunnhemp was also raised for seed and fibre purposes in dry lands after the harvest of the groundnut, greengram and redgram in an area of 1.50 acres with the help of the rains received at the time of sowing. The crop was quite good and gave an yield of 145 lb. of seeds per acre. The stalks were dried and kept stocked for the extraction of fibres. But for want of facilities for retting they could not be preserved any longer. Hence they were used as manure for paddy crop.

Long duration variety—Sunn hemp.—Fifty pounds of this variety were received from the Agricultural Demonstrator, Kovur, during October 1951. A portion of the seeds was sown in this station to see its performance in November. The seeds germinated well but the crop began to flower even in the fortieth day. No pods were set. The crop was a failure. The seeds were sown in May 1952 in summer again.

Cotton.—A number of selected varieties of cotton were grown in the rice fallows after the harvest of the samba paddy crop to find out the most suitable variety for the tract and also to fix the proper time of sowing the seed. An area of 1.5 acres was under P. 216 F. bulk crop. The experimental area both varietal trials and time of sowing experiments were conducted in an area of 0.75 acre. The yields obtained from the various varieties and in different times of sowing are noted separately. The bulk crop could not give the normal yield on account of the adverse weather conditions and insufficient supply of water. Cotton P. 216 F. was also sown in line 6 feet apart as a mixture with groundnut TMV. 1 in the fallows. Due to lack of sufficient supply of water the crop gave a very poor yield. But where the supply of water was normal the crop has given a very good yield. Thus in the experimental plot under varietal trials, P. 216 F. cotton has given an acre yield of 1,350 lb. Even in the bulk area though with meagre irrigation the crop has given an encouraging yield as detailed below. From the results the following conclusions have been arrived at with regards cotton cultivation in rice fallows in Pattukkottai tract:—

(1) The paddy fields should be ploughed under optimum moisture conditions to produce a good tilth before sowing the cotton seeds.

(2) An application of superphosphate at 100 lb. per acre has been very useful in the yield of the crop.

(3) A spacing of 9 inches in lines between plants and 2½ feet between lines may be better instead of 6 inches and 2 feet respectively.

(4) Flow irrigation or splash irrigation at more frequent intervals than for the groundnut crop will be necessary.

	Area.	Yield per acre.
	ACS.	
Cotton P. 216F.	2.00	464 lb. (The harvest is in progress.)

Cotton sown in field bunds.—Cotton seed P. 216 F. was sown in the first crop field bunds in August and also in September–November. In both the cases the plants came up better than in the fields. The plants raised in August began to produce bolls in November but most of them were insect attacked and the bolls did not burst properly. But the same plants along with the plants raised in November began to yield well burst bolls from May onwards. The quality of the kappas both in colour and length of the staple were far superior to the same obtained from the fields. It was also calculated by noting down the average number of bolls obtained from each plant and also the number of plants on an acre field bunds that 30 lb. of kappas could be collected from the field bunds of an acre of cotton plants.

Subsidiary food crops.—Six selected varieties of sweet potato received from the Paddy Specialist were planted in observation plots. They are V.10, TST. Red China, B. 219 USA., B. 4004 USA., V. 12 TST. White China, B. 196 and V. 1. The creepers were planted in November in ridges and furrows. The crop came up well but the tubers were very badly attacked by weevils in all the varieties and hence the crop was not successful during this year.

Tapioca.—The long duration varieties, namely, butterstick, Heparica, tapierin, Valenca, Bassoria were planted in an area of 0.25 acre in September. The crop as in the case of other crops in the summer season could not receive sufficient irrigation in summer. The yields obtained are as detailed below:—

	Area.	Yield per acre.
	ACS.	
Butterstick	0.08	7,000 lb.

The harvest of other varieties are not yet complete. The short duration varieties eight in number were planted in July and harvested in February. The variety Kayalachadi and Chullikayalachadi were found to be liked most by the consumers because of their quality. There was a very great demand for the setts. The varieties were planted in rice fallows in an area of 0.25 acre to study their performances there. The crop though suffered a great deal due to drought in summer yet the growth is quite normal. The crop is not yet harvested. The yield of the crop in the previous harvest is as follows:—

	Area.	Yield per acre.
	ACS.	LB.
Kamkoil Vellai (936½) ..	0.08	11,706
Sundari Vellai (184) ..	0.015	12,200
Nachikootan (271) ..	0.0125	21,700
Challikayalachadi (810½).	0.05	16,200
Kayalachadi (175) ..	0.0125	14,000
Kalikalan (200)	0.0125	16,000

Green manure crops.—Green manure crops like daincha, sunn hemp and sesbania were raised in rice fallows after the harvest of the groundnut crop in summer, according to the availability of water for irrigation. Sesbania was raised in an area of 1.25 acres, sunn hemp in 2.65 acres and daincha in 2.75 acres. Owing to the failure of rains the crops could not be given any irrigation and hence could not come up so nicely as in the previous year. A high seed rate of 60 lb. per acre have been used to get sufficient green manure. Green manure culture received from the Agricultural Chemist was mixed in each of the different varieties of green manure and the seeds sown treated and untreated separately side by side for observation. In the case of sunn hemp perhaps due to the adverse weather conditions the treated crop gave less yield per acre than the untreated ones as detailed below:—

	Area.	Acro yiled.
Sunn hemp treated with bacterial culture ...	0.25	5,800
Sunn hemp untreated with bacterial culture ..	0.25	6,800

Sesbania seedlings were planted all round the kuruvai paddy field bunds at 4 inches apart for collection of green manure. They were planted 1 to 1½ feet apart around the samba and thaladi fields for the collection of seeds. Since the seedlings planted along the kuruvai field bunds were very young the plants could not obtain the maximum growth before the harvest of the paddy crop and hence could yield only 1,000 lb. per acre of green leaves for thaladi crop. From the sesbania plants planted around the samba and thaladi fields seeds were collected. The plants from the thaladi fields could not grow as much tall as the same in samba fields and they matured earlier. Thus during the year 954 lb. of sesbania seeds were collected from the field bunds.

Vegetables.—During the year vegetables like lab-lab, bendai, bitter-gourd, snakegourd and brinjals were raised entirely for the production of seeds. The crops were applied with 50 tons of farm-yard manure per acre and 400 pounds of superphosphate per acre as a basal dressing. The yields are as detailed below :—

		Quantity of seeds obtained.	
		LB. OZ.	
Bendai	.. ..	13	0
Snakegourd	.. ..	79	3
Lab-lab	.. ..	1	7
Brinjals	.. ..	2	5
Bittergourd	.. ..	4	8

Sattur chillies.—Chilly pods were received from the District Agricultural Officer, Sattur and seedlings were raised in August and planted in October in an area of 0.08 acre. The crop came up quite well but because of the low level of the field and nearness to the wet field the plants became pale. It gave an acre yield of 454 lb. of dry pods per acre. As a commercial crop Sattur chillies is found to be quite successful in the tract. The quality of the pods was quite good.

Bellary onions.—Two pounds of Bellary onion seeds were received from Bellary in two seasons and sown in nurseries. The crop was planted in an area of 0.25 acre in the first season and 0.10 acre in the second season in September and February respectively. The crop came up quite well in the first season but was attacked by blight in the second season. Due to the sudden fall of prices in the market, marketing of the produce was found to be difficult. Anyway as a commercial crop it is quite successful for the tract. The bulbs obtained were of very good size and suitable to the market during the first season. The yields obtained are as below :—

		Area.	Total yield.
		ACS.	LB.
Bellary onions	..	0.25	850 (first season).
Bellary onions	..	0.10	148 (second season).

Pests and diseases.—(i) The paddy crop was attacked during the ear head stage both in samba and thaladi by a bug a minor pest of paddy in a number of fields. As per suggestions of the Plant Protection Assistant dusting of gammaxene 405 was done in a small area.

(ii) The samba paddy crop was found to be attacked by mealy bug in a number of fields. Hexidol 950 was sprayed, the affected plants pulled out and planted by fresh seedlings. The effect noticed was very little.

(iii) The thaladi paddy crop especially late planted one was found to be attacked by stem borer. Even before planting the roots of seedlings were dipped in guesorol 950. Light traps were set up and moths were caught in large numbers. The citrus plants in the orchard were dusted with sulphur dust against the attack of mites on leaves. Nepali lemon plants which were attacked by cork disease by which the fruits turned brown in colour was sprayed with Bordeaux mixture. To control against the rats in paddy fields rat bow traps were set up in large numbers and rats were caught daily. The rats were all applied to the fruit plants in the orchard as manure. As a manure rats have very good effect in the growth of citrus plants.

Attempts made to step up the income of not only the area reserved for bulk cropping but also the farm as a whole during the year 1951-52.

Summer cultivation was done in rice fallows to the maximum during the year 1951-52. After the harvest of the paddy crop an area of 15 acres was sown with groundnut, 2 acres under cotton, 0.25 acre under summer pumpkin and 0.25 acre under tapioca. Arrangements were made for irrigating the above crops by sinking temporary wells and pumping out water from these wells by means of portable oil engine and pumpset with hose pipe arrangements for suction.

The existing coconut trees which were almost barren all these years were irrigated in summer with the help of the temporary wells sunk for the purpose. The trees were manured by burying coconut husks in trenches dug between the trees. The trees began to bear during the year. Twenty-five fresh coconut seedlings were planted during the year.

The area under kuruvai was increased from 7.7 acres during 1950-51 to 9.76 acres during 1951-52. The area has been increased to 15 acres during 1952-53. The area under samba has also been increased by an acre during 1951-52.

To make the best use of the plenty of green fodder and other fodders available in the farm two Sindhi cows have been added to the livestock of the farm to increase the receipt of the farm by the sale of milk. With the help of the temporary wells sunk the fruit plants have been well maintained and not only fruits but also rooted cuttings and seedlings have been raised in large numbers for sale to the public.

Commercial crops like Bellary onion and Sattur chillies have been raised in garden lands and the revenue of the farm has been increased during the year 1951-52. During the year 1952-53 the area under orchard has been increased by 0.35 acre.

Broad outlines of the annual programme of work for 1952-53 and the results achieved in the Agricultural Research Station, Pattukkottai, for the year 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 of 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 Arantangi varieties of paddy were raised in trial plots in which culture 308, 424 and 936 have given the maximum yield as against kattai vellai, kodai vellai and kaivari samba standard respectively kept as control.

The experiments are programmed to be continued during the year 1952-53.

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 data of the results has been sent to the Paddy Specialist for statistical analysis. The experiment has been discontinued during 1952-53 as per instructions of the Chief Engineer.

Groundnut.—Groundnut TMV. 1 was sown in dry lands as a mixture with groundnut and redgram in separate fields. A small quantity of sunn-hemp seeds at the rate of 4 lb. per acre was also sown in each field as a minor mixture and this has given 80 lb. of sunnhemp seeds per acre without affecting main crop. Sunnhemp has also been sown as second crop in dry lands after the harvest of the groundnut with the help of the rains received and a successful crop of the same for seed was harvested during the year. The same has been programmed to be continued during the year 1952-53 also.

Greengram culture 62.—Greengram culture 62 was raised as a dry land crop over an area of 0.50 acre. The crop came up well in early stages but failed due to the sudden attack of leaf spot disease. During 1952-53 it is proposed to repeat the trials.

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, 2 acres under 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 though it would have been better under better irrigation. In the case of pumpkin and tapioca they were quite promising but for the severe drought which affected the yield of the crops. Temporary wells were dug and irrigation was given to the above crops with the help of the portable oil engine during the year 1951-52. During 1952-53 the trials will be conducted in larger areas with better facilities for irrigation.

Ragi.—Ragi Co.2 was raised as mixture with groundnut and cotton in summer. The performance of the crop was quite encouraging though the yield was below normal due to insufficient supply of water. During 1952-53 it is proposed to continue the trial. In addition to the above varieties like Co. 2, Co. 3 and AKP. 1 have been proposed to be compared in garden lands as to their suitability to the tract.

Vegetables.—Snake gourd, bendai, bitter gourd, brinjals and lab-lab were raised only for the production of seeds and the same collected during the year have been sold to the public. During 1952-53 also the same vegetable crops will be continued to be grown.

Fruits.—An orchard has been enclosed and seedlings of jack, lemons, lime and citron have been raised and potted in large numbers for sale to the ryots, during the year 1951-52. The orchard area has been extended and greater number of seedlings have been 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 have been raised for the supply of green manure for the paddy crop. Daincha and sunnhemp have also been raised for the 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. The above trials have been programmed to be continued during the year 1952-53.

TANJORE,
14th September 1952.

K. VARADACHARI,
Deputy Director of Agriculture.

Financial statement exhibiting the Expenditure and Receipts of the areas of bulk crops grown in the Agricultural Research Station, Pattukkottai, for the year 1951-52 as per the reference No. X-3-825/51, dated 22nd June 1951, of the Director of Agriculture, Madras.

Serial Number.	Name of crop.	Area in acres.	Expenditure	Receipts.			Profit or loss						
			cost of cultivation.				(+) or (-)						
			RS.	A.	P.	RS.	A.	P.					
1	Paddy—												
	Kuruvai—Bulk—Adt. 20.	3,	9.76	1,444	15	0	3,350	7	0	+	1,905	8	0
	Samba		15.61	1,020	4	0							
	Thaladi		9.76	1,123	9	0	7,680	8	0	+	4,934	11	0
2	Groundnut mixed with cotton, TMV 2, TMV 1.	14.60	1,427	3	0	1,184	0	0	—	243	3	0	
3	Vegetable seeds	0.50	220	15	0	633	8	0	+	412	9	0	
4	Tapioca	0.25	30	14	0	79	0	0	+	48	2	0	
5	Ragi, cotton and groundnut.	0.25	70	3	0	42	4	0	—	27	15	0	
6	Chillies	0.08	28	2	0	19	2	0	—	9	0	0	
7	Cotton P 216 F	2.00	296	0	0	232	0	0	—	64	0	0	
8	Cumbu	0.50	51	4	0	57	0	0	+	5	12	0	
9	Groundnut, redgram, cotton and sunhemp in dry lands.	0.80	51	14	0	46	0	0	—	5	14	0	
10	Bellary onions	0.25	87	8	0	99	13	0	+	12	5	0	
11	Orchard area	0.80	514	4	6	640	0	0	+	125	11	0	

STATEMENT No. 1.—Statement showing the rainfall data for 1951-52 at the Agricultural Research Station, Pattukkottai.

Month.	Week.	1951-52.		1950-51.		Average normal rain fall (10 years).	
		Rainfall in inches.	Number of days.	Rainfall in inches.	Number of days.	Rainfall in inches.	Number of days.
		South-west monsoon.					
July	1-4	..	..	..	..	0.161	0.60
	5-11	1.57	2	1.47	3	0.960	1.50
	12-18	3.01	2	..	..	0.328	1.10
	19-25	0.02	..	0.11	1	0.666	1.50
	26-1	0.18	2	1.14	2	1.290	1.80
August	2-8	..	..	0.07	..	0.616	1.40
	9-15	0.80	3	0.17	1	0.475	0.90
	16-22	0.23	1	4.15	3	0.974	1.50
	23-29	0.15	1	1.35	2	1.354	1.80
	30-5	0.08	..	1.17	2	0.812	1.30
September	6-12	0.79	2	0.03	..	0.588	1.30
	13-19	0.91	1	..	..	1.990	.60
	20-26	0.37	1	0.79	2	1.190	1.60
Total		8.11	15	10.45	16	11.404	17.90

STATEMENT No. 6 (a).—Agricultural Research Station, Pattukkottai—1951-52—Samba varietal trials
(Short duration—First year).

Field No.—1 and 2:	Size of plot— $\frac{1}{2}$ cent.	ADT. 8.	ADT. 21.	ADT. 22.	Co. 2.	ASD. 5.	General mean.	'F' value satisfied or not.	Critical difference.
Date of sowing—31st July 1951.	Treatments—5.	3,475	2,377	3,250	2,998	3,323	3,084	Satisfied.	231.3
Date of planting—5th September 1951.	Replication—8 and randomized.	112.7	77.0	105.4	97.2	107.8	100.0	..	7.5
Date of harvest—3rd January 1952.		ADT. 8.	ASD. 5.	ADT. 22.	Co. 2.	ADT. 21.			
Treatments—ADT. 8, ADT. 21, ADT. 22, Co. 2 and ASD. 5.									

Summary of results.

Acre yield in pounds	3,475	2,377	3,250	2,998	3,323	3,084	79.6	Satisfied.	231.3
Percentage on general mean ..	112.7	77.0	105.4	97.2	107.8	100.0	2.58	..	7.5
Conclusion on general mean ..	ADT. 8.	ASD. 5.	ADT. 22.	Co. 2.	ADT. 21.				

STATEMENT No. 6 (b).—Agricultural Research Station, Pattukkottai—1951-52—Samba varietal trials
(Long duration—First year).

Field No.—K. 3.	Size of plot— $\frac{1}{2}$ cent.	ADT. 1.	Co. 3.	Co. 16.	Co. 25.	PTB. 15.	General mean.	'F' value satisfied or not.	Critical difference.
Date of sowing—31st July 1951.	Treatments—5.	2,998	1,475	3,275	3,475	3,000	2,845	Satisfied.	512.1
Date of planting—3rd September 1951.	Replication—8 and randomized.	105.4	51.8	115.1	122.1	105.4	100.0	6.2	18.0
Date of harvest—31st December 1951 and 2nd February 1952.		Co. 25.	Co. 16.	ADT. 1.	PTB. 15.	Co. 3.			
Treatments—ADT. 1, Co. 3, Co. 16, Co. 25 and PTB. 15.									

Summary of results.

Acre yield in pounds	2,998	1,475	3,275	3,475	3,000	2,845	176.4	Satisfied.	512.1
Percentage on general mean ..	105.4	51.8	115.1	122.1	105.4	100.0	6.2	..	18.0
Conclusion on general mean ..	Co. 25.	Co. 16.	ADT. 1.	PTB. 15.	Co. 3.				

(a) Summary of results for Irrigation Experiment—Samba Co. 19—Agricultural Research Station, Pattukkottai—1951-52—(a) Time of sowing.

Particulars.	Time of sowing.			General mean.	Standard error.	'F' value satisfied or not.	Critical difference.
	(I)	(II)	(III)				
Acre yield in pounds	885	1,524	2,045	1,485	..	yes.	..
Percentage on general mean.	59.0	102.6	137.7	100.0	7.311	..	25.30

(b) Conclusion on general mean—Third sowing, second sowing, first sowing—(b) Quantity of water.

Particulars.	Quantity of water.				General mean.	Standard error.	'F' value satisfied or not.	Critical difference.
	(a)	(b)	(c)	(d)				
Acre yield in pounds	1,576	1,477	1,344	1,541	1,485	..	No.	..
Percentage on general mean	108.1	99.5	90.5	103.8	100.0	8.546	..	24.80

(c) Time of sowing and quantity of water.

Particulars.	First sowing.				Second sowing.				Third sowing.				'F' value satisfied or not.	Critical difference.
	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)		
Acre yield in pounds 994	888	622	1,048	1,795	1,535	1,290	1,476	1,940	2,029	2,111	2,100	1,485	..	No.
Percent on general mean.	67.0	58.8	42.6	70.6	130.9	103.4	86.9	99.4	130.6	142.2	141.4	100.0	14.81	..
Percent on general mean.	67.0	58.8	42.6	70.6	130.9	103.4	86.9	99.4	130.6	142.2	141.4	100.0	14.81	..

(a) Summary of results for Irrigation Experiment—Kuruvai ADT. 3—Agricultural Research Station, Pattukkottai—
(a) Time of sowing.

Particulars.	Time of sowing.			General mean.	Standard error.	F' value satisfied or not.	Critical difference.
	(I)	(II)	(III)				
Acre yield in pounds.	1,687	2,031	1,756	1,825	No.	..	..
Percentage on general mean.	92.4	111.3	96.2	100.0	6.642	..	22.99

(b) Quantity of water.

Particulars.	Quantity of water.				General mean.	Standard error.	F' value satisfied or not.	Critical difference.
	(a)	(b)	(c)	(d)				
Acre yield in pounds	1,869	1,855	1,758	1,818	1,825	..	No.	..
Percentage on general mean.	102.4	101.6	96.3	99.6	100.0	3.293	..	9.554

(c) Time of sowing and quantity of water.

Particulars.	First sowing.				Second sowing.				Third sowing.				F' value General Standard error.	Critical difference.
	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)		
Acre yields in pounn	1,812	1,745	1,443	1,750	2,058	2,010	2,092	1,964	1,739	1,809	1,737	1,739	1,825	No. ..
Percentage on 99.3	95.6	79.1	95.9	112.8	110.1	114.1	107.6	95.3	99.1	95.2	95.3	100.0	5.704	16.55
general mean.														

Agricultural Research Station, Pattukkottai—1951-52—Trials with Arantangi
varieties of paddy (samba season)—First year.

Field No.—H. 16.

Date of sowing—26th July 1951.

Date of planting—4th September 1951.

Date of harvest—5th February 1952.

Treatments—398, 413, 418, 424, 454, 470, Kattai vellai standard; 655, 701, 718, 757, 762, 790, kodai vellai standard; 898, 936, 948, 977, 1057, 1130 and kaivari samba standard.

Summary of results

	(1)				(2)				(3)				F' value satisfied or not.	Critical difference.
	Kattai vellai standard.	Kattai vellai standard.	Kattai vellai standard.	Kattai vellai standard.	Kodai vellai standard.	Kodai vellai standard.	Kodai vellai standard.	Kodai vellai standard.	Kaivari samba standard.	Kaivari samba standard.	Kaivari samba standard.	Kaivari samba standard.		
Acre yield in pounds	398.	413.	418.	424.	454.	470.	470.	470.	1130.	1057.	1057.	1057.	No.	..
Percentage on control	..	..	..	..	..	..	..	..	..	..	..	..	No.	..
Acre yield in pounds	3,188	2,994	2,875	3,325	2,000	2,688	2,688	2,688	3,000	2,969	2,969	2,969	No.	..
Percentage on control	113.8	107.0	102.7	118.8	71.4	96.0	96.0	96.0	107.1	106.0	106.0	106.0	No.	..
Acre yield in pounds	655.	701.	718.	757.	762.	790.	790.	790.	1130.	1057.	1057.	1057.	No.	..
Percentage on control	..	..	..	..	..	..	..	..	..	..	..	..	No.	..
Acre yield in pounds	2,525	2,900	2,800	2,575	2,969	3,000	3,000	3,000	3,000	2,969	2,969	2,969	No.	..
Percentage on control	90.2	103.6	100.0	92.0	106.0	107.1	107.1	107.1	107.1	106.0	106.0	106.0	No.	..
Acre yield in pounds	898.	936.	948.	977.	1057.	1057.	1057.	1057.	1130.	1057.	1057.	1057.	No.	..
Percentage on control	..	..	..	..	..	..	..	..	..	..	..	..	No.	..
Acre yield in pounds	1,400	2,019	1,725	1,550	1,575	1,900	1,900	1,900	1,950	1,900	1,900	1,900	No.	..
Percentage on control	71.8	103.5	88.5	79.5	80.8	97.4	97.4	97.4	100.0	20.60	20.60	20.60	No.	..

ADMINISTRATION REPORT OF THE DEPUTY DIRECTOR OF AGRICULTURE, MADURAI, VII DIVISION, FOR THE YEAR 1951-52.

I. Charge and staff.—The Madurai division is made up of the districts of Madurai, Ramanathapuram and Tirunelveli, and is under the administrative control of a Regional Deputy Director of Agriculture at Madurai. Each district is under the direct control of a District Agricultural Officer with headquarters at Madurai, Sathur and Tirunelveli. There are two Agricultural Research Stations, one at Koilpatti and another at Ambasamudram under the charge of a Superintendent and Senior Science Assistant respectively.

The Crop-sampling experiments were attended to by a Special District Agricultural Officer (Crop Sampling), with headquarters at Madurai and having jurisdiction throughout the Madurai division. The Special District Agricultural Officer (Crop Sampling) is under the direct control of the Deputy Director of Agriculture (Crop Sampling), Madras.

One Assistant Agricultural Engineer, with headquarters at Madurai and having jurisdiction throughout the Madurai division was looking after effectively the mechanical cultivation schemes. As an experimental measure, in the Madurai district, the mechanical cultivation schemes looked after by the District Agricultural Officer, Madurai has been handed over to the Assistant Agricultural Engineer, during the year under report.

The Sugarcane development work was attended to by a special Agricultural Demonstrator at Nilakottai with jurisdiction throughout that taluk. He is under the control of the Superintendent, Liaison Farm, Nellikuppam. A Sugarcane Inspector with headquarters at Madurai, functioned from 11th December 1950 to 31st October 1951 and 7th December 1951 to 30th June 1952. He looked after the interest of cane growers supplying cane to the sugar factory at Pandiarajapuram and undertook periodical inspection of the sugar factory.

Additional District Agricultural Officers were posted at Madurai and Tirunelveli for the sanctioning of loans for the purchase of fertilizers for paddy under the Intensive Manuring Scheme. They joined duty on 11th June 1951 and 2nd July 1952, respectively.

Seed Development Assistants, one for paddy, and another for millets worked in each of the districts of Tirunelveli and Madurai with headquarters at Tirunelveli, Koilpatti, Madurai and Nilakottai, respectively. They were under the control of Seed Development Officers, Tanjore, for paddy and millets at Coimbatore.

Additional Agricultural Demonstrators were posted to four taluks of Madurai and Tirunelveli districts and three taluks of Ramanathapuram district where scope for work was great to assist the regular Agricultural Demonstrators. Two Plant Protection Assistants for each of the three districts were attending to the effective control of pests and diseases.

The period of charge of the several officers working in this division are as follows:—

Name of office.	Name of officer.	Period of charge.	
		From	To
1 Regional Deputy Director of Agriculture.	Janab A Muhammad Ali.	1st July 1951.	30th June 1952.
2 District Agricultural Officer, Madurai.	Sri N. Krishna Pillai.	1st July 1951.	30th June 1952.
3 District Agricultural Officer, Ramanathapuram at Sattur.	Sri N. S. Ragagopala Iyer.	1st July 1951.	30th June 1952.
4 District Agricultural Officer, Tirunelveli.	Sri A. K. Ramasubbu Iyer.	1st July 1951.	30th June 1952.
5 Sugarcane Inspector, Madurai.	Sri S. Muthuswamy Iyer.	1st July 1951.	31st October 1951.
		7th December 1951.	30th June 1952.
6 Additional District Agricultural Officer, Madurai.	Sri T. N. Balasubramania Iyer.	1st July 1951.	30th November 1951.
		11th June 1952.	30th June 1952.
7 Additional District Agricultural Officer, Tirunelveli.	Sri N. V. Kalyansundaram Iyer.	1st July 1951.	30th November 1951.
8 Superintendent, Agricultural Research Station, Koilpatti	Sri B. W. X. Ponnaya.	1st July 1951.	30th June 1952.
9 Assistant (in charge) of the Rice Research Station, Ambasamudram.	Sri R. H. Krishnan.	1st July 1951.	30th June 1952.

II. Grow More Food Campaign.—A sustained and intensive effort was put forth in this division to increase food production by implementing the various grow more food schemes sanctioned by the Government. The efforts have yielded some promising results. In addition, the handing over to co-operative societies and tender firms, of the distribution of chemical fertilizers, iron and steel, and paddy seed distribution to co-operative societies has relieved the district staff of some responsibility and enabled them to concentrate more on the various grow more food schemes, with the result that better work has been turned out as compared with last year.

The following Grow More Food Schemes were under operation during the year under report in the Madurai Division:—

Scheme No. 1—Installing of Oil Engine Pumpsets (vide Appendix 1).—Ninety oil engines and pumpsets were installed as against 72 during the last year and the targetted number of 133. These 90 engines have been benefited 834 acres giving an increased food production of 370 tons. The non-reaching of the target is purely due to limited availability of oil engines.

Scheme No. 1—Installing of oil engine pumpsets (vide Appendix 1).—Nine hundred and seventy-two electric motor pumpsets were fitted up as against 563 during last year and the targetted number of 1,408. These have irrigated 5,200 acres increasing food production by 3,033 tons.

The demand for electric pumpsets is very heavy and the supply is being restricted by the availability or otherwise of electrical energy. As such the target could not be attained.

Scheme No. 3—Central Agricultural Engineering Stores (oil engines and electric motors) (vide Appendix 3).—Through this agency 97 sets have been distributed as against 447 during the last year and a target of 481. These have irrigated 640 acres giving an additional food production of 356 tons. Though demand for electric motors is heavy, the want of electric energy in the interior village has prevented large scale distribution and reaching the target fixed.

Scheme No. 4—Tractor cultivation (vide Appendix 4).—Out of an allotment of 28 tractors only 24 have been supplied and all of them have been put to work. These tractors have ploughed an area of 11,834 acres as against 7,601 acres during last year giving an increased food production of 6,640 tons. It is felt that a ready supply of spares would result in a better outturn of work. The demand for the tractor is on the increase.

Scheme No. 5—Soil conservation and contour-bunding (vide Appendix 5).—The importance of conserving the top layer of soil rich in plant food was one of the items of regular propaganda and the ryots have slowly but surely begun to realise its importance. With the available equipment, 333 acres were terraced, 1,415 acres were levelled and contour bunds put up in 1,416 acres as against 296, 920 and 588 acres, respectively during the last year.

Scheme No. 6—Rural compost making (vide Appendix 6).—Twenty-five thousand six hundred and ninety-nine tons of compost was prepared in 1,712 holdings as against 19,300 tons in 1,272 holdings during 1950-51 and the targeted quantity of 12,494 tons. Out of the quantity prepared 21,195 tons were used in 3,365 acres which are expected to have secured an additional food production of 415 tons.

The granting of subsidy at Re. 1 per ton of compost prepared was in operation this year also and Rs. 10,890 was disbursed as subsidy. This had made the preparation of compost very popular. To give wider publicity and to make the ryots more compost minded, compost week was celebrated when public meetings were held. The preparation of compost was actually demonstrated and its uses and advantages were explained. Instruction classes for Revenue officials were also held to equip the Revenue officials with necessary information for carrying out this item of work independently in villages.

Prizes in the shape of agricultural implements, seeds or books were awarded to ryots who had prepared the largest quantity of compost in the taluk. The following are the details of compost prepared by prize-winners in each district :—

District.	Number of villages to which prizes were awarded.	Quantity of compost prepared in tons.
Madurai	Nil	Nil.
Ramanathapuram	Eight	14 to 110 tons.
Tirunelveli	Eight	21 to 53 tons.

Urban compost.—Municipalities and panchayats were induced to compost their street sweepings and rubbish using nightsoil as starter. Departmental help was rendered in selecting suitable sites, demonstrating the preparation of compost and giving training to the staff.

The details of compost prepared by municipalities and panchayats of this division are as follows :—

District.	Number of villages to which prizes were awarded.	Quantity prepared in tons.
Madurai	30	248,503
Ramanathapuram	9	9,194
Tirunelveli	22	9,681

The District Agricultural Officers regularly attended the meeting convened by the Collector of each district for fixing the price at which compost is to be sold and assisted him in fixing a fair and reasonable price for the compost prepared by the local bodies. The demand for compost was generally heavy. The ryots have realized the value of compost to such an extent that they are found standing in queue and taking their turn. In most of the places the demands of the ryots are not met in full. Hence there is scope for increasing production of this useful manure.

Scheme No. 7—Control of pests and diseases (vide Appendix 7, and statements 31 (a), 31 (b) and 32).—Two Plant Protection Assistants, one for Mycology and another for Entomology worked in each of the three districts. They are under the technical control of the Plant Protection Officers, Mycology and Entomology, Coimbatore and under the administrative control of the respective District Agricultural Officers.

There was no major outbreak of pests or diseases in this division during the year. However, the following were the pests and diseases noted and against which effective remedial measures were taken :—

Crops.	Some of the important pests and diseases tackled.
Paddy	Jassids, Stem borer, Piricularia, Rice bug, Mealy bug, Rice case worm and Field rats.
Cholam	Flea beetle, Stem borer, Mites, Smut, Earhead bug and Surface grasshoppers.
Cumbu	Flea beetle and Earhead bug.
Chillies	Thrips, Fruit rot, Scales, Mealy bugs and Mites.
Brinjal	Epilachna, Aphis, Fruit borer, Lace wing bug, Shoot borer, Bud worms, Mealy bugs and Mites.
Bendai	Borer and Jassids.
Onions	Thrips and cut worm.
Groundnuts	Red Hairy cater pillar, surul poochi and wilt.
Citrus	Leaf miner, Lemon Butterfly, cankar, foliocollosis, Die back and frencing.
Mangoes	Mango hopper, gall flies, leaf drying and Mildew.
Grapes	Flea beetle, Mildew and Die back.
Coconuts	Rhinoceros beetle and field rats.
Stores	Rats.

The following is the work done as compared with last year :—

	1950-51.		1951-52.	
	Pests.	Diseases.	Pests.	Diseases.
Area treated in acres	30,659	45,318	23,784	77,868
Plants treated in numbers	30,102	28,632	7,455	25,773
Seeds treated in tons	..	139	..	29
Number of stores treated against store pests.	2,590	..	..	..
Quantity of fungicides and insecticides sold.	80 tons	..	155 tons	..

The above figures include an area of 94,711 acres of food crops successfully treated against insect pests and diseases. The efficiency of the treatment is such that ryots are flocking to the depots for insecticides and fungicides. The limiting factor seems to be want of personnel to attend to plant protection work and an increase in the plant protection staff is sure to go a long way in minimizing loss of food grains by the attack of pests and diseases.

Scheme No. 8—Distribution of phosphatic manures including bonemeal (vide Appendix 8).—To make up the deficiency of phosphoric acid in the Indian soils and to enable the ryots to take it up easily and become phosphatic minded, the subsidized scheme of distribution of phosphatic manures at half price was continued during this year also. The response from the ryots was rather slow and disappointing. However propaganda is being carried on and it is hoped that they will soon realize the important part played by phosphatic manures in putting up the grain yields.

During the year under report, 1,028 tons of phosphatic manures were distributed as against 1,293 tons during the previous year and the targetted quantity of 2,136 tons. The quantity distributed has been applied to 14,658 acres and this is expected to have increased food production by 844 tons.

Scheme No. 9—Distribution of ammonium sulphate (vide Appendix 9).—A total quantity of 11,464 tons has been distributed as against 5,981 tons during 1950-51 as against a targetted quantity of 13,464 tons. The ammonium sulphate distributed has covered an area of 257,799 acres and has stepped up food production by 21,530 tons.

Scheme No. 10—Intensive multiplication and distribution of paddy seeds (vide Appendix 10).—Four thousand three hundred and ninety-one acres of paddy seed farms were run as against 4,004 acres during 1950-51. One thousand eight hundred and sixty-eight tons of paddy seeds were purchased as against 1,181 tons during the previous year and the targetted quantity of 1,620 tons.

A total quantity of 1,218 tons of paddy seeds were distributed as against the 645 tons of paddy seeds distributed during the previous year. The departmentally-distributed paddy seeds covered an area of 63,422 acres and increased the food production by 4,391 tons.

Paddy crop yield competition.—It is an accepted fact that improved varieties do give a higher yield than the local, yet the rapidity of the spread of the improved strains does not keep pace with the target as extreme difficulty is experienced in procuring seeds at the rates fixed by the Government. This difference between the price offered and the free market price at one stage went up to Rs. 20 per bag of 160 lbs. This rendered the task of the procurement staff very difficult and the quantity procured tested and tried the perseverance and tact of the staff to the utmost extent.

Paddy crop yield competition.—With the idea of making the ryots take adequate steps in stepping up their paddy yields, the paddy crop yield competition inaugurated during 1950-51 was continued this year also. The number of entries received was quite satisfactory and the ryots were also found to evince keen interest in all the taluks of the districts. The number of entries received and the highest yield recorded in each district are detailed below :—

District.	Number of entries received.	Yield per acre in pounds.	Name of the ryot who got the highest yield.
Madurai	379	8,420	R. S. Tirupathi Gounder, Ammapatty, Uttamapalayam.
Ramanathapuram	1,324	8,805	Sri Duraiswamy Thevar, Enjaar, Sattur taluk.
Tirunelveli	1,572	8,560	Sri Ramaswamy Pillai, Palavoor, Tirunelveli taluk.

The following are the details of the prizes awarded to the ryots who recorded the highest acre yields :—

Taluk prize—Rs. 50 worth of agricultural implements.

District prize—Rs. 100 in cash.

Regional prize—Rs. 200 in cash and a medal worth Rs. 50.

Scheme No. 11—Green manures [vide Appendix 11 and statement 26 (c)].—Seventy-nine tons of green manure seeds were purchased as against 16 tons during 1950-51 and the targeted quantity of 349 tons. Sixty-seven tons of green manure seeds to cover 71,742 acres were distributed as against 50 tons to cover an area of 5,776 acres during 1950-51.

Procurement of green manure though by far better this year than that of the previous year, has fallen very short of the targeted quantity. As good summer showers were received during April-June 1951 the majority of the ryots ploughed in their green manure crop without waiting to collect seeds as they were anxious to plant their first crop as early as possible. Thus in years like the one under report when monsoon fails or sets in early it is found very difficult to procure the targeted quantity of green manure seeds.

Scheme No. 12—Multiplication and distribution of improved millet seeds.—The following statement details the work done in the multiplication and distribution of improved varieties of millet seeds :—

	Cholam.	Cumbu.	Ragi.
1 Area of seed farms in acres	949	1,177	630
2 Quantity of seeds purchased in tons	5-240	14-150	11-1730
3 Quantity of seeds distributed in tons	10-2050	6-1140	3-849
4 Area covered by (3) in acres	1,037	2,451	1,245
5 Additional production in tons	40-61	74-80	25-484
6 Area under natural spread in acres	11,292	21,734	8,071
7 Total area under strains in acres	13,829	23,985	9,316

Though a fairly large area under seed farms was arranged the difficulty in procurement as explained under paddy was felt in the procurement of this seed also.

III. Other items of work—(1) *Short-term food crops (vide Appendix 13 and statements 4, 5 and 6).*—Much attention was paid in bringing more area under short-term food crops like paddy, cholam, and ragi, diverting area from non-food crops to food crops and increasing the area under food crops like sweet potato and tapioca.

The following are the details of work done :—

	Madurai.	Ramanatha- puram.	Tirunelveli.	Total.
Seed material of short term food crops distributed free (acres)—				
Sweet potatoes	100	..	18	118
Tapioca	10	..	13	23
Additional production in tons	513	..	122	635
Area under non-food crops diverted to food crops.	710	1,110	3,500	5,320
Additional area brought under short-term food crops.	1,091	3,785	2,655	6,931
Additional area brought under (in acres.)—				
Sweet potato	374	{ 390	551	} 1,320
Tapioca	..	{ 5	..	

(2) *Takkavi loans [vide Appendix 13 (II)].*—As in 1950-51 in 1951-52 also two Additional District Agricultural Officers were posted one at Madurai, and the second at Tirunelveli with additional Agricultural Demonstrators and

Demonstration Maistries for the sanctioning of loans for the purchase of chemical manures for the paddy crops. The scheme was run from July to November. Loans for the purchase of seeds and manures and implements were also as usual, sanctioned by the District Agricultural Officers. The following are the details of work done :—

	Number of loan applications sanctioned	Amount distributed. RS.
Intensive Manuring Scheme for purchase of fertilizers.	11,415	8,75,550
For purchase of seeds and manures	3,289	2,98,410
For purchase of implements	148	5,250

Unlike last year the Intensive Manuring Scheme was started this year in time. An additional two lakhs worth of manures would have been distributed if like last year this year also the scheme was run up to the end of December, and not closed down by the end of November. The experience gained in running the Intensive Manuring Scheme for the past two seasons shows that the ryots consider this scheme a real boon to them and it has also as anticipated helped considerably in stepping up food production.

(3) *Extension work on green leaf manuring* [vide Appendix 13-III and statements 25 (a), (b) and (c)].—Intensive propaganda was done to impress upon the ryots the importance of green leaf manuring their fields. How large quantities of green leaves can be obtained at a nominal cost by growing sesbania speciosa and glyricidia maculata on and along field bunds, neglected corners and spaces and as mixed crop, was demonstrated to them in every village. This practice has caught the imagination of the ryots and promises to develop into an established practice in due course. 12,895 lb. and 67,197 numbers of seeds and stones were collected and distributed as against 6,479 lb. during the previous year. 7,839,626 cuttings and seedlings were planted as against 335,062 during 1950-51. 837 nurseries occupying an area of 7.90 acres were raised as against 226 nurseries in 0.97 acre during the previous year.

To stress the importance of increasing the tree population "Vana-mahotsavam" was celebrated this year also throughout the division. All the departments and the public took part in the celebration. Seedlings and cuttings of various types and kinds of plants were distributed and planted in ryots' holdings, public places, etc. The improvements effected in this line are given in Appendix 13-III. It is gratifying to record that with the co-operation of the public very good work as compared with last year has been turned out this year in this line of important work.

(4) An estimate of the increased production of foodgrains due to departmental activities is given in Appendix 14.

IV. *Agricultural education*.—Agriculture as a subject has been included in the high school syllabus and is being taught in the High Schools at Pasumalai, Usilampatti, Rajapalayam and Koilpatti. To encourage pupils to take to this education, candidates with Agricultural education seeking employment in Agricultural Department were preferred.

Intensive propaganda was done to enlist subscribers for Mezichelvam so that by reading the articles published the ryot may come to know of the latest developments in Agriculture. The following are the number of subscribers enrolled :—

Madurai—4,882
Ramanathapuram—7,489.
Tirunelveli—3,360.

Model farms.—Model farms were selected for all the taluks of the three districts and work in earnest was started. All the agricultural improvements advocated by the Agricultural Department were shown in the model farms. As orders from the Government were received to terminate the scheme, the maintenance of subsidized model farms was discontinued. However, they continued to carry out the improvements already adopted.

V. Season—

				Rainfall record.		
				Average for a series of years ending with 1940 in inches.	Rainfall received during 1951-52 in inches.	Difference, plus or minus in inches.
<i>Madurai district.</i>						
South-west monsoon	..	..	..	8.90	9.42	+ 0.52
North-east monsoon	..	..	..	16.70	11.46	— 5.24
Hot weather	..	..	..	6.70	5.89	— 0.81
Total	..	..	..	32.30	26.77	— 5.53
<i>Ramanathapuram district</i>						
Total	..	..	..	32.30	27.17	— 5.13
<i>Tirunelveli district.</i>						
South-west monsoon	..	..	..	3.40	4.88	+ 1.48
North-east monsoon	..	..	..	20.80	16.34	— 4.46
Hot weather	..	..	..	6.20	6.13	— 0.07
Total	..	..	..	30.40	27.35	— 3.05

Madurai district.—There was a total rainfall of 26.77 inches as against 34.38 inches during 1950-51 and an average of 32.30 inches.

The south-west monsoon was slightly above average. It was fairly active at the beginning, weakened at the middle and strengthened again during the closing period. Water in the Periyar channel was let in as usual and there was adequate supply throughout the year.

The north-east monsoon started late and was weak during the middle period and was a partial failure. The main crop paddy and the dry-land crops suffered from drought and the yields were 25 per cent below normal.

The hot weather rains though near enough to normal were so badly distributed and localized that they were of no use for agricultural operations and the summer crops suffered severely and their yields were reduced by fifty per cent.

In general, the season was fair for areas of assured water-supply and was a failure for the tank-fed and rainfed areas.

Ramanathapuram district.—During the year under report a total rainfall of 27.17 inches was received as against 27.49 inches during 1950-51, and an average of 32.30 inches. Though the amount of rainfall was less than normal, the distribution was satisfactory and helped in taking up the agricultural operations almost on time and also benefited the crop grown in the period.

Rains received during the south-west monsoon, however were moderate. The north-east monsoon was fair. The summer rains were poor, insufficient and disappointing.

In general the season was 25 per cent below normal.

Tirunelveli district.—There was a total rainfall of 27.35 inches as against 28.58 inches during 1950-51 and an average of 30.40 inches.

The south-west monsoon started early, waned and later on rains only in fits and starts were received. Similarly the north-east monsoon after a good start faded out. The summer rains were disappointing. Though the total quantity received was normal, the distribution was poor.

On the whole except for areas of assured water-supply the season for the other areas was not favourable.

Demonstration and propaganda.—The Grow More Food Scheme formed the backbone of extension work and have been dealt with in detail under their respective heads.

As in last year this year also the posting of two Additional District Agricultural Officers and staff for loan work enabled the regular staff to devote more attention to the various Grow More Food Schemes, and to extension work in green leaf manuring and other items of work not included under the Grow More Food Schemes. The plant protection work assumed great importance, and as is seen by the statements appended, a good volume of work has been turned out in spite of the inadequacy of staff. As in the previous years want of experienced and trained Agricultural Demonstrators was keenly felt this year also.

VII. Crops.—(1) *Paddy.*—This is the main cereal crop in this division. Every possible step was taken to step up production by the distribution of improved strains, chemical fertilizers and green manures.

Four thousand three hundred and ninety-one acres of seed farms were run as against 4,004 acres during 1950–51. 1,868 tons of seeds were procured and 1,218 tons distributed as against 1,181 tons and 645 tons, respectively. The seeds distributed covered an area of 63,422 acres which has been estimated to have yielded an additional quantity of 5,122 tons of foodgrains as against 2,165 tons during last year.

The strains under distribution are Co. 19, Co. 2, Asd. 5, Asd. 6, Co. 13, Asd. 1, Asd. 7, Co. 25, Co. 26 and GEB. 24. These strains occupied an area of 398,000 acres including natural spread as against 297,000 acres during 1950–51.

Sixty-seven tons of green manure seeds were distributed for manuring 7,742 acres as against 50 tons and 5,776 acres during last year.

This has stepped up the food production by 1,060 tons as against 738 tons during 1950–51.

Twelve thousand four hundred and ninety-two tons of phosphatic and other manures were distributed to cover an area 272,437 acres to increase the food production by 22,374 tons as against 6,846 tons, 126,638 acres and 12,702 tons during 1950–51.

Twenty-three thousand five hundred and ninety-eight acres of paddy affected by insect pests and diseases were treated and the crops saved from total destruction.

It has become an accepted fact that green manuring increases the yield of paddy, the rate of increase being one pound of paddy for every fifteen pounds of green leaves applied. The chief reason for this not being adopted universally is the lack of adequate quantities of seeds. These difficulties have been solved by the timely introduction of two green leaf yielding plants, viz., *glyricidia maculata* and *sesbania speciosa*. As trials conducted with these two

green leaf yielding plants last year were found to be very promising, great pains were taken to spread this improvement. *Glyricidia* seedlings were planted on big bunds and open spaces. *Sesbania* seedlings were planted along paddy, sugarcane, plantains and cotton field bunds.

The details of work done on these lines are furnished in detail in statements 25 (a), (b) and (c).

It is gratifying to note that as a result of concentrated efforts made during the year almost all the ryots have come to know the purpose for which the two abovesaid green manure plants are grown and this augurs well for its future spread.

(2) *Ragi.*—This is another important food crop of this division. The important departmental strains under distribution are Co. 1, Co. 2, Co. 4, and K. 1 Ragi. Six hundred and thirty acres of seed farms were run, 12 tons of seeds procured and three tons of seeds were distributed to cover an area of 1,245 acres which increased food production by 25 tons. The total area occupied by the departmental strains was estimated to be 11,700 acres including natural spread.

One thousand one hundred and fifteen acres of ragi affected by insect pests and diseases were saved.

(3) *Cholam.*—This is another important food crop which is raised both under dry and irrigated conditions. The most popular strains under distribution are Co. 9 and K. 2. Four more strains were under trial this year and like last year no conclusive results were obtained. Further trials will be conducted before distribution is taken up. Six hundred and thirty acres of seed farms were run, 12 tons of seed procured and three tons of seeds distributed to cover 1,245 acres, the increased food production being 25 tons.

Seeds to cover 14,400 acres were pre-treated to safeguard the crop against fungus diseases.

Irungu cholam occupies a large area in this division and is grown mostly for fodder. A strain As. 7081 (*periyamanjal irungu*) which was found to give a better grain and straw yield than Irungu was distributed. The grain unlike the brown irungu grain of Ramanathapuram and Tirunelveli can be used as food.

Crops following cholam are known to suffer. It was found by experiments that "Cholam effect" can be corrected by sowing 12 lb. of indigo per acre mixed with cholam and plough in the indigo crop during May–June. During the year 2,000 acres of cholam were sown mixed with indigo. Due to unfavourable seasonal conditions, in general the indigo crop was a failure.

The area under improved strains including natural spread is estimated to be 14,900 acres.

(4) *Cumbu.*—This is another major crop of this division especially in Tirunelveli district. It is grown both as a rainfed and irrigated crop. K. 1 has become popular in Tirunelveli district and has established itself firmly. The other popular strains under distribution are Co. 1, Co. 2 and Co. 3. The area occupied by the departmental strains including natural spread is estimated to be 25,000 acres.

One thousand one hundred and seventy-seven acres of seed farms were run. Fourteen tons of seeds were procured and 6½ tons were distributed to cover 2,451 acres increasing food production by 74 tons.

Fifty-five acres of cumbu were treated against insect pests and diseases.

The cumbu hybrid trial with X. 1 and X. 2 has indicated its suitability for the tract and their superiority over the local. So large scale distribution of these seeds will be taken up during the following year.

(5) *Pulses*.—The important pulse crops grown in this division are blackgram, redgram, greengram and horsegram. Blackgram and greengram are generally raised mixed with cotton in Tirunelveli and with cholam or cumbu in other districts. Blackgram is also grown as a pure crop in the wet lands after harvest of paddy in portions of Tirunelveli and Madurai district.

D.B. 7 horsegram was tried and found suitable in Dindigul taluk of Madurai district. The trials of redgram culture 37 were conducted in the Ramanathapuram district. Trial of redgram culture failed for want of rains. Performance of horsegram D.B. 7 was better than local and will be extended to other areas after further trials in other centres also.

Sixty-nine acres of redgram affected with insect pests and diseases were successfully tackled and the crop saved.

(6) *Oil seeds*—(a) *Groundnuts*.—This is the most important oil seed crop of this division occupying nearly 240,000 acres. It is mostly cultivated as a rainfed crop. It is also grown as an irrigated crop during summer where irrigation facilities are available.

Due to the failure of monsoons, and the low rate of multiplication of seeds, the quantity of seed procured was low and increased area under improved strains could not therefore be brought about quickly. The improved strains under distribution are TMV. 1 and TMV. 2. Four tons of improved strains were distributed to cover 98 acres. These strains are estimated to occupy an area of 9,500 acres including natural spread. One hundred and ninety-five acres of groundnuts affected by insect pests and diseases were successfully tackled.

(b) *Castor*.—This is only a minor crop and is invariably grown mixed in garden lands. TMV. 1 is under distribution. TMV. 2 is under trial in Ramanathapuram district and both TMV. 1 and TMV. 2 are found to fare better than local.

Two hundred and seventy-eight pounds of improved varieties were distributed to cover 59 acres. Including natural spread the improved strains are estimated to occupy an area of 86 acres.

(c) *Gingelly*.—This is cultivated as a pure crop during June–July in Madurai district and December–January in Tirunelveli district. It is also raised in wet lands after the harvest of paddy. The popular strain under distribution is TMV. 1.

Three hundred and fifty-nine pounds of improved varieties were distributed to cover 78 acres. Including natural spread the improved strains are estimated to cover an area of 500 acres.

(d) *Coconuts*.—Three thousand and twenty-three seed nuts and seedlings were distributed.

Demand for seedlings from the Agricultural Research Station is on the increase and supply is limited to the availability.

Three hundred and fifty coconut trees were successfully treated against pests and diseases.

(7) *Fibres*.—The important fibre crop in this division is cotton, and is grown both as a dry and an irrigated crop. The normal area under dry cotton is 522,700 acres and that under irrigated cotton is 57,300 acres. Karunganni is the local variety mostly grown under rainfed conditions. Madras Uganda is usually grown as an irrigated crop during March–April which is locally known as “Masipattam” in portions of all the three districts of this division. To extend the area under the departmental strains special schemes known as the K. 2 and Co. 4-B. 40 (M.U. 1) schemes were run during the year.

K. 2 and Madras Uganda 1 are the two popular strains under distribution. Four hundred and thirty-three tons of seeds were distributed and the area covered including natural spread is estimated to be 169,720 acres.

One thousand one hundred and six acres of cotton affected with pests and diseases were successfully treated.

K. 2 Scheme.—Twenty-nine thousand six hundred acres of seed farms were run under K. 2 cotton. This area of seed farm was spread in 2,451 holdings in 150 villages. The nucleus and the inner seed farms extending to 760 acres were thoroughly rogued. The harvest of cotton commenced from about the last week of February and closed by the end of April while the second flush came to a close by the third week of June.

Procurement of seed was hampered by the fall in the price of cotton and the seed farm ryots had to be met often and persuaded to gin and sell the seeds to the department. Five thousand bags of seeds (1 bag = 112 lbs.) had been procured by the end of the period under report and about 3,200 pothies of kappas are yet to be ginned and the seeds purchased. Due to bad seasonal conditions it is feared that a total of only 10,000 bags will be available for procurement out of the targeted quantity of 20,000 bags.

Co. 4-B. 40. or Madras Uganda 1 Scheme—(a) 1951–52 (1951 summer).—Eleven thousand eight hundred and sixty-seven bags of seeds (1 bag = 98 lbs.) comprising of 7,449 bags from seed farms and 4,418 bags from non-seed farms were procured from the 1951 summer crop thus almost reaching the target of 12,000 bags. Out of this quantity 7,728 bags were supplied to various districts in this State, and 354 bags to other States in the Indian Union. One thousand and sixty-two bags were issued for raising seed farms and 2,439 bags sold outright. The balance of 276 bags left unsold will be transferred as cattle food.

(b) 1951–52 (winter).—Two hundred acres of Madras Uganda 1 in Periyakulam taluk of Madurai district and 5 acres under Madras Uganda 2 (7682) in Eruvadi estate in Tirunelveli district were raised as winter crop for the 1951–52 season. About 237 pothies of kappas were purchased for supply to Jail departments. This was ginned and 473 bags (1 bag = 98 lb.) of seeds were obtained and 34 candies and 140 lb of lint supplied to the Superintendent, Central Jail, Coimbatore. Out of these 473 bags, 139 bags had to be rejected due to poor viability and only 334 bags were found useful for sowing purposes.

The kapas of M.U. 1 and M.U. 2 available at the Eruvadi estate were also ginned and 739 lb. of M.U. 1 and 1,983 lb. of M.U. 2 seeds were procured.

(c) 1952–53 (1952 summer).—As stated in Madras Uganda 1 Scheme (a), 1,062 bags of seeds were issued for the sowing of 4,000 acres of seed farms in Srivilliputtur taluk of Ramanathapuram district, and Periyakulam taluk of

Madurai district. Further with the seeds received from the Agricultural Research Station, Kovilpatti, 33 acres of seed farm under 7682 named as Madras Uganda 11 were raised.

It was found that Periyakulam zone was found unsuitable for running seed farms under Masipattam cotton and hence arrangements were made to confine the seed farms to the Srivilliputhur-Rajapalayam zone. So far 3,692.27 acres of seed farms have been sown. The crop is fairly satisfactory. Roguing was attended to in the inner and nucleus areas.

Observation trials of "season and summer seeds".—Ryots prefer season seeds for sowing purposes to the summer and to see whether there is any ground for this preference, ten plots were laid to find out the difference in yielding capacity of the season and summer seeds. Three plots failed due to adverse seasonal conditions. The yield datas show that there is practically no difference.

P. 216 F, a short-duration cotton variety, has been introduced successfully in small areas. It is cultivated in single-crop wet lands after the harvest of paddy. The area under this will be extended in the coming season. Wherever this was grown simultaneously with M.U. 1 in the Masipattam the preference is for M.U. 1.

Cotton trials.—Trials of 7682 with Co. 4-B.40. is under progress in Ramanathapuram district. Pickings have not yet been completed. However, 7682 appears to be better.

(8) *Sugarcane.*—The normal area under cane is 7,470 acres. The area increased gradually due to high prices of jaggery and the springing up of the sugar factory of the Madurai Sugars and Allied Products, Ltd., at Pandiarajapuram. During the year the season was quite adverse to the sugarcane crop. The complete failure of the summer rains after the closure of the Periyar channel depleted all the irrigation facilities. Extreme difficulty was experienced in irrigating the standing crop of cane. Pith formation began on a large scale as a result of which jaggery failed to set. Nearly 200 acres of cane were given up as the low prices of jaggery and the poor quality of jaggery produced did not pay even the boiling charges. The fields were cleared by either setting fire to the dried up standing crop or allowing poor people to remove the cane for fuel purposes.

The sugar factory did not experience any difficulty in getting cane. The offers were more than the factory could handle. Due to frequent machinery trouble the factory was not working properly and the recovery percentage of sugar was very low when compared with the other factories. The following are the details of the working of the sugar factory in 1951-52 :—

Dates of working of the factory	..	1st July to 31st October 1951. 17th December 1951 to 30th June 1952.
Total number of crushing days	..	320.
Total number of hours of actual crushing.	..	5,562 hours and 40 minutes.
Total quantity of cane crushed	..	50,148 tons and 172 lb.
Total quantity of sugar manufactured.	..	3,581 tons and 12 cwt.
Total amount of cess paid	..	Rs. 38,236-3-7.
Percentage of average recovery	..	Maximum 9.02 in April 1951. Minimum 6.29 in June 1951. Maximum 8.24 in April 1952. Minimum 6.36 in June 1952.

The grades of sugar manufactured are 28 E, 27 E and 26 E, ninety per cent of the total quantity of sugar produced being 27 E grade.

Sugarcane development work is being attended to by a special Agricultural Demonstrator, at Nilakottai with four maistries. Improvements were effected in all aspects of sugarcane cultivation.

Ninety per cent of the area is under Co. 419, Co. 421, Co. 449 and Co. 527 are under distribution.

The Sugarcane Inspector inspected the factory 87 times. The weigh-bridges were tested and the cane accounts checked. Eleven mill tests were conducted and the results sent to the Sugarcane Specialist, Anakapalli. Two actual test weighments of the weight of the binders used for tying the sugarcane bundles were carried and the weight of binders worked out to 1.11 and 1.04 per cent. In addition to inspection work the Sugarcane Inspector attended to propaganda and demonstrations to increase the acre yield of cane by cultural, varietal and manurial improvements.

With a view to improve the soil texture and reduce the manure bill intensive propaganda was done to grow a green manure crop between the cane lines and incorporate the same at the time of first earthing up, and the results obtained were very encouraging. 8,962 lb. of sunnhemp seeds were distributed to cover 448 acres. Sesbania seedlings were planted round 31.55 acres of cane fields and 360 lb. of seeds were collected.

Forty entries for sugarcane crop yield competition were received, out of which only 13 were harvested. The maximum yield of 87 tons, 370 lbs. was obtained by Sri W. P. A. Soundarapandian at Chottangulam, with Co. 419 under the pit method of cultivation.

Number of demonstrations held, area covered and other details are furnished in Statement No. 17.

(9) *Tobacco.*—Nil.

(10) *Fodder.*—Fodder crop occupies a normal area of 158,405 acres. An additional area of 2,786 acres was brought under fodder during the year under report. Other details of work done are enumerated in Statement No. 19 (a) and (b).

The demonstration grass farm started at Melaseval of Ambasamudram taluk, Tirunelveli district, is working well. The stand of the fodder crop is good and is attracting the attention of neighbouring ryots.

VIII. *Better collection and preservation of manures.*—Intensive propaganda was continued towards better collection and preservation of farmyard manure. Pit system was generally recommended. During the year 6,275 new pits were opened and 3,934 old pits renovated. In addition 2,062 new cattle-sheds under byre system were started, 139 renovated, and 2,154 dry earth cattle sheds opened.

IX. *Sale of implements.*—Two thousand and twenty-two improved implements and 8,601 spares were distributed during the year. Ninety-one implements were hired out and 3,226 demonstrations with implements were conducted.

XI. *Apiculture.*—In spite of the many drawbacks and difficulties in maintaining bee colonies the results of propaganda to induce people to maintain an

apiary is very encouraging. Three hundred and eighty-seven new hives were introduced. At present 1,424 colonies are working and 7,016 pounds of honey were produced.

Though there is no special scheme functioning for the expansion of this cottage industry, maistries trained in apiculture are posted to Kodaikanal, Courtallam, etc., where there are good possibilities for the development of apiculture.

XII. *Exhibitions and shows.*—Seventeen exhibitions and shows were held in 17 places and a total expenditure of Rs. 243-14-0 was incurred and number of ryots who visited the exhibitions and shows are estimated to be 82,000. The various exhibits shown created interest and attracted visitors. Much difficulty has been experienced in putting up an exhibition in an attractive and useful manner. The formation of a central exhibition bureau with a permanent artist will go a long way in facilitating putting up a large number of exhibitions in a more attractive and useful manner and their educative value will also be high.

XIII. *Work done through other agencies.*—During the year 154 Agricultural Associations and 125 Advisory Committees were formed. At the end of the year 321 Agricultural Associations and 125 Advisory Committees were functioning with a total membership of 4,790. Seven hundred and thirty-two meetings were held. The members helped the department in the preparation of rural compost, running seed farms and demonstrating green manure extension work, etc.

With the help of the Educational Departmental officials vegetable seeds were issued to schools and vegetable gardens raised in the school compounds.

The Highways Department took active part in dibbling *prosopis juliflora* on the road margins and raised nurseries of economic trees and shrubs in travellers bungalow compounds for distribution during the Vanamahotsavam. Wherever *prosopis juliflora* plants have come up as avenue plants along the road margins and field borders they are catching the eye of the general public. This augurs well for its quick spread as an avenue, hedge and a fuel plant. The special advantages it possesses are its quick growth and thorny nature. The latter effectively protects the plant from cattle, sheep and goats ravages.

XIV. *Pests and diseases.*—There was no major outbreak of pests or diseases during the year. Details regarding the work done are given in Appendix 7 and statements 31 (a) and (b) and 32. As already mentioned under scheme 7, plant protection work is increasing rapidly as the ryots have realized in full the efficacy of the methods adopted and are flocking to the depots for the insecticides and fungicides. Whenever a sudden demand is created the Plant Protection Assistants are unable to cope up with the demand and give timely help in the proper manner. An increase in the plant protection field staff will therefore go a long way in minimising loss of food-grains due to destruction by pests and diseases and thus indirectly helping the Grow More Food campaign.

XV. *Rural Welfare Work.*—Intensive work is in progress in Tirumangalam, Malli and Palayamkottai firkas of Madurai, Ramanathapuram and Tirunelveli districts respectively. A special Agricultural Demonstrator is in charge of the work at Tirumangalam, with headquarters at Tirumangalam and work is carried in a number of selected villages of the firka. All

the agricultural improvements advocated by the Department are being done in these Rural Welfare centres in a concentrated form according to a well drawn up programme.

As the rural welfare area is situated in a dry tract depending upon the monsoon for its agricultural prosperity, the failure of the seasonal rains has greatly hampered the programme. Among the several agricultural improvements effected special mention has to be made of—

- (1) bringing additional area under cultivation;
- (2) digging new wells;
- (3) fitting up oil engines or electric motor pumpsets for irrigation;
- (4) preparation of compost, etc.; and
- (5) spread of improved seeds.

The Special Agricultural Demonstrator and the Provincial Compost Development Officer took classes for the Grama Sevaks undergoing training at Kallupatti. The Deputy Director of Agriculture and the District Agricultural Officer regularly attended the periodical meetings of the Rural Welfare Committee. The details of work done are detailed in Statement No. 40.

Administration and supervision.—All the subordinate officers in the division have been inspected by the respective superior officers. No serious irregularities were noticed. Small omissions noticed were set right immediately. Adequate tours and inspections have been made. The general efficiency and discipline have been maintained in the division.

Crop-custing experiments.—The following are the crops and the number of experiments allotted for the year 1951-52:—

	Madurai.	Ramanathapuram.	Tirunelveli.	Total.
Paddy, first crop	24	..	30	54
Paddy, second crop	96	100	90	286
Paddy—Grow More Food Aid experiments.	80	32	68	180
Cholam irrigated	58	20	30	108
Cholam dry	56	20	30	106
Cumbu irrigated	20	..	..	20
Cumbu dry	40	70	100	210
Ragi irrigated	40	40	20	140
Groundnuts, rainfed	66	42	..	108
Total	480	324	368	1,172

The above experiments were distributed among 25 Agricultural Demonstrators and 126 Revenue Inspectors of the division. Five hundred and forty-four experiments in cholam, cumbu and ragi were allotted to Revenue Inspectors as against 628 experiments on paddy, and groundnuts to the Agricultural Demonstrators.

The following are the number of experiments actually laid and the acre yields obtained:—

District and taluk.	Number of experiments planned.	Number of experiments.		Average acre yield in pounds.
		Laid.	Failed.	
Madurai—				
Madurai	4	4	..	2,388
Melur	4	4	..	1,675
Periakulam	4	4	..	3,958
Dindigul	4	4	..	2,729
Nilakottai	4	4	1	1,200
Palni	4	4	..	756

Average yield—2,116 lbs. dried paddy.

District and taluk.	Number of experiments planned.	Number of experiments		Average acre yield in pounds.
		Laid	Failed,	
Tirunelveli—				
Nanguneri	6	6	..	1,781
Srivaikundam	8	8	..	1,884
Tiruchandur	4	2	2	1,362
Ambasamundram	8	8	..	2,638
Tenkasi	4	4	..	2,200

Average yield of dried paddy per acre—2,071 lbs.

The percentage of driage worked out to 9.77 in Madurai district and 8.5 per cent in Tirunelveli district.

Second-crop paddy.

District and taluk.	Number of experiments planned.	Number of experiments.		Acre yield of dried paddy in pounds.
		Laid.	Lost.	
Madurai—				
Madurai	28	28	1	2,081
Melur	16	16	..	2,220
Tirumangalam	14	14	..	1,430
Periakulam	12	12	..	2,760
Dindigul	10	10	..	1,362
Nilakottai	12	12	1	1,814
Palni	4	4	..	819

Average yield per acre of dried paddy—1,925 lbs.

Ramanathapuram—				
Srivilliputhur	12	12	1	1,563
Sathur	4	4	..	2,135
Aruppukottai	6	6	2	1,388
Mudukulathur	10	10	..	953
Paramakudi	24	24	2	525
Tiruvadanai	16	16	..	575
Tirupathur	14	14	..	712
Sivaganga	8	8	..	988
Ramanathapuram	6	6	..	606

Average yield per acre of dry paddy—890 lbs.

Tirunelveli—				
Tirunelveli	14	14	..	1,300
Nanguneri	16	16	1	1,728
Srivaikuntam	8	8	..	2,000
Tiruchendur	10	10	..	1,775
Ambasamudram	16	16	1	2,288
Sankarankoil	14	14	..	1,206
Koilpatti	4	4	..	769
Tenkasi	10	10	..	2,044

Average yield of dried paddy per acre—1,697 lbs.

The following are the losses due to driage in paddy :—

	PER CENT.
Madurai	11
Ramanathapuram	8
Tirunelveli	10.8

The following are the actual average yields of paddy obtained as compared with normal yields given in the Season and Crop reports :—

District.	Acre yield of paddy first crop in pounds.	Acre yield of paddy second crop in pounds.	Average acre yield in pounds.	Normal acre yield in pounds.
Madurai	2,116	1,925	2,020	1,950
Ramanathapuram	..	890	890	1,450
Tirunelveli	2,071	1,697	1,884	2,000

Crop-cutting experiments on groundnuts.—This is the first year of conducting crop sampling experiments on Groundnuts. The number of experiments planned, laid and the yield data are as follows :—

District and taluk.	Number of experiments.		Number of experiments lost.	Average acre yield in pound.
	Planned.	Laid.		
Madurai—				
Dindigul	10	10	..	875
Madurai	8	6	2	715
Melur	10	10	..	840
Nilakottai	8	8	..	825
Palani	8	8	..	306
Periakulam	10	6	4	453
Tirumangalam	12	12	..	612

Average acre yield—675 lbs.

Ramanathapuram—				
Aruppukottai	10	12	..	755
Mudukulathur	10	10	..	1,017
Sathur	10	10	..	505
Srivilliputhur	10	10	..	306

Average acre yield—650 lbs.

Pre-sowing experiments on improved paddy seeds.—Eight and 24 experiments in Madurai district on the first and second crops, and 6 and 14 experiments in Tirunelveli district on the first and second crop were planned, laid and conducted. The results are as follows :—

Paddy seed—First crop.

District and taluk.	Number of experiments.		Number of experiments lost.	Average additional production per cent.	
	Planned.	Laid.		LB.	oz.
Madurai—					
Madurai	2	..	2	..	..
Periakulam	2	..	2	..	..
Dindigul	2	1	1	0	11
Nilakottai	2	2	..	8	11

Average—437 lbs. per acre.

Tirunelveli—					
Tirunelveli	2	2	..	5	10
Nanguneri	2	2	..	..	..
Ambasamudram	2	1	1	3	4

Average—444 lbs. per acre.

Paddy seeds—Second crop.

Madurai district	29	29	..	3	9
Tirunelveli district	15	15	..	1	8

Average—253 lbs. per acre.

Paddy green-manure—Post manuring.

Madurai district	16	15	1	3	14
Tirunelveli district	16	16	..	7	0

Average—538 lbs. per acre.

Paddy—Ammonium sulphate—Pre-manuring—First crop.

Madurai district	4	4	..	3	34
Tirunelveli district	4	2	2	2	10

Average—280 lbs. per acre.

The increased yields are above the official rate of response estimated by the Government in assessing the value of Grow More Food Schemes.

Paddy—Pre-manuring experiments—Ammonium sulphate—Second crop.

	Number of experiments.		Number of experiments lost.	Average additional production per cent.	
	Planned.	Laid.		LB.	OZ.
Madurai district	12	10	2	2	12½
Ramanathapuram district ..	16	12	4	2	9½
Tirunelveli district	14	14	..	3	3
Average—284 lbs. per acre.					

The average additional production of paddy by application of 80 lbs. of ammonium sulphate is as follows:—

First crop—

Madurai district	322 lbs. per acre dried paddy.
Tirunelveli district	263 lbs. per acre dried paddy.

Second crop—

Madurai district	276 lbs. per acre dried paddy.
Ramanathapuram district ..	260 lbs. per acre dried paddy.
Tirunelveli district	319 lbs. per acre dried paddy.

Paddy—Post manuring experiments—Ammonium sulphate.

For first-crop paddy four in each of Madurai and Tirunelveli districts were planned. No experiments were laid in Madurai district. Four experiments were laid in Tirunelveli district, and the increased yield was 1 lb. 9 oz. per cent.

On the second-crop paddy, 16 experiments in Madurai and Ramanathapuram districts and 12 in Tirunelveli district were laid. Only four experiments were lost in Ramanathapuram district. The additional production worked out as follows:—

Madurai district	700 lbs. paddy per acre.
Ramanathapuram district ..	225 lbs. paddy per acre
Tirunelveli district	470 lbs. paddy per acre.

Crop-cutting experiments on Millets—Irrigated ragi.—Forty experiments each for Madurai and Ramanathapuram and 20 for Tirunelveli district were planned. In Ramanathapuram district alone three experiments failed and four were lost, while in the other two districts the planned number of experiments were laid. The following are the final results:—

Madurai district	998 lbs. grain per acre.
Ramanathapuram district ..	681 lbs. grain per acre.
Tirunelveli district	1,064 lbs. grain per acre.

Irrigated cumbu.—Twenty experiments were planned and 12 were laid for Madurai district alone. The average acre yield for Madurai district was 550 lb.

Unirrigated cumbu.—Forty experiments were planned and 34 experiments laid in Madurai district. Seventy experiments were planned and 52 laid in Ramanathapuram district, and 100 planned and 72 laid in Tirunelveli district. The acre yields obtained are as follows:—

Madurai district	319 lbs. dried grain per acre.
Ramanathapuram district ..	354 lbs. dried grain per acre.
Tirunelveli district	487 lbs. dried grain per acre.

Irrigated cholam.—Seventy-eight and 46 experiments were planned for Madurai and Tirunelveli districts, respectively out of which only 64 and 42 experiments were laid with the following results:—

Madurai district	869 lbs. per acre.
Tirunelveli district	912 lbs. per acre.

Unirrigated cholam.—The following are the experiments planned, laid and yields obtained:—

Madurai district ..	40 experiments planned, 34 experiments laid, 2 experiments failed and 4 experiments lost.
Ramanathapuram district.	70 experiments planned, 52 experiments laid, and 18 experiments lost.
Tirunelveli district ..	100 experiments planned 72 were laid, and 28 were lost.

The average yields obtained are as follows:—

Madurai district	319 lbs. dried grain per acre.
Ramanathapuram	354 lbs. dried grain per acre.
Tirunelveli district	487 lbs. dried grain per acre.

Manure Dealers' Licensing Order, 1949.—The Manure Dealers' Licensing Order, 1949, continued to operate this year also in this division. The following are the details of licences issued:—

	Madurai.	Ramanathapuram.	Tirunelveli.	Total.
Number of new licences issued ..	174	62	98	334
Number of old licences renewed ..	194	207	287	688
Number of licences cancelled ..	13	21	9	43
Number of dealers warned ..	..	23	3	26
Amount realized by way of licensing fees.	Rs. 12,134	Rs. 9,285	Rs. 9,508	Rs. 30,927

Licensing fees which were enhanced during 1950-51 were again reduced to the original level which is as follows:—

Manure dealers	Rs. 20.
Rotaries	Rs. 20 for a factory irrespective of the number of rotaries working.
Expeller	Rs. 100 for a factory irrespective of the number of expellers working.
Manure mixing firms	Rs. 100

Scheme for effective control and test of manure mixtures.—The Fertilisers Inspector continued to be on duty throughout the year. At the beginning he had jurisdiction over the VII division and the districts of Tiruchirappalli and Tanjore as well. Consequent to the posting of a Fertiliser Inspector at Tanjore during January 1952, the jurisdiction of the Fertilisers Inspector, Madurai, is limited to the Madurai division only.

In addition to the inspection of the accounts of the various dealers and depots of manure mixing firms the following samples were taken and despatched to the Government Agricultural Chemist, Coimbatore, for analysis

to see whether the quality of the samples is in accordance with the guarantee given by the firm when they applied for fixation of sale prices of their mixtures.

	Number of samples taken.	Number of samples not up to guarantee.
Madurai	63	7
Ramanathapuram	11	..
Tirunelveli	49	5
Tiruchirappalli	17	5
Total	140	17

Action was taken by Director of Agriculture, Madras, against firms whose samples were not up to guarantee by reducing the sale price of the mixture proportionately.

Special schemes.—The temporary River lift scheme started at Nenmeni in Ramanathapuram is working satisfactorily. Two oil engines of 12 h.p. each are working and pumping water from the river Vaipar and irrigating paddy and cholam, in 40 acres. The spring at this spot seems to be unfailing and adequate to supply enough water even for a 6-inches pump. It has been proposed to install on a permanent basis three oil engines, each of 15 h.p. with 6 inches by 6 inches pumps to irrigate 150 acres. The Government has agreed to collect Rs. 43 per acre from the beneficiaries towards the cost of irrigation water. The total cost per acre comes to Rs. 86 and what the Government has decided to collect from the ryots is fifty per cent of the actual expenditure. The ryots benefited are quite ready to pay this charge.

The installation of filter points in the delta area and along the banks of the Vaigai river is being investigated. A successful demonstration of pumping water with 3 inches delivery was held at Madurai on the bank of Vaigai river. The ryots, public and the press were invited and they appreciated the demonstration. This method of irrigation will be popularised in the ensuing year in view of its cheapness.

Special problems of Madurai Division, Madurai district.—*Reclamation of virgin lands.*—A block of 20,000 acres of virgin land is available for reclamation in the Gandamanaickanur zamin. About 400 acres have already been reclaimed. Proposals to reclaim another 4,000 acres have been submitted for orders. The factor retarding progress in this direction is the non-availability of adequate number of bull dozers for reclamation work. A separate organization with sufficient number of bull dozers and tractors under an Assistant Agricultural Engineer and necessary staff will go a long way in quickly bringing a vast area under cultivation and thus increasing food production.

Betterment of irrigation sources.—The Periyar system is designed to irrigate only 1.75 lakhs of acres. But in practice another 50,000 acres are added on to the tail-end of the system as a result of which the whole area suffers for want of adequate supply water resulting in lower yields. So by increasing the area by 50,000 acres of paddy, 1.75 lakhs of acres of paddy get their yields reduced. If however a stricter control over water supplied is exercised the yield of paddy from 1.75 lakhs of acres can surely be stepped up.

As in Ramanathapuram, a river pumping scheme is quite feasible in this district as well. Vaigai river is well known for its underground springs. Installation of pumping sets at strategic points will go a long way in bringing fresh area under irrigation and getting good yields.

Waste lands and hillock slopes can be profitably used for fuel plantation by sowing *Prosopis Juliflora*. As a beginning, 25 acres of waste lands and a small hillock have been dibbled with *Prosopis* ten feet apart. The seeds have germinated.

Ramanathapuram district.—The special problems of the district fall into three categories: (1) Lack of irrigation water, (2) reclamation of vast area of virgin lands and scrub jungles and (3) provision of adequate agricultural population.

(1) *Lack of irrigation water.*—A good beginning has been made to make up the deficit in irrigation by installing engine and pumps to pump out water from the underground springs in the river. The ryots are enthusiastic about it and are eagerly awaiting further extensions to the river pumping schemes. At present, oil engines are used for working the pump sets. With the extension of river pumping scheme, a special line carrying electric energy can be laid and the cost of pumping water considerably reduced.

There are a number of areas with sandy strata, fit for the installation of filter point wells in taluks of Sivaganga along Vaigai river, Paramakudi and Tirupattur. It is proposed to tap the sources in the coming year.

(2) *Reclamation.*—About four lakhs of acres of scrub jungle and uncultivated land fit for cultivation exist in almost all the taluks. Wherever soil depth is adequate, there is scope for bringing the land under cultivation after clearing the scrub jungle with bull dozers and levelling, terracing and ploughing the land. The machinery on hand is quite inadequate. Further additions to the machinery is sure to help in bringing more land under cultivation at an early date.

The vast sandy stretches of this district can be profitably planted with Casuarina, *Prosopis*, Cashew and Babool. There is also the possibility of raising Coconut plantations.

(3) *Adequate agricultural population.*—When more area is brought under cultivation and better irrigation facilities are developed, there will be a tendency for agricultural population from dense districts for migrating and settling in Ramanathapuram district. Further, the people who keep moving between Tanjore and Ramanathapuram will settle down, and to that extent the agricultural population will increase in number.

Tirunelveli district.—*Reclamation of lands.*—As in the other two districts in this district also vast areas of waste lands are available and the schemes suggested for Madurai and Ramanathapuram districts are applicable for this district also.

Augmenting irrigation.—With necessary modifications to suit local conditions, the schemes suggested for Ramanathapuram and Madurai districts are suggested for Tirunelveli district also.

XVII. A brief summary of the work done in the Madurai Division.—Each of the three districts comprising the Madurai Division had a District Agricultural Officer, and he was assisted by a Personal Assistant (non-gazetted). Two Additional District Agricultural Officers were posted one for Madurai and the other for Tirunelveli district, for the sanctioning of loans for the purchase of chemical fertilisers for paddy in areas having assured water-supply. One Sugarcane Inspector was posted for inspection of the sugar factory at Pandiarajapuram and to safeguard the interest of sugarcane growers. The Assistant Agricultural Engineer at Madurai, looked after the mechanized cultivation portion of agriculture. The two Plant Protection Assistants and

the Seed Development Assistants, Paddy and Millets, and one Fertilizer Inspector continued to be on duty this year also. The trading scheme activities have been handed over to co-operative societies and tender firms and the Agricultural Demonstrators relieved of much of the responsibility with a view to give the Agricultural Demonstrators time to attend to propaganda work. At present, they are acting as stockists for chemical manures and releasing the manures whenever required by the co-operative societies and tender firms. If this item of work is also removed, they will be in a position to devote more attention to the various Grow More Food schemes, etc. In spite of all these activities, it is gratifying to record that better progress has been achieved under the various items of work when compared with last year. This year also "Vanamahotsava", "Compost work" and paddy crop yield competitions were continued. Crop yield competition for sugarcane was introduced this year.

The green-manure extension work received great fillip during the year. Work done in respect of raising nurseries, planting seedlings and stumps and collection of seeds of green-leaf yielding trees and shrubs is nearly double that of last year. One great handicap experienced was that nature did not help the departmental efforts. Failure of summer rains and the south-west monsoon to a large extent nullified the efforts taken in green-manure extension work. A large number of seedlings and cuttings failed to establish themselves. Those that established themselves did not grow vigorously.

One thousand and one hundred and fifty-nine oil engines and electric motor pump sets were distributed to irrigate 6,674 acres.

With 33 bull dozers, bull graders and tractors, 11,834 acres were ploughed, 333 acres terraced, 1,415 acres levelled and 1,416 acres contour bunded.

Under the rural and urban compost scheme, 291,952 tons of compost was prepared which is expected to manure 58,390 acres.

Good work has been done under plant protection. One hundred and fifty-four tons 1,216 lb. of pesticides and fungicides were distributed for treating 101,552 acres of crops and 33,228 plants.

One thousand and twenty-eight tons of phosphatic manures, 11,464 tons of ammonium sulphate and 67 tons of green-manure seeds were distributed.

Under paddy seed farms, 4,391 acres were arranged, 1,868 tons of seeds were purchased and 1,218 tons of seeds were distributed.

Under millets, 2,756 acres of seed farms were arranged, 31 tons of seeds procured and 21 tons of seeds distributed.

For the purchase of fertilizers, seeds and manures and implements, loans to the value of Rs. 11,79,210 were distributed to 14,652 ryots.

Seeds of trees of green leaf value to the tune of 16,612 lb. were collected and distributed. Eighty lakhs seventy-two thousand one hundred and forty seedlings, cuttings and stumps of shrubs and trees of green leaf value were planted.

Seeds of trees of green leaf value to the tune of 16,612 lb. were collected in an area of 29,600 acres and 4,000 acres, respectively.

The total quantity of seeds distributed are as follows:—

Quantity of seeds distributed in tons.

K-2	..	..	..	..	..	..	..	185
M.U. 1	..	..	..	..	..	..	..	202
Others	..	..	..	..	..	..	..	46

Agricultural Research Station, Koilpatti.—At the Agricultural Research Station, Koilpatti, evolution of better strain than K. 2 cotton is being carried out and four selections having a staple length of more than one inch have reached the multiplication stage.

Cumbu crop was a failure this year due to failure of the monsoons. The selections and crosses of cumbu did not give any significant results. A number of crosses were made between the Koilpatti strain K.1 and three economic selections from Coimbatore. The economics of the F.1 generation were studied and one of the combinations, viz., cumbu K.1 x P.T. 504 has given significantly higher yields than K.1. Further studies will be continued during the next season.

A.S. 7081 (Periamanjil irungu), a cross between irungu cholam of this tract and Periamanjil cholam of Coimbatore was found to give a better grain and straw yield than irungu cholam under Koilpatti conditions. The grain unlike the irungu can be used for food purposes. It also yields higher than the white irungu type of Madurai district. Trials conducted showed that 15 lbs. seed rate is optimum for a grain crop and 60 lbs. for fodder crop.

In pure selection work on Ragi, one selection K.R. 249 proved to be economic and ten single plant cultures have been carried forward. In yield trials, economic culture K.R. 76 and K.R. 4 gave statistically equal yield to that of K. 1. Since K.R. 4 does not lodge like K. 1 and K.R. 76, it is proposed to try Ragi K.R. 4 in the districts.

In Vellaicholam (irrigated), two selections K.S. 288 and K.S. 296/4 gave higher yields than cholam K.2. These two selections are longer in duration than K.2 by about a week. It will be issued for sowing in places where longer duration higher yielding types are required.

The following are the final results and decisions arrived at regarding the various agronomic experiments conducted at the Research Station:—

It was found that cotton-cumbu rotation is the best.

A medium cultivation for cotton and no cultivation for millets is sufficient to produce a good crop.

Sowing 12 lbs. of indigo per acre mixed with fodder cholam and ploughing in the indigo crop during May-June corrects the "Cholam effect".

Since the cereal indigo experiment with super phosphate gave indications that the new method, viz., the addition of super phosphate to irungu cholam and ammonium sulphate to the cotton crop counteracted the "cholam effect", this particular experiment will be further continued to get confirmation.

In boron experiments as no significant results were obtained, the experiments were discontinued.

Selection work and yield trials on sweet potato were continued. Bhadrakali type 1 has given consistently higher yields for the past three years, with an acre yield of 16,167 lbs.

Three economic types of tapioca have been isolated and multiplied for distribution in the districts.

The trial of four fodder grasses under irrigated conditions was continued and the high-yielding nature of Kolakatti grass was confirmed. The acre yield was 92,550 lb. for ten months—two months being lost for renovation. The yield of grasses tried are as follows:—

Kolakattai grass	..	..	..	92,550 lbs. per acre	..	..
Buffaloe grass	..	..	..	95,640 lbs. per acre	..	..
Guinea grass	..	..	..	91,490 lbs. per acre	..	..
Australian grass	..	..	..	30,950 lbs. per acre	..	..

} calculated
acre
yields.

The Blue buffel, a new type of Kolakakatti grass, gave a calculated acre yield of 35,400 lb. of green fodder for six months. The Gauthimala grass established itself well but did not fare well during the droughty months.

In Brinjals, two economic type Nos. 67 and 108 were evolved which gave a calculated acre yield of 28,642 and 28,327 lbs. respectively of tender fruits.

In Chillies, local types were compared with Guntur types. The Guntur types gave lower yields but were shorter in duration. It is proposed to make single plant cultures from the local bulk during the ensuing season.

Poultry.—The Rhode Island breed of poultry was maintained and 1,648 hatching eggs were distributed. As this breed is found unsuitable to South Indian conditions on account of its fragile nature, hybridization of Rhode Island reds with the locals (fighting type) was started in 1950-51. Three distinct groups of F. 1 were marked and studied. All the F. 1 birds are hardy combining the meat and egg production. The F. 2 progeny is under study.

PROGRAMME FOR 1952-53.

The main lines of work for 1952-53 will be implementation of the various Grow More Food schemes and stepping up production of food crops. In addition, the following will receive special attention :—

- (1) Green-manure extension work.
- (2) Better preservation of farmyard manure.
- (3) Preparation of compost in urban areas.
- (4) Extension of short-term and alternative food crops.
- (5) Extension of area under fruits and vegetables.
- (6) Trials, demonstration and observation plots of new strains of crops.
- (7) Formation and utilisation of Agricultural Advisory committees for extension work.
- (8) Intensive work in Rural Welfare area.

MADURAI,
16th September 1953.

A. MUHAMMAD ALI,
Deputy Director of Agriculture.

APPENDIX 1.

SCHEME No. 1—Installation of oil engine pump sets (attained).

	Madurai.	Ramanatha- puram.	Tirunel- veli.	Total.
Number of sets distributed ..	29	33	28	90
Area benefited in acres ..	514	96	224	834
Additional production in tons ..	210	48	112	370

APPENDIX 2.

SCHEME No. 2—Supply of electric motor pump sets (attained).

	Madurai.	Ramanatha- puram.	Tirunel- veli.	Total.
Number of sets distributed ..	320	405	247	972
Area benefited in acres ..	1,535	2,430	1,235	5,200
Additional production in tons ..	1,200	1,215	618	3,033

APPENDIX 3.

SCHEME No. 3—Central Agricultural Engineering Stores (oil engines and electric motors) (attained).

	Madurai.	Ramanatha- puram.	Tirunel- veli.	Total.
Number distributed ..	24	35	38	97
Area benefited in acres ..	190	200	250	640
Additional production in tons ..	105	126	125	356

APPENDIX 4.

SCHEME No. 4.—Tractor cultivation (attained).

	Madurai.	Ramanatha- puram.	Tirunel- veli.	Total.
Number of tractors ..	6	10	8	24
Number actually put to work ..	6	10	8	24
Area ploughed in acres ..	1,092	4,696	6,046	11,834
Additional production in tons ..	1,092	2,348	3,200	6,640

APPENDIX 5.

SCHEME No. 5.—Soil conservation and contour bunding (attained).

	Madurai.	Ramanatha- puram.	Tirunel- veli.	Total.
Terracing in acres ..	287	46	..	333
Levelling in acres ..	900	42	473	1,415
Contour bunding in acres ..	410	711	295	1,416

APPENDIX 6.

SCHEME No. 6.—Rural compost making (attained).

	Madurai.	Ramanatha- puram.	Tirunel- veli.	Total.
Quantity composted in tons ..	14,560	3,419	7,720	25,699
Quantity utilized or sold in tons ..	14,560	3,419	3,216	21,195
Area covered in acres ..	2,430	405	530	3,365
Additional production in tons ..	300	50	65	415
Number of places where pits were opened.	805	430	417	1,712

APPENDIX 7.

SCHEME No. 7.—Control of pests and diseases (attained).

	Madurai.	Ramanatha- puram.	Tirunel- veli.	Total.
Area of food crops covered in acres.	9,904	26,962	57,845	94,711

APPENDIX 8.

SCHEME No. 8.—Distribution of phosphatic manures including bonemeal (attained).

	Madurai.	Ramanatha- puram.	Tirunel- veli.	Total.
Quantity distributed in tons ..	443	38	547	1,028
Area covered in acres ..	12,390	768	1,560	14,658
Additional production in tons ..	350	39	455	844

APPENDIX 9.

SCHEME No. 9.—Distribution of ammonium sulphate (Attained).

	Madurai.	Ramanatha- puram.	Tirunel- veli.	Total.
Quantity distributed in tons ..	2,796	969	7,699	11,464
Area covered in acres ..	35,712	6,498	215,569	257,779
Additional production in tons ..	4,194	1,938	15,398	21,530

486

ADMINISTRATION REPORTS OF SUBORDINATE OFFICERS OF

APPENDIX 10.

SCHEME No. 10.—Intensive multiplication and distribution of paddy seeds (attained).

	Madurai.	Ramanatha- puram.	Tirunel- veli.	Total.
Quantity distributed in tons ..	1,066	95	707	1,868
Quantity distributed in tons ..	614	297	307	1,218
Area covered in acres ..	28,525	21,282	13,615	63,422
Additional production in tons ..	3,344	10,641	737	5,122
Area under seed farm in acres ..	2,490	535	1,366	4,391

APPENDIX 11.

SCHEME No. 11.—Green manures (attained).

	Madurai.	Ramanatha- puram.	Tirunel- veli.	Total.
Quantity of seeds purchased in tons.	10	4	65	79
Quantity of seeds distributed in tons.	25	21	21	67
Area covered in acres ..	3,000	3,206	1,536	7,742
Additional production in tons ..	420	430	210	1,060
Area under seed farms in acres ..	50	..	..	50

APPENDIX 12.

SCHEME No. 12.—Multiplication and distribution of improved millet seeds (attained).

A. Cholam.

	Madurai.	Ramanatha- puram.	Tirunel- veli.	Total.
Area of seed farm in acres ..	13	759	177	949
Quantity of seeds purchased in tons.	0-240 lbs.	Not harvested.	5	5-240
Quantity of seeds distributed in tons.	0-2015 lbs.	5	5	10-2015
Area covered in acres ..	183	759	695	1,637
Additional production in tons ..	0-161 lbs.	Not yet harvested.	40	40-161

B. Cumbu.

	Madurai.	Ramanatha- puram.	Tirunel- veli.	Total.
Area of seed farm in acres ..	34	648	495	1,177
Quantity of seeds purchased in tons.	0-150 lbs.	6	8	14-150
Quantity of seeds distributed in tons.	0-1140 lbs.	2	4	6-1140
Area covered in acres ..	188	778	1,435	2,451
Additional production in tons ..	0-80 lbs.	41	33	74-80

C. Ragi.

	Madurai.	Ramanatha- puram.	Tirunel- veli.	Total.
Area of seed farm in acres ..	142	363	125	630
Quantity of seeds purchased in tons.	0-1730 lbs.	9	2	11-1730
Quantity of seeds distributed in tons.	1-1825 lbs.	1	0-1264	3-849
Area covered in acres ..	630	363	252	1,245
Additional production in tons ..	0-484 lbs.	9	16	25-484

APPENDIX 13.

Area in acres.

	Madurai.	Ramanatha- puram.	Tirunelveli.	Total.
--	----------	----------------------	--------------	--------

(i) Short-term food crops.

Seed material of short-term alternative food crops distributed free—				
1 Sweet potato	100	..	18	118
2 Tapioca	10	..	13	23
Additional production in tons ..	513	..	122	635

(ii) Loans—(1) Number of loan applications actually sanctioned.

(a) Intensive manuring scheme.	5,529	..	5,886	11,415
(b) Seeds and manures ..	496	2,497	296	3,089
(c) Implements	11	92	45	148

(2) Amount actually disbursed.

(a) Intensive manuring scheme.	507,450	..	367,550	875,550
(b) Seeds and manures ..	40,000	238,710	19,700	298,410
(c) Implements	500	3,000	1,750	5,250

(iii) Extension work on green leaf manuring.

Quantity of seeds collected and distributed during the year, for growing economic trees of green leaf value in pounds.	8,400	1,989	5,793	16,612
Number of seedlings, cuttings and stumps distributed for planting trees and shrubs of economic and green leaf value.	5,566,575	467,190	2,038,375	8,072,140

APPENDIX 14.

Estimated increased production due to departmental activities.

	Area including natural spread in acres.	Additional production in tons.
1 By improved strains of—		
(a) Paddy	397,735	16,520
(b) Cholam	14,943	752
(c) Cumbu	25,224	1,420
(d) Ragi	11,707	660
2 By use of manures—		
(a) Ammonium sulphate and phosphate	426,740	33,900
(b) Cakes	22,916	2,840
(c) Green manures	22,082	2,294
(d) Rural compost	71,690	8,450
(e) Town refuse compost	5,125	780
3 New area brought under cultivation by tractor, etc. ..	5,673	290
4 Conversion of dry into irrigated area by well sinking, sale and hire of pumpsets.	94,711	2,200
5 By protection of crop against insect pests and diseases.	1,069	620
6 By soil conservation, contour bunding, etc.	..	..
Total	..	68,726

STATEMENT NO. 1.—Increased area brought under food crops.

	Area in acres.			Total.
	Madurai.	Ramanatha-puram.	Tirunelveli.	
1 Paddy	1,417	3,786	555	9,604
2 Cholam	1,165		..	
3 Cumbu	180		1,500	
4 Ragi	205		..	
5 Other millets	198		..	
6 Blackgram and other pulses.	..		..	
7 Onions	..		..	
8 Vegetables and root crops.	599		..	

STATEMENT NO. 2.—Number of new wells sunk and old wells renovated.

	Madurai.	Ramanatha-puram.	Tirunelveli.	Total.
1 Number of old wells renovated.	..	845	357	1,202
2 Number of new wells sunk.	..	196	..	196

STATEMENT NO. 3.—Fresh areas brought under irrigation.

	Madurai.	Ramanatha-puram.	Tirunelveli.	Total.
New area brought under irrigation in acres.	1,091	3,123	714	4,928

STATEMENT NO. 4.—Area under non-food crops diverted to food crops.

	Area in acres.			Total.
	Madurai.	Ramanatha-puram.	Tirunelveli.	
1 Groundnuts	710	410	..	5,330
2 Cotton		710	3,500	
3 Chillies		..	..	
4 Garlic		..	..	
5 Sugarcane		..	..	
6 Others		..	..	

STATEMENT NO. 5.—Additional area brought under short duration food crops.

	Area in acres.			Total.
	Madurai.	Ramanatha-puram.	Tirunelveli.	
1 Paddy	1,091	..	555	6,931
2 Ragi		1,700	..	
3 Cholam		785	..	
4 Cumbu		1,300	1,500	
5 Others		..	..	

STATEMENT NO. 6.—Additional area brought under sweet potato, tapioca, kurkan, etc.

	Area in acres.			Total.
	Madurai.	Ramanatha-puram.	Tirunelveli.	
1 Sweet potato	374	390	551	1,320
2 Tapioca		5	..	
3 Kurukan		..	..	

THE DEPARTMENT OF AGRICULTURE, MADRAS, 1951-52

489

STATEMENT NO. 7.—Percentage of increase in the production of foodcrops in this fasli as compared with the last fasli.

	Yield in fasli 1360 in tons.			Yield in fasli 1361 in tons.			Percentage of increase or decrease.		
	Madurai.	Ramanatha-puram.	Tirunelveli.	Madurai.	Ramanatha-puram.	Tirunelveli.	Madurai.	Ramanatha-puram.	Tirunelveli.
1 Paddy	268,631	5,676	258,338	268,363	8,705	29,213+2½	+4	..	..
2 Ragi	33,892	2,843	8,237	29,213+2½	..	..	+5	..	..
3 Cholam	146,860	9,664	31,042	12,732	..	..	..	..	..
4 Cumbu	12,020	3,433	7,406	..	..	..	..	..	..
5 Tenai	4,816	..	..	..	..	..	..	..	..
6 Vegetables including root crops.	21,470	..	..	..	..	..	..	..	..
Total for the division.									
	Yield in Fasli 1360 in tons.			Yield in Fasli 1361 in tons.			Percentage of increase or decrease.		
1 Paddy	..	..	..	814,328	841,590	+ 3.3	..	..	..
2 Ragi	..	..	..	..	..	..	..	..	..
3 Cholam	..	..	..	..	..	..	..	..	..
4 Cumbu	..	..	..	..	..	..	..	..	..
5 Tenai	..	..	..	..	..	..	..	..	..
6 Vegetables including root crops ..	..	..	..	..	..	..	..	..	..

STATEMENT NO. 8.—Quantity of seeds and manures distributed free—Area covered and additional quantity of food stuff produced.

	Quantity distributed in tons.			Area covered in acres.			Additional food stuff produced in tons.		
	Madurai.	Ramanatha-puram.	Tirunelveli.	Madurai.	Ramanatha-puram.	Tirunelveli.	Madurai.	Ramanatha-puram.	Tirunelveli.
Vegetable seeds	29 lb.	..	25 lb.	31	..	13	152	..	24
Sweet potato cuttings.	..	..	282,000	..	..	18	..	..	70
Tapioca cuttings	..	..	18,976	..	..	8	..	..	52
Ammonium sulphate.	..	..	..	..	..	..	..	..	..
Total for the division.									
	Quantity distributed.			Area covered in acres.			Additional food production in tons.		
Vegetable seeds	..	..	54 lb.	..	..	44	..	..	176
Sweet potato cuttings	..	..	282,000	..	..	18	..	..	70
Tapioca cuttings	..	..	18,976	..	..	8	..	..	52
Manures	..	..	..	..	..	..	..	..	..

STATEMENT NO. 9.—Waste lands reclaimed and brought under cultivation and foodgrains produced.

District.	Area in acres.	Foodgrains produced in tons.
Madurai	1,092	528
Ramanathapuram	3,786	1,890
Tirunelveli	1,506	65

STATEMENT No. 10.—Manures distributed, area covered and additional quantity of foodgrains produced.

Manures distributed and crops benefited.	Quantity distributed in tons.	Area covered in acres.	Additional quantity of food grains produced in tons.
1 Groundnut cake .. ..	.. ..	.. ..	.. ..
2 Bonemeal, sulphur and other phosphate manures, paddy.	1,025	Merged with ammonium sulphate, figures.	.. ..
3 Ammonium sulphate. Paddy.	11,197	270,993	21,000

STATEMENT No. 11.—Demonstration and propaganda—General.

The details regarding additions to the District Staff, hiring of petrol pump sets for irrigation, and well sinking, hiring of tractors; bulldozers are herewith furnished quantitatively in a statement form.

	Madurai.	Ramanathapuram.	Tirunelveli.	Total.
1 Addition to the district staff—				
Agricultural Demonstrators .. ..	.. ..	.. ..	.. ..	.. ..
Upper Division Clerks .. ..	.. ..	.. ..	.. ..	.. ..
Plant protection assistants .. ..	.. ..	.. ..	.. ..	.. ..
Fieldmen	3	7	8	18
Demonstration maistries	2	18	.. ..	20
2 Details of petrol pumpsets—				
Total number in stock	30	33	30	93
Number sold during the year .. ..	.. ..	.. ..	.. ..	.. ..
Number hired out	30	30	26	86
3 Details of tractors—				
Number of tractors working	6	10	8	24
Area ploughed in acres	1,092	4,698	8,048	11,834

STATEMENT No. 12-A.—Crops—Paddy.

(a) Quantity of improved strains distributed in tons	1,218
(b) Area covered by (a) in acres	56,384
(c) Quantity of green manure seeds supplied in tons	78
(d) Area covered by (c) in acres	8,128
(e) Quantity of phosphatic and other manures distributed in tons	9,416
(f) Area covered by (e) in acres	2,48,438
(g) Cultural improvements in numbers	866
(h) Area covered by (g) in acres	2,230
(i) Additional quantity produced due to (a) to (h) in tons	18,828

STATEMENT No. 12-B.—Crops—Paddy—Seed Multiplication Scheme.

(a) Area under seed farms	4,391
(b) Quantity purchased in tons	1,608
(c) Opening balance in tons	476
(d) Total quantity distributed in tons	1,218
(e) Area covered in acres	56,384
(f) Closing balance in tons	405

STATEMENT No. 13-A.—Crops—Millets.

	Ragi.	Gholam.	Cumbu.
(a) Quantity of improved strains distributed in tons	3-309	10-1,646	6-1,097
(b) Area covered by (a) in acres	2,688	1,194	2,451
(c) Quantity of green manure seeds supplied in tons .. ..	.. ..	.. ..	.. ..
(d) Area covered by (c) in acres .. ..	.. ..	.. ..	.. ..
(e) Quantity of phosphatic and other manures distributed in tons .. ..	.. ..	100	75
(f) Area covered by (e) in acres .. ..	.. ..	2,800	2,100
(g) Cultural improvements numbers .. ..	.. ..	.. ..	.. ..
(h) Area covered by (g) in acres .. ..	.. ..	.. ..	.. ..
(i) Additional quantity produced due to (a) to (h) in tons	66	197	196

STATEMENT No. 13-B.—Crops—Millets—Seeds Multiplication Scheme.

	Ragi.	Gholam.	Cumbu.
(a) Area under seed farms in acres	630	949	1,177
(b) Quantity of seeds produced in tons	10-1,505	4-166	12-1,972
(c) Opening balance in tons	14-644	14-644	14-644
(d) Total quantity distributed in tons	3-849	10-1,246	6-1,097
(e) Area covered in acres	2,298	1,637	1,088
(f) Closing balance in tons	8-1,427	0-97	5-1,623

STATEMENT No. 14-A.—Crops—Oil Seeds.

	Ground-nuts.	Castor.	Gingelly.
1 Area under improved strains in acres	9,481	86	538
2 Quantity of improved strains distributed in tons	3-1,190	0-278	4-359
3 Area covered in acres	98	59	78
4 Additional quantity produced in tons	4-336	1-420	0-349
5 Additional gain to cultivators in Rupees	2,644	60	65
6 Remarks on pests and diseases	Red Hairy caterpillar controlled by Hexidol 810. (On groundnuts.)		

STATEMENT No. 14-B.—Crops—Oil Seeds—Coconuts.

1 Number of seed nuts and seedlings distributed	3,023
2 A record on the performance of the trees distributed in the past	Satisfactory.
3 (a) Total number of trees from selected seeds and seedlings distributed in the past	2,010
(b) Number of trees in bearing	410
(c) Age at which the trees start bearing	6 to 8 years.
(d) Number of nuts purchased during the year .. ..	.. ..
(e) Average yield per tree	100 to 120 nuts per tree per year.

STATEMENT No. 15.—Introduction of plants—Fruits.

	Number distributed.	Area covered in acres.
1 Mango	218	7-50
2 Oranges and other citrus varieties	310	5-00
3 Grapes .. ..	.. ..	.. ..
4 Jack	4	House compounds.
5 Cashew nuts	150	5-00
6 Others	1,304	House compounds and school compounds.

STATEMENT No. 16.—Cultural and other improvements—Fruits—Area under improvements in acres.

	Mangoes.	Oranges.	Limes.	Others.
1 Cultural	171	9	41	15
2 Manurial	31	12	36	15
3 Irrigation	10	9	12	15
4 Control of pests and diseases	66	46	84	.. ..

STATEMENT No. 17.—Sugarcane.

Nature of improvements.	Numbers of Demonstrations.	Area covered in acres.
1 Cultural	201	194
2 Varietal	2	2
3 Manurial	53	49
4 Control of pests and diseases	114	158
5 Sindewake and other improved furnaces	1	.. ..
6 Jaggery manufacture	3	.. ..

STATEMENT No. 18 A.—Vegetable—Schemes.

1 Military Scheme	Nil.
2 Civil Scheme	Nil.

STATEMENT No. 18-B.—Vegetables—Non Scheme areas.

1 Total quantity of vegetable seeds supplied in pounds	656
2 Increased area due to departmental efforts in acres	675
3 Quantity of vegetables produced in Tons	1,687

STATEMENT No. 19-A.

1 Normal area in acres	158,405
2 (a) Additional area brought under fodder crops including natural spread in acres.	2,786
(b) Estimated quantity of fodder produced in tons	2,960
3 (a) Quantity of Fodder seeds supplied in pounds	4,616
(b) Quantity of grass slips supplied in numbers	41,500

STATEMENT No. 19-B.—Fodder Seeds and Slips distributed.

Cholam in pounds	4,230
Lucerne in pounds	44
Agathi, in pounds	53
Pillepesara in pounds	289
Kolakatti grass	..
Guinea grass slips, numbers	38,500
Others, numbers	3,000

STATEMENT No. 20.—Pulses.

I. Free Distribution Scheme—Nil.

II. Non-scheme areas.

1. Area brought under improved Strain in acres	10
2. Additional area brought under upluses in acres	7
3. Estimated additional quantity produced in tons	1-1,148 lbs.

STATEMENT No. 21.—Chillies—Nil.

STATEMENT No. 22-A.—Fibres—Cotton—Special Schemes.

(1) Co. 4, B. 40 Scheme—Ramanathapuram district only.

1 Quantity of seeds distributed in tons	153
2 Area covered in acres—	
Departmental spread	16,000
Natural spread	8,000
Total	24,000
3 Additional quantity of Kappas expected to be produced including natural spread in tons.	900 tons.
4 Additional gain to cultivators	12 lakhs of rupees.

STATEMENT No. 22-B—(2) 7406—(K. 2) Cotton Scheme Ramanathapuram and Tirunelveli districts

1 Quantity of seeds distributed in tons	185
2 Area covered in acres—	
Departmental Spread	30,000
Natural spread	80,000
Total	1,10,000
3 Additional quantity of kappas produced in tons	1,214
4 Additional gain to cultivators in rupees	10 Lakhs.

STATEMENT No. 22-C.—Fibres—Cotton—Scheme and Non-Scheme areas.

	Quantity of seeds distributed in tons.	Area covered including natural spread in acres.	Additional quantity of Kappas produced in Tons.	Additional gain to cultivators.
Co. 2, Cotton	5	215	1/8	Nil.
Madras Uganda 1	202	51,747	1,074	12,51,048
K. 2, Cotton	185	1,10,000	1,214	10,00,000
K. 5, Cotton	41	7,758	26	..

STATEMENT No. 23.

Tobacco	Normal Area	9,130 acres
-----------------	-------------	-------------

STATEMENT No. 24.

Pyrethrum	Nil.
-------------------	------

STATEMENT No. 25-A.—Seeds, Seedlings and cuttings of Economic and Green leaf yielding trees and shrubs distributed.

1 Number of seeds sown in pits or beds.	426,992
2 Number of seedlings or stumps planted	
Glyricidia	87,050
Sesbania	7,664,273
Vadanarayana	14,833
Poovarasu	3,304
Malaipoovarasu	5,713
Pungam	39,228
Vagai	29,313
Neem	26,982
Drumstick	2,795
Luciana glauca	3,090
Kapok	3,098
Tamarind	39,055
Others	19,995

STATEMENT No. 25-B.—Seeds of Economic and Green leaf yielding trees and shrubs collected. (Quantity given in pounds.)

Tamarind	984	Cassia varieties	2,688
Pungam	1,608	Erythrina Indica	622
Neem	600	Vagai	2,402
Glyricidia	12	Prosopis juliflora	182
	11,300	Mango stones	65,599
	cuttings.	Jumberi	1,598
Sesbania	2,382		numbers.
Luciana glauca	211	Others	1,204
			numbers.

STATEMENT No. 25-C.—Area of nurseries raised.

	Area in cents.	Number of places.
Glyricidia	60	45
Sesbania	646	640
Vagai	21	24
Tamarind	22	18
Others	41	110

STATEMENT No. 26-A.—Manures—Compost.

(a) Compost prepared by municipalities and panchayat boards—	
1 Number of places in which manufactured	66
2 Quantity produced in tons	266,283
3 Quantity used by ryots in tons	32,270
4 Estimated increase in production in tons	665
(b) Compost prepared in ryots dwellings—	
1 Number of places in which manufactured	1,712
2 Quantity prepared in tons	25,699
3 Quantity used by ryots in tons	21,185
4 Estimated increase in production in tons	415

STATEMENT 26-B.—Farm Yard Manure.

Cattle Manure—					
1	Number of pits opened	..	..	..	6,275
2	Number of pits renovated	..	..	..	3,934
Byro System—					
1	Number started	..	..	..	2,602
2	Number renovated	..	..	..	139
Loose Box System—					
1	Number started	..	..	..	..
2	Number renovated	..	..	..	..
Dry Earth System—					
1	Number started	..	..	..	2,154
2	Number renovated	..	..	..	..

STATEMENT 26-C.—Green Manures.

I Kolingi—					
(a)	Quantity of seeds distributed in tons	..	..	..	27½
(b)	Area covered in acres	..	..	..	3,042
(c)	Natural spread in acres	..	..	..	10,778
II Daincha—					
(a)	Quantity of seeds distributed in tons	..	..	..	4½
(b)	Area covered in acres	..	..	..	783
(c)	Natural spread in acres	..	..	..	1,972
III Sunnhemp—					
(a)	Quantity of seeds distributed in tons	..	..	..	22½
(b)	Area covered in acres	..	..	..	1,921
(c)	Natural spread in acres	..	..	..	515
IV Pillepesara—					
(a)	Quantity of seeds distributed in tons	..	..	..	9½
(b)	Area covered in acres	..	..	..	1,330
(c)	Natural spread in acres	..	..	..	..
V Others—					
(a)	Quantity of seeds distributed in tons	..	..	..	3
(b)	Area covered in acres	..	..	..	766
(c)	Natural spread in acres	..	..	..	..
VI Area under seed farm—					
(a)	Area in acres	..	..	..	50
(b)	Quantity produced in tons	..	..	..	79
(c)	Subsidy paid	..	..	..	..

STATEMENT No. 27.—Agricultural Implements, Tools and Machinery.

	Number distributed.	Number hired.	Number of demonstrations conducted.
1 Tractor and Bull dozers	..	24	..
2 Small ploughs	98	4	1,886
3 Other implements	..	..	430
4 Water lifts	35	..	120
5 Chaffcutters	..	..	2
6 Jaggery Pan, etc.	..	..	16
7 Trampler	4	2	33
8 Puddler	6	5	25
9 Buckscraper	..	10	63
10 Bund former	44	24	611
11 Others	1,835	22	80
12 Spares distributed	8,601	..	..

STATEMENT No. 28.—Soil Erosion.

	Number of demonstrations.	Area covered in acres.
(a) Terracing	122	333
(b) Levelling	131	1,415
(c) Contour bunding	225	1,416
(d) Construction of spill ways, check dams and gully plugging.	2	760
(e) Hedge planting of aloes	233	210
(f) Contour planting and ploughing	334	1,250

STATEMENT No. 29.—Area under improved strains of crops.

	Departmental spread in acres.	Natural spread in acres.	Total in acres.
1 Paddy	63,422	334,313	397,735
2 Cholam	1,637	13,306	14,943
3 Ragi	1,245	10,462	11,707
4 Cumbu	2,451	9,258	25,224
5 Groundnut	98	9,383	9,481
6 Cotton	88,902	82,818	169,720
7 Sugarcane	200	2,800	3,000
8 Kolingi	3,042	19,778	22,820
9 Daincha	783	1,972	2,755
10 Sunnhemp	1,921	515	2,436
11 Pillepesara	1,330	..	1,330
12 Other green-manure crops	768	5,250	6,016

STATEMENT No. 30.—Subsidiary Industries.

I Apiculture—			
1	Number of hives introduced	..	387
2	Progressive total	..	1,424
3	Quantity of honey produced in pounds	..	7,016
4	Report on the working of special Schemes	..	Nil
II Malt Making—Nil.			

STATEMENT No. 31-A.—Plant protection work—Crops, etc., treated.

Madurai district.

Posts.	Serial number and name of crops.	Name of pest.	Area tackled.	Remedial measures.
1 Paddy	..	Rice bug	487 acres.	Dusting of 10 per cent BHC.
	..	Green spotted	58	Dusting/405/DDT.
	..	Jassid	..	Spraying DDT. 550.
	..	Thrips	24	Dusting 10 per cent BHC.
	..	Army worm	17	Sprayed DDT. 550.
	..	Grass hopper	14½	Dusted 10 per cent BHC.
	..	Caseworm	3	Do.
	..	Hispa	1½	Do.
	..	Ear-head bug	120	Do.
	..	Mites	107	Dusting Sulphur.
	..	Ear-head bug	5	Dusted 10 per cent BHC.
	..	Flea-beetle	55	Sprayed H. 950.
	..	Cutworm	130	Sprayed H. 950.
	..	Epilachna	289	Sprayed Cal. Arsenate.
7 Cabbage	..	Leaf noctuid	28	Do.
	..	Jassid	28	Dusted 405-50.
	..	Diamond back moth.	12	Sprayed DDT. 550.
	..	Epilachna	2	Sprayed Cl. Arsenate.
8 Bitter gourd	..	Thrips	1,920	Sprayed and dusted BHC.
	..	Thrips	3	Do.
	..	Aphid and cutworms.	37	Do.
	..	Thrips	50	Do.
13 Sugarcane	..	Mealy bug	23	Sprayed H. 950.
	..	Red hairy caterpillar.	..	Dusted and Sprayed BHC.
	..	Pod borer	20	Sprayed 550.
	..	Rhinoceros	250 trees.	Removed the beetle and applied mixture of 10 per cent. BHC. and sand.
17 Mango	..	Parasalapida	10 trees.	Sprayed G. N. Oil emulsion.
	..	Hopper	700 do.	Sprayed DDT. 550.
	..	Leaf webber	500 do.	Do.
	..	Red ants	250 do.	Sprayed H. 950.

STATEMENT No. 31-A—Plant protection works—Crops etc., treated—cont.

Madurai district—cont.

Pests—cont.

Serial number and name of crops.	Name of pests.	Area tackled.	Remedial measures
18 Citrus	Mites	1,500 trees.	Dusted fine sulphur.
	Thrips	550 do.	Sprayed H. 950.
	Aphids	100 do.	Do.
19 Grapes	Flea beetle	185 acres.	Sprayed DDT. 550 and H. 950.
20 Cotton	Leaf roller	40 do.	Dusted cotton dust.
	Boll worm	40 do.	Do.
	Thrips and Aphids	24 do.	Sprayed H. 950.
21 Paddy	Rodent	2,515 do.	Applied Zinc Phosphide baits.

Mycology.

Crops.	Diseases.	Preventive measures adopted.	Area covered in acres.
Paddy	Blast	Spraying of Bordeaux mixture and also spraying of Perenox.	15
	Green Algae	Dissolving of crystals of copper sulphate.	190
	Foot-rot	Seed treatment with Agrosan G.N.	4,511
Cholam	Grain Smut	Seed treatment with sulphur.	3,708
Grapevine	Mildew	Spraying of Bordeaux mixture and dusting of sulphur.	162
Citrus	Cankar and Die back.	Judicious pruning and spraying of Bordeaux mixture.	3,905
	Frenching	Application of zinc sulphate and lime-mixture.	1,570
	Mildew and Mites	Dusting of sulphur	1,400
Chillies	Wilt and fruit rot	Spraying of Perenox and Bordeaux mixture.	104
Coffee	Rust and sooty mould.	Spraying of Bordeaux mixture.	25

Ramanathapuram.

Paddy	Blast	Sprayed 1 per cent Bordeaux mixture.	73.8
Paddy	Foot rot	Treating seeds with Agrosan G.N.	14,980.3
Ragi	Blast	Spraying 1 per cent Bordeaux mixture or Perenox.	60.20
Cholam	Grain smut	Treating with sulphur	9,253.0
Chillies	Dieback and fruit rot.	Spraying of Perenox or 1 per cent Bordeaux mixture.	881.5
Onion	Die back	Spraying of Perenox	16.2
Grapewine	Mildew	Spraying of 1 per cent Bordeaux mixture.	15.0
Yam	Die back	Spraying of 1 per cent Bordeaux mixture.	4.00
Tomato	Leaf blight	Spraying of 1 per cent Bordeaux mixture.	3.10
Tobacco	Black shank	Drenching stem with 1 per cent Bordeaux mixture.	2.00
Groundnut	Wilt	Removal of wilted plants.	6.00
Citrus	Cankar and Die back.	Spraying of 1 per cent Bordeaux mixture.	232
Citrus	Follicellosis	Spraying of zinc sulphate.	140
Mango	Die back.	Spraying of 1 per cent Bordeaux mixture.	43
Plantain	Helminthosporium	Spraying of 1 per cent Bordeaux mixture.	50
Plantain	Panama disease	Removal of diseased plants and application of lime.	
Coconut	Bud rot	Spraying of 1 per cent Bordeaux mixture.	130

Pests.

Crop.	Pests	Extent.	Remedial measures.
1 Paddy	Rice bug	273.50 acres.	Dusting 10 per cent B.H.C.
Do.	Jassid	199.25 ..	Dusting Guesarol 405 or spraying Guesarol 550.
Do.	Stem borer	3.00 ..	Sprayed Guesarol 550.
Do.	Mealy bug	146.00 ..	Sprayed Hexidol 950 at one lb. in 13 gallons.
Do.	Atharigona fly	39.00 ..	Sprayed Hexidole 950.
Do.	White ants	4.00 ..	Application of crud oil emulsion.
Do.	Oxya velox grass-hopper.	22.00 ..	Dusted 10 per cent BHC.
2 Cholam	Mite	118.00 ..	Dusted sulphur.
Do.	Stem borer	17.00 ..	Dusted D. 120 as prevention.
Do.	Earhead bug	660.00 ..	Dusted 10 per cent BHC.
Do.	Aphis	10.00 ..	Do.
3 Ragi	Flea beetle	104.20 ..	Dusted G.205 or ten per cent BHC.
Do.	Cut worm (Laphygma).	947.00 ..	Dusted Guesarol 405 or sprayed Guesarol 550.
4 Cumbu	Grasshopper	49.50 ..	Dusted 10 per cent BHC.
5 Brinjal	Epilachna	891.00 ..	Sprayed or dusted. Calcium arsenate.
Do.	Tingids	99.00 ..	Dusted Guesarol 405-50 or sprayed Guesarol 550.
Do.	Jassids	118.00 ..	Dusted Guesarol 405.50.
Do.	Aphis	47.00 ..	Sprayed fish oil soap.
Do.	Mealy bug	12.00 ..	Sprayed Guesarol 550.
6 Onion	Thrips	118.50 ..	Sprayed Hexidol 950.
Do.	Cutworm	12.00 ..	Sprayed Guesarol 550.
7 Sweet potato.	Mite	2.00 ..	Dusted Sulphur.
8 Red gram	Leaf folder	49.00 ..	Dusted 10 per cent BHC.
9 Chillies	Thrips	8,764.00 ..	Sprayed or dusted BHC.
Do.	Scales	2.00 ..	Sprayed kerosene oil emulsion.
Do.	Aphis	45.00 ..	Sprayed BHC.
Do.	Field rats	32.00 ..	Zinc phosphide baits.
Do.	Prodenia caterpillar.	48.00 ..	Sprayed Guesarol 550.
10 Gingelly	Gingelly bug	3.00 ..	Dusted 10 per cent BHC.
11 Cotton	Jassid thrip and aphid.	546.00 ..	Dusted cotton dust.
Do.	Red cotton bug	392.00 ..	Dusted 10 per cent BHC. or cotton dust or sprayed BHC.
Do.	Grasshopper	64.00 ..	Dusted 10 per cent BHC.
12 Groundnut	Surulpoochi	24.00 ..	Sprayed Guesarol 550.
Do.	Red hairy caterpillar.	119.00 ..	Dusted 10 per cent BHC.
13 Agathi	Jassid	4.10 ..	Dusted Guesarol 405.
Do.	Prodenia	6.00 ..	Sprayed Guesarol 550.
14 Mango	Webber	42 trees.	Sprayed Guesarol 550.
Do.	Mangohopper	1,426 ..	Do.
15 Citrus	Aphis	135 ..	Sprayed Hexidole 950.
Do.	Fruit fall prevention.	105 ..	Sprayed Phymone.

Tirunelveli district.

Pests and diseases.	Pests and diseases noted.
Paddy	Jassid, stem borer, rice bug, field rats, Piricularia Helminthosporium.
Samai	Leaf Caterpillars.
Cholam	Flea beetle, mites, stem borer, short smut.
Ragi	Leaf noctuids.
Brinjal	Epilachna, shoots and fruit borer, mealy bug, aphids, little leaf disease.
Bendai	Borer, jassids.
Citrus	Leaf miner, lemon butterfly, cankar, die back, Follicellosis.
Mangoes	Mangohoppers, gall flies, leaf drying, mildew.
Grapes	Flea beetle, Mildew.
Chillies	Thrips, fruit rot.
Cotton	Jassids, aphids, black arm disease.
Cocoanuts	Rhinoceros beetle, field rats.

STATEMENT No. 31 (b)—*Pests and diseases—Demonstration conducted.*

	<i>Pests.</i>	<i>Diseases.</i>
Aera in acres	23,784	77,868
Plants in numbers	7,455	25,773
Nursaries acres	..	..
Pretreatment of seeds in tons	..	29

STATEMENT No. 32.—*Quantities of Fungicides used in the Division.*

	<i>Quantity used in.</i>	
	<i>Tons.</i>	<i>Lb.</i>
DDT. 550	2	185
DDT. 405	1	1,629
DDT. 405-50s	1	38
D. 120	30	1,982
D.O. 24	0	163
Hexidole 805	3	107
Hexidole 810	21	107
Hexidole 950	73	2,117
Agroicide	0	328
G. 205 P.	0	2,203
Cotton dust	2	2,041
Fish oil soap	0	112
Calcium arsenate	1	1,124
Lead arsenate	0	151
Pyro dust	0	20
Zinc phosphide	0	351
Copper sulphate	6	1,107
Sulphur	5	790
Zinc sulphate	0	912
Perenox	1	553
Agrosan G.N.	1	786
Total ..	154	1,126

Agri Tree killer 12 Gallons.

STATEMENT No. 33.—*Exhibitions and Shows.*

- 1 Number held—17.
- 2 Number of places in which held—17.
- 3 Expenditure incurred—Rs. 243-14-0.

STATEMENT No. 34—*Work done through other Agencies.*

Madurai. Ramanathapuram. Tirunelveli.

I. *Agricultural Associations—*

1 Number started	38	186	30
2 Progressive total	57	220	44
3 Total number of members ..	2,350	2,080	360
4 Number of meetings held ..	97	440	65
5 Work done through the agencies during the year quantitatively.	Compost preparation. Resolved to get electric energy for Agricultural purposes.	Compost preparation and running seed farms.	Demonstrating and publishing the activities of the department.

II. *Advisory Committee—*

1 Number started	12	..	113
2 Meetings held	..	..	130

III. *Education—*

29 lb. of vegetable seeds were distributed free of cost for school gardens. Rs. 100 worth of vegetable seeds given to 70 schools. Propagation of green manure crops like Sesbania, Glyricidia, etc.

IV. *Veterinary*

Nil. Proper feeding of animals.

V. *Co-operation*

Distribution of manures, iron and steel was continued. Sale of improved paddy seeds was taken up by the co-operative societies during the year under report.

VI. *Revenue*

Sowing prosopis Juliflora along the margins of roads. Raising of seedlings of economic plants in Travellers Bungalow compounds and planting them on road margins.

STATEMENT No. 35.—*Sugar Excise fund—Nil.*STATEMENT No. 36.—*Sugarcane Auxiliary Scheme—Nil.*STATEMENT No. 37.—*The Koya Uplift Scheme—Nil.*STATEMENT No. 38.—*Special Schemes—Nil.*STATEMENT No. 39.—*Loans.*

	<i>Number of loans sanctioned.</i>			<i>Amount of loan sanctioned.</i>		
	<i>Madurai.</i>	<i>Ramanathapuram.</i>	<i>Tirunelveli.</i>	<i>Madurai.</i>	<i>Ramanathapuram.</i>	<i>Tirunelveli.</i>
1 Seeds and Manures Interest free.	496	2,497	296	40,000	2,38,710	19,700
2 Intensive Manuring Scheme.	5,529	..	5,886	5,07,450	..	3,67,550
3 Purchase of implements.	11	92	45	500	3,000	1,750

STATEMENT No. 40—Details of work done in the Rural Welfare Centres during 1951-52.

	Madurai District.	Ramanathapuram district.
Planting green leaf yielding and economic trees, and shrubs.	12,800 Nos.	6,700 Nos.
Compost—Preparation	4,350 tons.	4,526 tons.
Preservation of manures—		
New pits opened	304	79
Old pits renovated	3,103	219
Dry earth cattle-sheds and byre systems ..	536	65
Fuel trees—Prosopis Juliflora dibbled ..	40 miles.	..
Sale of improved implements	Nil.	77
Demonstration with improved implements ..	403 Nos.	189 Nos.
Tractor ploughing	372 acres.	312 acres.
Bull dozer levelling	210 hours.	..
Bunding to prevent soil-erosion	23 acres.	..
Control of pest and diseases	327 acres.	3,153 acres.
Quantity of insecticides and fungicides, sold ..	1 ton.	9 tons.
Loans sanctioned for seeds and manures ..	Rs. 9,000	Rs. 40,310
Beehives introduced	25	42
Mezichelvam subscribers canvassed	756	..
Poultry—Introduction of	18 Nos.	..
Exhibitions conducted	2	..
Shows held	52	..
Crop competition entries	12	..
Ammonium sulphate distributed	65 tons.	..
Super phosphate distributed	6 tons.	..
Bonemeal distributed	..	2 tons.

List of temporary and permanent posts.

Name of service and post.	Number of sanctioned posts.	
	Permanent.	Temporary.
1 Madras Agricultural Service—		
Regional Deputy Director of Agriculture	..	1
2 Madras Agricultural Subordinate Service—		
1 Upper subordinates	1	1
2 Fieldmen	3	1
3 Madras General Subordinate Service—		
1 Demonstration Maistries	..	..
4 Madras Ministerial Service—		
1 Upper division clerk	..	1
2 Lower division clerks	..	3
3 Typist	..	1
5 Madras inferior Service—		
1 Peons	..	5

ADMINISTRATION REPORT OF THE DEPUTY DIRECTOR OF AGRICULTURE, COIMBATORE DIVISION, FOR THE YEAR 1951-52 (FASLI YEAR 1361).

I submit below the Administration Report of the Eighth Regional Division comprising of Coimbatore, The Nilgiris, North Malabar, South Malabar and South Kanara districts. I was also in charge of the administrative control of the Agricultural Research Station, Taliparamba, the Agricultural Research Station, Nanjanad, the Wynaad Colonization Scheme, the Government Botanic Gardens, Ootacamund, and the Seed Multiplication Scheme of cotton seeds.

It may not be out of place here to mention that this is the biggest division in the State having five districts under its jurisdiction and five stations under its administrative control. The work of the ten Gazetted Officers which has considerably increased has to be supervised by the Deputy Director of Agriculture, Coimbatore division.

I. Charge.—During the year under review there were frequent changes in the personnel of the Deputy Director of Agriculture of this division.

Sri M. Satyanarayana held charge of this division for 13 days from 1st to 13th July 1951. He was succeeded by Sri S. S. Katchapeswaran who held charge of this division from 14th July 1951 to 4th February 1952. Mr. T. S. Francis succeeded as Deputy Director of Agriculture for a short period from 5th to 22nd February 1952. From 23rd February 1952 till the end of the year, I held charge of this division.

The names of officers who held charge of the various posts in the division during the year are detailed below :—

District Agricultural Officers in Coimbatore division.

(1) *District Agricultural Officer, The Nilgiris district.*—Sri P. N. Nayar, from 1st July 1951 to 30th June 1952.

(2) *District Agricultural Officer, Coimbatore district.*—Sri K. Sivasankara Menon, from 1st July 1951 to 25th April 1952 and Sri M. Mukundan, from 26th April 1952 to 30th June 1952.

(3) *District Agricultural Officer, South Malabar district.*—Sri M. Gopala Unnithan, from 1st July 1951 to 1st December 1951, Sri N. K. Thomas in full additional charge from 2nd to 10th December 1951 and Sri N. Srinivasa Rao, from 11th December 1951 to 30th June 1952.

(4) *District Agricultural Officer, North Malabar district.*—Sri K. Sanjiva Shetty, from 1st July 1951 to 30th June 1952.

(5) *District Agricultural Officer, South Kanara district.*—Sri K. S. Ramanna Rai, from 1st July 1951 to 30th June 1952.

Other Heads of Offices in Coimbatore division.

(1) *Superintendent, Agricultural Research Station, Nanjanad.*—Sri P. Uttaman, from 1st to 10th July 1951, Sri M. D. Azariah, Farm Manager, in full additional charge from 10th July 1951 to 19th August 1951, and Sri K. Saptharishi, from 20th August 1951 to 30th June 1952.

(2) *Superintendent, Wynaad Colonization Scheme.*—Sri P. G. Kurup, from 1st to 15th July 1951, Sri K. Sambamurthi, from 16th July 1951 to 15th September 1951 and Sri P. G. Kurup, from 16th September 1951 to 30th June 1952.

(3) *Pepper Specialist, Agricultural Research Station, Taliparamba.*—Dr. P. Abraham, from 1st July 1951 to 30th June 1952.

(4) *Curator, Government Botanic Gardens, Ootacamund.*—Dr. S. Krishnamurthi, from 1st to 25th July 1951 and Sri P. N. Nayar, in full additional charge from 26th July 1951 to 30th June 1952.

(5) *Assistant Cotton Specialist, Tiruppur.*—Sri N. G. Narayana, from 1st July 1951 to 30th June 1952.

The District Agricultural Officers were assisted by a Personal Assistant of the cadre of a senior Agricultural Demonstrator and Ministerial staff in office work and by Agricultural Demonstrators at one for each taluk with fieldmen and demonstration maistries in district work. The District Agricultural Officer, Ootacamund, however, had no Personal Assistant to help him in his office work. In addition to regular Agricultural Demonstrators, Additional Agricultural Demonstrators were also working during the year in some heavy taluks. Two Plant Protection Assistants, one for Entomology and the other for Mycology, for each district were continued during this year also to attend exclusively to crop and plant protection work and control of pests and diseases. In the Nilgiris, however, a special Entomology Assistant for Coffee Pest Act was working throughout the year.

The sugarcane development work in Coimbatore and South Kanara districts was attended to by three Agricultural Demonstrators, two in the former and one in the latter. All these Agricultural Demonstrators were working under the control of the District Agricultural Officers concerned.

One Seed Development Assistant was working in South Kanara district under the control of the District Agricultural Officer, Mangalore.

II. Grow More Food Campaign—

(1) *Land development by mechanical cultivation and installation of pump-sets*

Number of tractors used for ploughing—31.

Number of tractors used for pumping—5.

Number of bull dozers worked—15.

Area ploughed with tractors—

(a) Virgin lands—435.79 acres.

(b) Cultivated lands—26,920.10 acres.

Harrowing—159 acres.

Area levelled with bull dozers—524.98 acres.

Estimated additional production in tons of foodgrains—269.44 tons.

Number of oil engines and petrol pump-sets hired—48 numbers.

Area irrigated by the above—510 acres.

Number of pump-sets sold to ryots—1.

Additional production of foodgrains by hiring of pump-sets—227 tons.

(2) *Production and distribution of compost from town refuse—*

(a) Number of municipalities and panchayats manufacturing compost—53 numbers.

(b) Quantity of compost produced—53,886 tons.

(c) Quantity of compost applied on land—39,435 tons.

(d) Estimated increase in production of foodgrains—820.8 tons.

(3) *Rural compost making—*

Number of villages where compost were manufactured—1,222 numbers.

Number of compost pits opened—7,789 numbers.

Quantity of compost manufactured—33,033 tons.

Quantity of compost applied to crops—24,103 tons.

Estimated additional production of foodgrains—779 tons.

Subsidy paid to ryots—Rs. 17,313.

(4) *State Trading Schemes for purchase of manures, seeds, iron and steel.*—The schemes were not run under departmental aegis except for the fact that the department acted as wholesale stockists of chemical manures. The sale of iron and steel, chemical manures, etc., was entrusted to the co-operative societies and tender firms.

(5) *Scheme for (comprehensive) multiplication and distribution of improved seeds of paddy, millets, pulses, groundnut, gingelly and green manure.*—The comprehensive scheme assumed an altered form known as Intensive Cultivation Self-Sufficiency Scheme.

(6) *Control of pests and diseases.*—In order to keep a protective and preventive watch two Plant Protection Assistants (one for Entomology and the other for Mycology) were employed in each district. These assistants were appointed not only for remedial measures but also for taking preventive steps in collaboration with the field staff. The Pest Act on the control of "Bud Rot" of palms was extended to the entire district of North Malabar. In the Nilgiris, owing to drought conditions caused by the failure of monsoon rains, there was heavy attack of cut worms on potatoes. In Coimbatore district, foot rot on paddy, smut on cholam, thrips on chillies and stem borers on sugarcane were effectively controlled by the Plant Protection staff. In South Kanara district the major pests noticed were Spodoptera, Caseworm Hispa, etc., on paddy, Nephantis and Rhinoceros beetle on coconut and Mahali disease on arecanut, etc.

(7) *Free distribution of vegetable seeds to schools and land colonization societies.*—To popularize the cultivation of vegetables and to solve the present food problem to a small extent, vegetable seeds were issued to schools and land colonization societies—

Quantity of seeds supplied—164 lb.

Estimated area grown—492 acres.

Additional estimated production—1,920 tons.

(8) *Items done under short-term food production.*—Seed materials of short-term food crops like tapioca, sweet potato, kurkan, etc., were supplied to ryots at concessional rate—

Seed materials like tapioca, sweet potato, etc.—9,20,700 sets and 1 ton 1,360 lb.

Area covered—270 acres.

Additional production estimated—517 tons.

III. *Season and its effects on crops.*—The total rainfall recorded in North Malabar during the year was 111.81 inches as against the average of 139.43 inches for the last three years. The south-west monsoon was not evenly distributed throughout the period with the result that it caused some set back to the first crop of paddy. Inadequate rains in July affected the dry paddy crops. The rain during September interfered with the harvest and threshing of paddy. The north-east monsoon rains were inadequate and this affected

the second crop paddy in high-level areas. Though the hot weather rains were poor they were well distributed which enabled the ryots to prepare their lands for sowing paddy.

In the Nilgiris, the south-west monsoon was erratic in distribution. The monsoon which commenced in time gave hope of a favourable season. The monsoon was active in July, but weakened in August and revived in September. The north-east monsoon proved a failure, though unusually heavy in November. The hot weather rains in plateau regions were satisfactory. Both the monsoons during the year may be stated to be poor and disappointing.

In South Malabar district, the south-west monsoon was late with a rainfall of 37.69 inches as against 54.67 inches during last year. The late receipt of the rains and its insufficiency and unevenness in distribution adversely affected the growth of the first crop of paddy. The hot weather rains were inadequate which delayed the normal preparatory operations for the first crop paddy. In short, the season was not normal. Hence the production of food crops, especially that of the first crop of paddy was below normal.

The South Kanara district recorded a rainfall of 135.66 inches as against 148.51 inches in the previous year. The rainfall was not only less than the normal, but also uneven. The south-west monsoon which started well in June was disappointing in July and unevenly distributed in August. The uneven spread and dry intermittent spells adversely affected standing crops. The north-east monsoon though it commenced with promise but failed in the latter part. This adversely affected the irrigation sources. The conspicuous absence of summer showers in May delayed the sowings of nurseries for first crop paddy. The season as a whole was reported to be not satisfactory.

The total precipitation of 21.7 inches as against 20.96 inches in the previous year in the district of Coimbatore was below normal. The seasonal conditions were not favourable for production of normal crops. The monsoon was a failure in succession for the fourth year. The result is that the water level in tanks and wells went down and droughty conditions prevailed. Garden and dry land cultivation suffered for want of rains. On account of drought, food crops like ragi, money crops like cotton and tobacco did not yield even three-fourths of the normal yields. The season on the whole was disappointing.

IV. Propaganda and demonstration.—The adverse seasonal conditions stood in the way of agricultural propaganda measures being implemented with beneficial results. The entire staff in the districts strived their level best to carry on propaganda and demonstration on the popularization of Grow More Food Schemes, the running of seed farms under paddy, potatoes, cotton, millets, etc., on the effective manuring of crops, on the proper method of composting farm waste and preservation of cattle manure, etc. The district staff was also engaged in the planting of quick growing plants and trees for green manure leaves and control of pests and diseases, demonstration of improved and labour saving implements, procurement of seed farm produce, the distribution of Takkavi loans and in the supply of pipes and pumping machinery to ryots. The celebration of compost week and Vanamahotsava and the harvest of crop competition plots were some of the other items of work that engaged the district staff. The Engineering section endeavoured

to help the ryots in the matter of supply of pipes and fittings and hiring of pumpsets and tractors. The ryots have become more inclined to resort to mechanized agriculture and the demand for tractors, bulldozers, pumps and engines has assumed a great proportion.

(1) *Crops—*

Paddy—

(a) Quantity of improved strains distributed ..	877 tons.
(b) Area covered by (a)	32,453 acres.
(c) Quantity of green manure seeds distributed ..	77 tons.
(d) Area covered by (c)	9,408 acres.
(e) Quantity of phosphatic manures distributed ..	1,977 tons.
(f) Area covered by (e)	53,095 acres.
(g) Cultural improvements, economic planting and reduction in seed rate by raising cent nurseries (exclusive of South Kanara district).	8,896 "
(h) Area covered by (g)	44,778 "
(i) Additional production of produce due to (a) to (h).	7,263 tons.

(2) *Seed Multiplication Scheme—*

Places—

South Kanara district	Six taluks.
Coimbatore district	Ten taluks.
North Malabar district	Four taluks.
South Malabar district	Six taluks.

(a) *Paddy—*

Extent of seed farms arranged	4,465 acres.
Quantity of seed produced	807 tons.
Opening balance	259 "
Closing balance (exclusive of South Malabar district).	235 "

(b) *Millets, Ragi, Cumbu, etc.—*

(a) Quantity of improved strains distributed ..	13 tons.
(b) Area covered by (a)	1,894 acres.
(c) Quantity of phosphatic and other manures distributed (in Coimbatore district)	133 tons.
(d) Area covered by (c) (in Coimbatore district) ..	2,660 acres.
(e) Additional quantity of millets produced due to (a) to (d) (in Coimbatore district only).	300 tons.

Seed Multiplication Scheme—

Millets—

Extent of seed farms arranged	1,106 acres
Quantity produced	2 tons.
Opening balance	17 "
Total quantity distributed	12 "
Area covered.	2,750 acres
Closing balance (in Coimbatore district only).	7 tons.

(c) *Fruits.*—

Kind of variety.						Number distributed.	Area covered. ACS.
Citrus	..	..	..	..	..	1,425	306
Mangoes	..	..	..	..	..	6,217	
Sapota	..	..	..	..	..	1,546	
Guava	..	..	..	..	..	110	
Papaya	..	..	..	..	..	406	
Jack fruit	..	..	..	..	..	145	
Lemon	..	..	..	..	..	1,516	
Bread fruit	..	..	..	..	..	350	
Gooseberry	..	..	..	..	..	759	
Plantains	..	..	..	..	..	45,269	
Cashewnut	..	..	..	..	..	200	
Pineapple sucker	..	..	..	..	..	79,425	
Oranges	..	..	..	..	..	1,300	
Mangosteen	..	..	..	..	..	560	
Passion fruit	..	..	..	..	..	491	
Plum	..	..	..	..	..	1,532	
Pears	..	..	..	..	..	1,799	
Peaches	..	..	..	..	..	751	
Tree tomatoes	..	..	..	..	..	119	
Miscellaneous	..	..	..	..	..	539	

(3) *Cultural and other improvements.*—

Kind of improvement.						Area. ACS.
Cultural	..	..	..	..	..	6,619
Manurial	..	..	..	..	..	27,085
Varietal	..	..	..	..	..	2,387
Irrigation	..	..	..	..	..	229
Pests and diseases	..	..	..	..	..	462

Remarks—(1) Intensive cultivation with iron ploughs and raising of green manure trees.
 (2) Manuring with manure mixtures, bonemeal, superphosphate and ammonium sulphate.

(3) Ring method of irrigation.

(4) Spraying with Bordeaux mixture, zinc sulphate, D.D.T., etc.

Sugarcane.—

Nature of improvement.						Number of demonstrations.	Area. ACS.
Cultural	..	..	..	..	..	526	1,970
Varietal	..	..	..	..	..	71	66
Manurial	..	..	..	..	..	751	5,003
Jaggery making	..	..	..	..	..	212	..
Sindwahe furnaces	..	..	..	..	..	28	..
Control of pests and diseases	..	..	..	..	..	115	285

Sugarcane is only a minor crop in North and South Malabar and the Nilgiris.

(4) *Vegetables.*—

Total quantity of vegetable seeds supplied	988 lb.
Number of seedlings sold	445 Nos.
Increase in area due to departmental efforts	1,412 acres.
Estimated production	6,082 tons.

(5) *Fodder.*—

Normal area (excluding Nilgiris, North and South Malabar).	5,739 acres.
Additional area brought under fodder including normal spread.	556 ..
Estimated quantity of fodder produced (exclusive of Coimbatore and South Malabar).	462 tons.
Quantity of fodder seeds supplied (exclusive of South Malabar).	566 lb.
Slips supplied	131,225 slips.
Fodder farm and special schemes, if any	There are no schemes or fodder farms run by the department in this division. Silage with hill grass was made by one ryot in Chirakkal taluk near A.R.S., Tali-paramba who was paid a subsidy of Rs. 94.

The Coimbatore Municipality is running a grass farm under sewage irrigation.

(6) *Pulses—Redgram, etc.*—

(a) Area of seed farm arranged (in Coimbatore district only).	20 acres.
(b) Quantity procured	..
(c) Opening balance on 1st July 1951	375 lb.
(d) Quantity distributed	320 ..
(e) Closing balance on 30th June 1952	55 ..

A quantity of 108 lb. of redgram and horsegram and cowpea were distributed in South Malabar district.

Chillies.—

(a) Normal area South Kanara, North Malabar and Coimbatore only.	20,467 acres.
(b) Quantity of seeds distributed	12.5 lb. and 10.5 lb of pods were distributed in Coimbatore, North and South Malabar only.
Area covered.	Fifteen acres in Coimbatore district only.

The information is not available in respect of other districts.

(7) Oil Seeds.—

Name of strain.	Area under improved strains.	Quantity of seed sold.	Area covered	Additional quantity procured.	Additional gain to ryots.
Groundnut	9,000 (in Coimbatore district only).	1,520 lb. (in South and North Malabar and Coimbatore).	3 acres in Coimbatore only.	1/2 a ton.	Rs. 200 in Coimbatore only.
Gingelly	1,000 (in Coimbatore district only).	125 lb. (in South and North Malabar and Coimbatore).	4 acres.	1/16 ton (Coimbatore).	Rs. 50 (Coimbatore).
Castor	80 (in Coimbatore district only).	16 lb.	1 acre	..	Rs. 25
Coconut	Nil.	13,890 Nos.	..	..	..

Seed Multiplication Scheme—Oil seeds—Seed farm average.—

Area.	Quantity produced.	Opening balance.	Quantity sold.	Area covered.	Closing balance.
12.75 acres.	1,035 lb. pods.	..	1,255 lb.	..	..

The information was not furnished by the District Agricultural Officers other than District Agricultural Officer, South Malabar. Even the District Agricultural Officer, South Malabar, has not submitted full information on this.

(8) Fibres.—Cotton.

The major portion of cotton area is in Coimbatore district. A special scheme for the multiplication of Co. 2 and K. 5 was run under the control of Assistant Cotton Specialist, Tiruppur, in Palladam, Avanashi and Coimbatore taluks.

A separate report on this was submitted by the Assistant Cotton Specialist, Tiruppur. The area under cotton is negligible in other districts.

Variety.	Quantity distributed.	Area covered.
	LB.	ACS.
Co. 2	98,792	9,879
MU-1	93,502	9,345
K-5.	82,790	10,350
P.216F	65	1
Co. 4 B-40	250	3

(9) Gogu.—The area is very negligible in this division. Six pounds of mesta seeds were distributed in South Malabar district. The progress is said to be not very satisfactory.

(10) Tobacco.—No development work was carried on in this division on tobacco.

(11) Pyrethrum.—The area under this crop is practically nil. The Forest Department is planning to undertake cultivation on a large scale in the Nilgiris.

(12) Tree planting.—The Tree Planting Week was celebrated with increased zeal and vigour during this year. The importance and significance of planting trees were explained to the public. Nurseries were prepared in advance and seeds of trees of economic importance were purchased and

distributed. The response for this national festival was very good and results were encouraging. Special meetings and processions of school children were arranged and ceremonial plantings were done during the week.

Stumps planted—220,285.

Seedlings planted—822,520.

Nurseries raised—485.

Seeds distributed—1,407 lb.

(13) Cattle manure preservation—

Number of new pits dug—3,782.

Number of old pits renovated—5,199.

Dry earth sheds newly constructed—1,115.

Dry earth sheds renovated—924.

Loose box system—63.

Loose box renovated—230.

Byre system of collecting urine of cattle—799

(14) Green manure—

Kind of seed.	Quantity distributed.		Area covered.
	TONS.	LB.	
Sunn hemp	13	2,114	1,311.5
Kolinji	60	1,509	5,410
Indigo	..	970	45
Pillipesara	..	476	23
Glyricidia	..	44	223
Dhaincha	..	284	12.5
Sesbania	..	481	1,539
Crotalaria	..	1,528	71
Lupin	..	1,025	40

(15) Agricultural implements and machinery—

Demonstrations conducted—

Details.	Number.
Tractor ploughing	70
Buck scraper	221
Ridge plough	198
Turmeric polisher	5
Iron ploughs	771
Mhote wheels	27
Junior hoe	19
Guntakas	28
Bund former	358
Wetland puddler	22
Archemedan screw	6
Picota	18
Pumpsets	23
Bull grader levelling	33

V. Area under improved strains of crops—

Crop.	Departmental spread.	Natural spread.	Total.
Paddy	32,565	277,476	310,041
Ragi	725	6,447	7,172
Cholam	2,516	8,505	11,021
Sugarcane	424	7,571	7,995
Groundnut	1,375	109	14,84
Gingelly	46	339	385
Cotton	24,002.5	36,002.5	60,005
Cumbu	350	4,070	4,420
Tennai	25	200	225
Tapioca	135	34,000	34,135
Green Manure	1,950	3,740	5,690

VI. Subsidiary industries—

Agriculture—

Number of hives introduced—771.

Progressive total—2,679.

Quantity of honey extracted—14,124 lb.

A special fieldman for bee-keeping development work is working in South Kanara district.

Poultry.—Intensive propaganda on poultry-keeping was continued.

Others.—Propaganda on fish-rearing in ponds and wells, improvement of cattle by proper feeding and breeding, etc., was carried on.

VII. Pests and diseases—

This was delta with under the paragraph “Control of pests and diseases”.

VIII. Exhibition and Fairs—

Number of exhibitions held—48.

Expenditure incurred—Rs. 1,353-12-3.

IX. Work through other agencies—

(a) Agricultural Associations—58.

Progressive total—120.

Total number of members—2,269.

Number of meetings held—374.

(b) *Work through other departments—Co-operative Department.*—The distribution of chemical manures and iron implements was done by the Co-operative Department. The distribution of paddy seeds was taken up by some co-operative societies in the West Coast districts. There was closer contact and greater co-operation with this department in view of the above items of work.

Education.—The school authorities were contacted to grow vegetables in the school compounds and vacant spaces..

Forest.—The services of the Forest Department were utilized in providing green leaf manure as also the supply of seeds of economic importance to ryots in order to raise seedlings for planting in pursuance of tree-planting scheme.

Revenue Department.—Training classes on agricultural matters were held for the benefit of village officers and Revenue officials. The celebration of Vanamahotsava, conduct of crop competitions, procurement of paddy seeds, celebration of compost week, work on crop cutting experiments, collection of arrears of recoveries pertaining to seed farm advances, were done in close co-operation with the Revenue Department.

X. Firka Development (Rural Welfare)—The Nilgiris.—The rural welfare scheme continued to be in operation in Kunda firka and Ootacamund rural area of Ootacamund taluk and the two firkas comprising of Gudalur taluk. The departmental staff of one fieldman and two demonstration maistris continued to do work in Kunda firka and were diverted to Gudalur taluk also as and when necessary as no special staff was sanctioned for Gudalur. The necessary staff of two fieldmen and four demonstration maistris for Gudalur and Pandalur firkas will be posted without further delay. Items of work done in the two areas are as hereunder :—

- (1) Takkavi loans disbursed—Rs. 7,870.
- (2) Total number of ryots to whom the loan was given—26.
- (3) Potato seeds sold—4 tons, 2,000 lb.
- (4) Number of seed farms raised—12.
- (5) Number of bee-hives introduced—9.
- (6) Supply of tree seedlings—10,800.
- (7) Compost making—469 pits.
- (8) Digging manure pits—92.
- (9) Supply of improved millet seeds—56 lb.
- (10) Supply of vegetable seeds—47 lb.
- (11) Control of pests and diseases—sale of insecticides—2 tons and 1,840 lb.
- (12) Planting of medium sized tubers—145 acres.
- (13) Contour planting—65.90 acres.
- (14) Subsidy paid for compost making—Rs. 778.

Coimbatore—

Name of the taluk.	Firka.	Villages.	Hamlets.
Avanashi	Avanashi, Annur and Cheyyur.	25	181
Dharapuram	Vellakoil and Kangayam.	27	474
Palladam	Tirupur, Pongalur and Varapatty.	..	293 (Number of villages including hamlets.)
Total number of ryots—		80,775	
Number of ryots benefited—		16,920	

Villagers are given timely advice on the agricultural problems and regarding better farming and intensive cultivation methods. Interest-free loans are issued for the purchase of seeds and manures and loans with interest for the purchase of implements. Demonstration with improved and labour saving implements are conducted and the use of high-yielding improved strain of foodcrops is being introduced. Intensive propaganda regarding proper utilization of waste vegetable matter by properly composting them is done and demonstrated. Intensive propaganda is carried on the use of green manure with sunnhemp, kolinji, indigo and pillipesara and the advantages of green leaf yielding plants like Glyricidia and Sesbania.

Large scale demonstration were conducted in the better preservation of cattle manure by pits system, by heap system and by loose box system—

- Compost pits opened—84.
- Compost pits renovated—72.
- Manure pits opened—546.
- Manure pits renovated—692.
- Dry earth system constructed—718.
- Dry earth system renovated—316.
- Loose box system opened—65.
- Loose box system renovated—56.
- Byre system introduced—27.
- Improved seeds distributed—10 tons.
- Glyricidia seedlings planted—17,642.
- Glyricidia cuttings planted—2,760.
- Sesbania seedlings planted—96,320.
- Sesbania nurseries sown—96.
- Glyricidia nurseries sown—32.
- Demonstration of buckscraper—141.
- Demonstration of bundformer—220.
- Demonstration of ridge plough—190.
- Demonstration of ploughs—360.

South Malabar—

There is no firka development areas in this district.

North Malabar—

Nature of work.

(1) Seeds and Plants distributed—

				Taluk.			
				Kottayam, 3 firkas, 49 villages.		Chirakkal, Payyanur firka 6 villages.	
				TONS.	LB.	TONS.	LB.
Improved paddy seeds	..	..	..	19	644	5	926
Vegetables	..	..	..	0	179	0	38
Millet	..	..	..	..	..	..	..
Gingelly	..	..	..	..	5	..	31
Green manure	..	..	..	4	1,829	0	2,133
Cotton	..	..	..	0	4	0	15
Groundnut	..	..	..	..	..	0	14
Mango grafts—Numbers	..	..	..	2,024	..	..	190
Malta lemon	..	..	..	212	..	..	30
Other fruit plants	..	..	..	387	..	..	58
Mauritius plantain suckers	..	..	..	240	..	..	100
Fodder grass slips	..	..	..	..	..	..	1,000
Coconut seedlings	..	..	..	2,122	..	..	98

Taluk.	
Kottayam, 3 firkas, 49 villages. TONS.	Chirakkal, Payyanur firka, 6 villages. TONS.

(2) Demonstrations conducted—

(a) Cultural.—

- Use of iron plough versus country plough. 17 7
- Thin sowing × thick sowing .. 23 12
- Optimum seed rate × heavy seed rate. 29 5
- Economic planting × bunch planting. 18 2

(b) Varietal.—

- Improved seed × local seed .. 33 15

(c) Manurial—

- Green manure crops × no crop. 10 5
- Optimum doze of green manure × ordinary dose. 15 4
- Application of chemical fertilisers × ordinary manure. 15 8
- Application of compost × ordinary manure. 13 5
- Total number of demonstration 173 63

(3) Manure preservation—

- Collection of cattle urine by spreading loose earth or litter in cattle shed. 186 107
- Preservation of cattle manure in roofed pits. 208 102
- Total quantity of manure preserved. (Tons.) 350 290
- Quantity of urban compost manufactured. (Tons.) 325 85
- Quantity of rural compost manufactured. (Tons.) 1,120 930
- Amount of subsidy paid for compost making. Rs. 495 359

(4) Grow More Food Campaign—

- Extent of waste land brought under cultivation (Acres) 1,516 25
- Area brought under Agricultural improvements (Acres) 900 345

(5) Apiary—

- Number of bee-hives maintained. 9 4

(6) Pests and diseases—

- Quantity of pesticides sold .. 1,842 582
- Area of food crops saved .. 385 196

(7) Takkavi loan—

- Amount disbursed for purchase of seeds and manures. Rs. 35,260 2,530

The work under this scheme was carried on with the field staff under the administrative control of the Rural Welfare Department, and the technical supervision of the officers of the Agricultural Department. This dual control was not conducive for the efficient working of the agricultural schemes, although full complement of staff at the rate of one fieldman and two demonstration maistries for each firka was appointed from 1st March 1952.

South Kanara.—Intensive work in the selected firkas and centres under the Rural Welfare Scheme was being carried out in Kumbbla, Manjeshwar and Moolky firkas and in the eight villages of Nileshwar centre of Nileshwar-cum-Payyanur area. There was one Model Farm in Moolky firka and one in Kumbbla firka where all the improvements were being demonstrated. The scheme of model farms was discontinued during the middle of June 1952 as per Government Orders.

The work done in the above selected firkas is furnished below :—

Disbursement of loans for seeds and manures—Rs. 15,970.

Distribution of improved paddy seeds—40 tons, 60 lb.

Distribution of green manure seeds—2 tons, 1,216 lb.

Compost manufactured—991 tons.

Subsidy disbursed for compost making—Rs. 578.

Pest control work—737 acres.

Insecticides and fungicides distributed—1 ton, 1,718 lb.

XI. Cropwar targets fixed and attained in 1951-1952—

Variety.	Target fixed.	Target attained.
	TONS.	TONS.
Paddy	9,120	6,113
Cholam	1,500	586
Green manure	9,850	9,132
Ragi	440	293.57
Cumbu	500	186.80
Tenai	115	40
Redgram	50	..
Bengalgram	40	20

XII. Loans—

Nature of loan.	Number of loans granted.	Total amount.
		RS.
Loans for purchase of seeds and manures.	4,542	6,18,440
Loans for purchase of implements	22	1,390

XIII. Additional information required—

Number of demonstration plots	.. .. .	984
Number of propaganda meetings held.	.. .. .	675
Exhibitions conducted	.. .. .	48

Loans.	Number.	Amount.
		RS.
Seeds and manure	4,542	6,18,440
Implements	22	1,390
	<u>4,564</u>	<u>6,19,830</u>

XIV. Brief review of district work—The Nilgiris.—The year under report has been one more year of dissatisfaction and loss to ryots due to adverse weather conditions. Though the price of potato—the main money crop of the district—has been maintained high, the yield being poor, the economic condition has deteriorated and there is considerable difficulty for agricultural credit.

Out of the target of 1,000 acres of tractor ploughing fixed for the district only 226.89 acres were actually attained due to the late receipt of the tractor, the constant breakdown and economic condition of the ryots. Although a target of 15 tons of sulphate of ammonia was fixed, the actual quantity sold was only 985 pounds. Two petrol pumpsets were hired out for irrigation of potatoes and vegetables. The Tengumarahada Collective Farming Society has been assigned a further area of 300 acres of forest land and registration is expected to be over soon. This society will cultivate paddy, cholam, cotton, groundnut, chillies, etc., according to the advice of the department. The area under rainfed sugarcane has not extended due to fall in price of jaggery.

Coimbatore.—Vigorous propaganda was carried out on growing of green manure crops like sunnhemp, kolinji, pillipesara in garden and wet lands as inter-crops and the required seed material was arranged to be distributed to the ryots.

Propaganda on the popularization of planting Glyricidia and Sesbania in wet lands area bunds and channels was also done in a very large scale. Cultivation of short-term foodcrops like sweet potato and tapioca as a subsidizing crop was encouraged by distributing cuttings.

Improved strain of paddy and millets were also distributed to propagate good, disease-free seeds and planting of seedlings of economic importance was also demonstrated.

Intensive propaganda on the application of concentrated manure in combination with green manure to paddy crop was also taken up.

The national tree planting and compost week were celebrated.

Both the south-west and north-east monsoon were failure during the year with the result that the wells were more or less dry and cultivation of both dry as well as irrigated crops were greatly affected. Though intensive propaganda was done in the departmental improvement in various aspects of the cultivation, actual execution of the work was handicapped by the failure of monsoons. Under the conditions stated, the target figures could not be reached under seed farm cereals.

Popularization of large-scale use of insecticides and pesticides, widespread attack of calocoris on cholam and aphid on ragi were noticed in the district and prompt action was taken to combat the same by spraying Hexidole-950 dusting with 5 per cent or 10 per cent B.H.C.

Loans.—A sum of Rs. 1,27,055, Rs. 50,325 and Rs. 350 was distributed towards loan for the purchase of manures and seeds, special loans for the purchase of chemical fertilizers for paddy crop and implements, respectively. The progress was good when compared to last year.

The seed farm procurement was practically discouraging as the ryots refused to part with these seeds.

The trials under cholam and cotton were conducted.

Mezhichelvam enrolment—3,400 numbers.

South Malabar—Compost subsidy.—The Government of India subsidy operated till 31st March 1952. Though only Rs. 2,360 was fixed as subsidy, Rs. 2,604 was paid for 1,142 compost pits.

Free distribution of vegetable seeds to schools.—Rupees 130 worth vegetable seeds of various varieties were issued to schools against Rs. 160 provided. As seeds could not be received from nurserymen in time, the amount could not be spent fully.

Concession sale of planting materials of short-term food crop.—Though Rs. 1,250 was provided for this item, only Rs. 772-8-0 could be spent due to adverse seasonal factors.

Paddy seeds.—One thousand eight hundred and eighty-three acres were achieved though only 1,830 acres were targetted under seed farms. Procurement and distribution targets were more or less completely attained.

Green manure.—Six thousand nine hundred and fifty acres were fixed as the area to be covered. Only 2,615 acres could be achieved. Intensive propaganda to cover more areas will be done.

Takkavi loans.—This has become very popular. One thousand three hundred and seventy-one ryots were granted Rs. 1,41,750 though only rupees 65,000 was provided for this.

Tractor cultivation.—Mechanical cultivation is not yet fully appreciated by ryots and the target could not therefore be attained.

North Malabar.—The district staff consisted of four Agricultural Demonstrators and two Additional Agricultural Demonstrators, assisted by seven fieldmen and 16 demonstration maistries. Besides attending to the various items of Grow More Food Schemes, they were engaged in the successful demonstration of agricultural improvements for large-scale adoption. The main items of work were multiplication and distribution of improved paddy, distribution of other seeds, and plants, green manure seeds, etc., better manuring of foodcrops, reclamation of waste lands and extension of cultivated areas, control of pests and diseases, conducting demonstrations of agricultural improvements in ryots' fields, prevention of soil erosion, etc.

Two Plant Protection Assistants, Entomology and Mycology, concentrated their work in the control of pests and diseases of crops.

Agricultural Engineering section attended to the hiring of tractors, bulldozers and oil engine pumpsets in addition to the maintenance of machines and departmental vehicles.

The programme of work chalked out for the year was carried out in full except in the following cases:—

(a) Although 427 acres of seed farm for paddy was organized against the target of 250 acres for 1951-52, the procurement of seed was only about one-third while, the distribution was less than half of the targets.

(b) Observation plots under paddy Co. 25 and Co. 26 and pulses D.B. 7 could not be laid out for want of seeds.

(c) Only 505 malta lemon cuttings were distributed against the target of 3,750, since the price of the cuttings at Agricultural Research Station, Taliparamba, worked out to Re. 0-8-0 each including incidental charges. There was no demand even when the price was reduced to 4 annas per plant.

Model farms.—Model farms were organized in all the four taluks. Two of them who were not working satisfactorily were replaced by new farmers in April 1952. The scheme was, however, discontinued towards the end of the year. Salient features of work done in the model farms were as follows:—

(1) Cultivation of improved strains of paddy (acres) ..	20
(2) Growing of green manure crops	8
(3) Application of concentrated manures	17
(4) Preparation and application of compost manure ..	13
(5) Cultivation of better varieties of other crops—	
Tapioca	1-25
Vegetables	5-00
Plantains	0-26
Sugarcane	0-10
Cowpea	1-55
(6) Planting of green manure plants Sesbania, Glyrioidia, etc. (numbers)	18,180
(7) Demonstration plots laid out (numbers)	22
(8) Control of pests (acres)	5
(9) Tractor ploughing (acres)	5

Crop competition.—The crop competition was conducted for the paddy crop during the year. There were 631 entrants for the competition, but only 293 plots were offered for harvest. Eleven firka prizes of Rs. 25 and four taluk prizes of Rs. 50 each were awarded in kind, while the district prize of Rs. 100 in cash was awarded to Sri M. Achuthan Nair in Wynaad taluk who obtained the maximum yield of 6,810 lb. per acre.

Crop-cutting experiments.—Crop-cutting experiments under the Imperial Council of Agricultural Research Scheme and Grow More Food Aid Scheme were conducted in seventeen villages of this district of North Malabar.

Rural compost making.—The compost week was celebrated in all the taluks in the first week of October 1951. The prize of Rs. 25 per taluk was awarded to the ryots who prepared the maximum quantity of compost during the week.

Agricultural improvement work.—An amount of Rs. 80 was awarded as prize from the discretionary grant of the Collector in kind to fourteen ryots for adopting all-round agricultural improvements.

Publications—

Villager's calendars sold—217.

Agricultural bulletins sold—150.

Number of subscribers enlisted for Grow More Food Journal—*Naveenakarshakan*—1,681.

Besides large number of leaflets on tapioca of agricultural interest were distributed free amongst the ryots.

Mangalore (South Kanara).—(a) The programme of work chalked out for 1951-52 was carried out satisfactorily in all items of work. The target was not however, reached in enrolment of subscribers for the Grow More Food Journal and procurement of paddy seeds from seed farm ryots, though the area under seed farms was exceeded. Sea Island cotton trials were not

conclusive, while horsegram D.B. 7 and D.B. 35 did not prove successful. Kolinji for green manure became more popular among the ryots. Extensive work on Glyricidia and Sesbania was carried out and ryots have yet to realize the usefulness of the same.

(b) Non-lodging variety of paddy—MTU. 3 and MTU. 4 which was recommended in place of PTB. 9 became popular among the ryots. There was great demand for these strains during the year under report. Seeds were obtained from West Godavari district and distributed to ryots. Seed farms were also run for multiplying the strain locally.

(c) *Saline resistant paddy*.—Though S.R. 26 B was found suitable for saline conditions, yet it did not become popular among the ryots due to its long duration.

(d) *Irrigation*.—(1) There was great demand for oil engine pumpsets on hire. The department was able to supply only 25 sets on hire. Several applications were received for supply of oil engines under hire purchase system. The supply was being made on a priority basis by the Director of Agriculture, Madras. During the year under report eight oil engine pumpsets were supplied under the hire-purchase system, bringing the total to 30 up to the end of the year.

(2) *River pumping scheme*.—This scheme functioned at one centre during the third-crop season and supplied water to irrigate about 53 acres.

(e) Apart from the above, Vanamahotsava Week and Compost Week were celebrated successfully. The crop competition has proved that a maximum yield of over 6,300 lb. of wet paddy could be obtained and that the yield of paddy could be easily doubled in this district by adopting improved methods of cultivation.

(f) It was observed during 1951-52 that Co. 25 paddy was quite suitable for the second-crop season, where water for irrigation was available in plenty up to the month of February.

XV. Programme of work for 1952-53—The Nilgiris district.—The paddy work in Gudalur taluk will be intensified by the extension under bulk selection of local varieties done at Ambalavayal Colonization Farm, intensive green manuring, application of chemical fertilizers, etc. The work in Tengumarahada Colony will be systematized by cultivation of paddy, ragi, cholam and cumbu strains, extension of area under Cambodia cotton, groundnuts and gingelly. The tractor ploughing will be undertaken both at this colony and Gudalur taluk.

North Malabar district—

Organization of paddy seed farms—620 acres.
Procurement of seed—1,240 bags.
Distribution of seed—4,000 bags.
Area to be covered—8,000 acres.
Green manuring paddy—2,650 acres.

Laying of observation plots—

Millet—90 acres.
Pulses—40 acres.
Oil seeds—30 acres.
Chillies—20 acres.
Cotton—15 acres.

Number of demonstration plots—200.

Sale of vegetable seeds—400 lb.

Sale of coconut seedlings—16,500.

Sale of fruit plants—8,300.

Compost manufacture—4,000 tons.

Improved method of storage of cattle-dung and urine—1,150 lb.

Improved cattle manure pits—500.

Tractor ploughing—1,200 acres.

Bulldozer working—2,400 hours.

Oil engines to be hired—6.

Contour cultivation—1,250 acres.

Agricultural exhibitions—

Major—4.

Minor—8.

Bee-hiving numbers—140.

South Kanara (Mangalore).—It is proposed to intensify work on Glyricidia, Sesbania Speciosa and Kolinji for green manure purposes. Seed farms of suitable paddy strains will be run in all taluks for multiplying the improved strains including Co. 25.

Groundnut will be tried in single-crop wet lands after the harvest of the first crop of paddy in observation plots.

Observation plots will be laid with selected strains of ragi, samai, cholam, chillies, gingelly and paddy cultures to observe their suitability for this district.

Takkavi loans for purchase of seeds, manures and implements will be disbursed to ryots.

Plant protection, tree planting and compost making work will be intensified as also use of chemical manures.

Taluk and village advisory committees will be formed for assisting the Agricultural Demonstrators in their day-to-day work. Agricultural associations will also be formed for the purpose.

Paddy yield crop competition will also be conducted during the year 1952-53 for demonstrating that the yield of paddy could be considerably increased in the district by adopting improved methods of cultivation.

The annual reports of the research stations were submitted to the Director of Agriculture, Madras, by the officers in charge of the stations.

COIMBATORE, P. A. VENKATESWARAN,
4th September 1952. Deputy Director of Agriculture, Coimbatore Division.

APPENDIX I.

Details of Iron Articles and Chemical Fertilisers sold.

Details-	Quantity sold.
Iron and steel	10 tons and 973 lb.
Implements	482 numbers.
Chemical manures	2,570 tons and 515 lb.

(Exclusive of South Malabar district.)

APPENDIX II.

Statement of Charges—Fasli-year 1951-52.

	RS.	A.	P.
(1) 40-B. Superintendence.—			
Pay of Officers	5,403	10	0
Pay of Establishment	4,601	2	0
Travelling Allowance and House rent Allowance	4,312	15	0
Dearness Allowance	3,029	5	0
Service postage stamps	1,000	0	0
Other contingencies	553	1	6
Tour charges	162	14	6
Dearness Allowance to Menials	216	0	0
Total	19,279	0	0
(2) 40. d. I. 17. Scheme for effective control and test of manure mixtures—			
Pay of Establishment	2,441	6	0
Dearness Allowance	844	3	0
Travelling Allowance and House rent Allowance	1,398	14	0
Total	4,684	7	0

Statement of Receipts—Fasli-year 1951-52.

XXIX—Agricultural Receipts—

Miscellaneous	93	0	0
-----------------------	----	---	---

APPENDIX III.

Statement showing the strength of the staff.

Name of service and post.	Number of sanctioned posts.	
	Permanent.	Temporary.
(1) Madras Agricultural Service—		
Deputy Director of Agriculture	1	..
District Agricultural Officers	4	1
(2) Madras Agricultural Subordinate Service—		
Upper Subordinates	34	33
Fieldmen	..	78
Demonstration Maistris	20	102
(3) Madras Ministerial Service—		
Upper Division Clerks	1	14
Lower Division Clerks	18	75
Typists	1	5
(4) Inferior Service—		
Peons	14	11
(5) Agricultural Engineering Section—		
Staff working	..	*85

* Exclusive of South Kanara district.

ADMINISTRATION REPORT OF THE CURATOR, GOVERNMENT BOTANIC GARDENS, OOTACAMUND AND SIM'S PARK, COONOR, FOR THE YEAR 1951-52 (FASLI 1361).

I. Charge.—Dr. S. Krishnamurthi was Curator till 25th July 1951, when he was relieved by Sri P. N. Nayar, District Agricultural Officer, Nilgiris, Ootacamund, and the latter held full additional charge of the post of the Curator, during the rest of the period under report.

Sri N. Raghavan, Farm Manager-Nursery, took over additional charge of the post of the Farm Manager, Government Botanic Gardens, Ootacamund, on 5th July 1951 from Sri B. M. Pinto, who proceeded on leave and handed over charge of his additional duties as Farm Manager, Government Botanic Gardens, Ootacamund, on 22nd August 1951, to Sri D. I. E. Mangaladoss, who continued for the remaining period of the year. Throughout the year under report Sri N. Raghavan was Farm Manager-Nursery, Government Botanic Gardens, and Sri V. Sampath was Farm Manager, Sim's Park Coonoor.

The Nursery Scheme at the Government Botanic Gardens, Ootacamund was made permanent as per G.O. Ms. No. 1303, Food and Agriculture, dated 26th June 1951. The posts of the Farm Managers in the Government Botanic Gardens, Ootacamund, and Sim's Park, Coonoor, were re-designated as Research Assistants in G.O. No. 18, Food and Agriculture, dated 4th January 1952.

II. Government Botanic Gardens, Ootacamund—(1) Season and rainfall.—A total rainfall of 34.99 inches was recorded on 111 days as against a fall of 54.65 inches on 155 days during the previous year. The heaviest fall of 2.43 inches was recorded on 28th August 1951. The rains during north-east monsoon period was far lower than that received in the previous years. The showers were fairly distributed from July to December 1951, the months of January to March 1952, being completely dry. The south-west monsoon was a failure.

The maximum temperature ranged from 82° to 50° F., and the minimum from 28° to 55.5° F. During December to February many days recorded very low temperatures with 29 frosty nights as against 25 days during the corresponding period in 1950-51. The winter was severe as in the previous two years.

With no rains from January to March 1952 the natural water-sources became very weak and all the ponds were almost dry for a long time till June 1952. Great difficulty was experienced to water the flowerbeds, conservatories and the nurseries. Handwatering had to be done every day and most of the labour had to be diverted to this work alone. Due to the drought, all the seedlings in flower beds had a poor start and consequently the performance of the annuals were not up to expectations.

(2) *Research—(a) New introductions—(i) Ornamental section.*—Varieties of Lilliums, named varieties of Anemones and Daffodils, Ranunculus, Stenbergiabutea, Satyrium Repalense, Habenuaria Susannae, red, white and yellow Zephyranthes; Rescoea Procera and Nerine Sarlayehsis from various sources were the successful introductions among the bulbous plants.

Tetra snaps and Polyanthus from a local source deserve a special mention among the annuals, while among the trees and shrubs may be mentioned *Quercus Incana*, *Berberis Umellatus*, *Elaeocarpus Sikkimensis* and *Deutzia Corymbosa* raised from seeds obtained from Royal Botanic Gardens, Darjeeling.

Quercus Suber (Cork Oak), and *Copernicia Serifera* (Brazilian Wax Palm) from Indian Museum, Calutta, *Hydnocarpus Wightiana* and *Alnus Nepalensis*, from local sources were also tried.

Of the imported seeds Chrysanthemums and Pansies afforded numerous varieties of colours.

(ii) *Vegetable section*.—‘Pomocol’ cauliflower and ‘Early Drumhead’ cabbage from the Pomological Station, Coonoor, and Cucumber and Corn varieties from Chicago acclimatized in South India, were under trial.

(iii) *Plants of Economic and other importance*.—Among attempts in this line of work, were introduction of (i) *Aleurites fordii* and *Aleurites Montanna* (the ‘Tung-Oil’) trees (2) Seville and Malta lemons among fruit plants (3) *Ocimum camphora* (Kilemanjurium) the Camphor yielding *Ocimum* (4) *Pelargonium Graveolans* (Scented gerani n), (5) Varieties of clovers from Africa, and (6) Medicinal herbs like Sage, Marjoram, Rosemary, *Digitalis lanata*, *Oroculus sativus*, etc.

(b) *Studies on annuals*.—Floricultural records giving data on the various annuals on their growth, flowering, etc., were continued to be maintained as in the previous years. The data collected has been of value in utilizing these annuals for various designs, colour patterns and seasons. It was also possible to fix up the early intermediate and late varieties, and information which is very valuable in adjusting the period of sowings of these different annuals.

Classification of annuals on the basis of the time taken for flowering.

Early Bloomers. 3 months.	Intermediate Bloomers. 3 to 4 months.	Late Bloomers. 4 months and above.
Balsam.	Archusa.	Antirrhinum.
Clarkia.	Calendula.	Carnations.
Cynoglossum.	Lady-lace.	Cuphea.
Dimorphotheca.	Marigold.	Candytuft.
Echium.	Petunia.	Calceolais.
Eschscholtzia.	Phlox.	Chrysanthemums.
Gypsophylla.	Stock.	Dianthus.
Lupins.	Sun flower.	Delphinium.
Linum.	Nigella.	Gaillardia.
Linaria.	Lobelia.	Godetia.
Xeranthemum.	Viscaria.	Helichysum.
Cornflower.	Nemesia.	Holly hock.
Poppy.	Centuarea.	Larkspur.
Pansy.	Dahlia.	Statice.
	Schizanthus.	Zinnia.
	Sweet peas.	Aster.
		Salvias.
		Verbena.
		Salpiglossis.

(c) *Observations on shrubs*.—With a view to have systematic records of all the species of shrubs grown at the Government Botanic Gardens, Ootacamund, relevant data was continued to be collected so as to assess their performance on the hills, with due emphasis on their girth, height and spread and to make suitable recommendations regarding their uses in home and public gardens.

This enabled the fixing up of the periods of bloom of the various shrubs which is as follows:—

January to March.	April to June.	July to September.	From October to December.
Abutilon denelge.	Choisya ternata.	Abutilon Red.	Cassia dymobobrya.
Cistus albidua.	Cotoneaster Bacillaris.	Abutilon Pink.	Diervilla filorum.
Hydranged hortensis.	Crotonaria agatifloria.	Abutilon variegata.	Plumbago capensis.
Hydranged Parsifal.	Cystisus scoparius.	Abutilon megapota-micum.	Wigandacarancas.
Clethra Arborea.	Fuchsia arborescens.	Buddlei Davidii.	
Colletia Ferox.	Fuchsia Dominiana.	Camellia Japonica.	
Coprosoma lucida.	Fuchsia double blue.	Cornus capitata.	
Cotonester buxifolia.	Fuchsia fulgens.	Datura arborea.	
Cotonester Frigida.	Fuchsia gracilis.	Dehlia imperialia.	
Deutzia Scabra.	Heliotropium.	Duranta Plumeria.	
	Hibiscus Hybrida.	Erica species.	
	Holmskieldia sanguinea.	Escallonea Floribunda.	
	Hypericum hookerianum.	Escallonea organensis.	
	Hypericum mysorensis.	Escallonea maranta.	
	Hypericum patulam.	Euonymus Japonica.	
	Ixora grandiflora.	Euonymus Radilans	
	Impatiens Hookeriana.	Feigoa sellowiana.	
	Impatiens Hoolstee.	Legustrum Licidum.	
	Impatiens Oliveri.	Lippia citriodora.	
	Justicea carneia.	Montonoa bipinnatifida.	
	Lucalia gratissima.	Olea fragrans.	
	Psoralla pinnatta.	Poinsettia pulcherrima.	
	Rhodo myrtus tomentosa.	Rondeltia amoena.	
	Strepto-solem Jamesonii.		

(d) *Observations on trees*.—As mentioned already for the shrubs, observations were also recorded on the different kinds and varieties of the trees that exist at the Government Botanic Gardens, Ootacamund. The following is the arrangement of the trees according to their flowering periods:—

January to March.	April to June.	July to September.	From October to December.
Acer caudatum.	Acer oblongum.	Acacia elata.	Aracaria bidwillii.
Acer negundox.	Albizia julibirs.	Agathia robusta.	Callicoma seratifolia.
Aralia papyrifolia.	Aralia sieboldii.	Aralia sieboldii.	Eucalyptus engenoides.
Araucaria cookii.	Caria candamansis.	Araucaria rulei.	Pinus insignis.
Arbutus rollissonii.	Cedrus deodra.	Bambusa fortuneii.	Quillaja saponaria.
Arbutus zenedo.	Corynocarpus laevigatus.	Biota orientalis.	Araucaria cunningghamii.
Bucklandia populnea.	Eucalyptus ficifolia.	Callistemon citrinus.	Chaemyrops fortunei.
Chinchona officinalis.	Jacaranda mimosifolia.	Cryptomeria Japonica.	Eucalyptus hemifolia.

January to March.	April to June.	July to September.	October to December.
Cuprusus Lawso- niana.	Leptospermum mic- bolii.	Cupressus Funibris.	Rhododendron aro- reum.
Cuprusus macro- carpa.	Leptospermum scoparium.	Cupressus obtusa.	
Cuprusus torulosa.	Meliosma wightii.	Dombia natalensis.	
Cuprusus sempervi- runs.	Sauria nepalensis.	Erica arborea.	
Dracanda lanuginosa.		Juniperus bermo- diana.	
Eucalyptus citrio- dora.		Lapurus nobilis.	
Eucalyptus leucoxy- lon.		Magnolia grandiflora.	
Eucalyptus pillularis.		Michelia champaka.	
Eucalyptus robusta.		Quercus suber.	
Fagus sylvatica.		Podocarpus taxifolia.	
Ficoid elastica.		Prunus puddum.	
Ginkgo biloba.		Taxus Baccata.	
Grevilla Hilliana.		Widdringtonia whykii.	
Leptospermum scopa- rium.			
Melaleuca styph- loides.			
Pieris ovelifolia.			
Salix babylonica.			
Vitex littoralis.			
Yucca gloriosa.			
Acacia melanoxylon.			
Buxus sempervirens.			
Erythrina cristagalli.			
Ilex cornuta.			
Pinus patula			
Rhododendron panti- cum.			

(e) *Propagation studies.*—To find out the optimum period of the year for the planting of cuttings of Magnolia Grandiflora, Quercus Serrata and Wistaria Chinensis and the nature of cuttings that respond most, hard, semi-hard and soft wood cuttings of the former two and terminal cuttings of the latter, were inserted every month and the percentage of rooting was determined. The results are tabulated below :—

Month of planting.	Magnolia.			Quercus.			Wistaria.
	Hard wood.	Semi-hard wood.	Soft wood.	Hard wood.	Semi-hard wood.	Soft wood.	
1951—							
May	..	..	16	..	..	..	..
June	..	8	..	..	..	..	..
July	..	..	..	..	..	..	..
August	..	..	..	..	..	..	16
September	8	16	8	..	..	..	..
October	8	..	32	..	..	..	..
November	..	..	..	..	..	..	..
December	..	..	..	..	..	..	..
1952—							
January	..	8	..	..	..	..	..
February	..	..	..	..	..	..	..
March	..	..	..	..	..	..	..
April	..	Final counts not yet over.			..	..	..
May	..				..	..	..
June	..				..	..	..

All the Magnolia cuttings planted in July, August, November, December of 1951, and February and March 1952 failed to root.

The hard wood cuttings do not seem to fare well as the other kinds of cuttings. With regard to the cuttings of Quercus, all the cuttings planted so far in all the months have failed to root, thereby giving an indication that it may not be possible to root cuttings of Quercus.

That Wistaria cuttings are very shy in rooting is confirmed by the low 16 per cent rooting in August 1951, the plantings of the cuttings during the rest of the period having failed to strike roots.

(f) *Study on the period of dormancy of seeds.*—Trials were under way to determine the dormancy, and the longevity of seeds of Eucalyptus Globulus, Cupressus Macrocarpa and C. Torulosa (which are important multipurpose trees of the Nilgiris, propagated by seeds), information of which is wanting. The results obtained so far are tabulated hereunder :—

Age of seeds.	Percentage of germination of Seeds of.		
	Eucalyptus Globulus.	Cupressus Torulosa.	Cupressus Macrocarpa.
Fresh	52	2	17
1 month old	43	3	23
2 months old	18	2	25
3 months old	68	..	26
4 months old	42	..	28
5 months old	46	..	26
6 months old	67	..	31
7 months old	88	..	50
8 months old	54	..	8
9 months old	55	26	54
10 months old	91	2	42
11 months old	45	..	15
12 months old	43	1	15*
13 months old	..	..	..*

* Final counts not yet over.

The data reveal that the Eucalyptus Globulus, except in the case of two months old seeds, the germination of the seeds sown during the first six months after collection and storage has been fair and the general trend indicates an increase in the percentage of germination as the period of storage increased up to ten months, after which period there is tendency for a gradual decline.

From virtually a nil germination of fresh seeds of Cupressus Torulosa, there has been a sudden increase in the germination up to 26 per cent in the case of nine months old seeds after which again the germination continued to be poorer, leading to the possible assumption that the seeds may themselves be of a very poor viability.

In the case of Cupressus Macrocarpa a maximum germination of 54 per cent was recorded with nine months old seeds, and the subsequent sowings revealed a decline. All the fresh seeds have germinated thereby leading to the conclusion that there is not a marked dormancy period in these seeds.

(g) *Extraction of essential oils.*—With a view to explore the commercial possibilities for the utilization of the available plant wealth of the Government Botanic Gardens, Ootacamund, as well as the Nilgiris, extraction of essential oils was undertaken. Besides Eucalyptus, oils were extracted from Cymbopogon Flexuosus (Lemon grass) found wild in the Ketti Valley of the Nilgiris, Pelargonium Graveolens (Scented geranium) and Ocimum Camphora.

(h) *Wild Flora of the Nilgiris.*—The work was started last year for the collection of the Wild Flora of the Nilgiris. During the year, for further study of their usefulness, 35 species have been identified and added on to the existing collection.

Preliminary trials.

(a) *Propagation of green house plants.*—In order to multiply, some of the much-sought-after green house plants such as, Gloxiria, Gesnera, Begonia, Fuchsia, Dahlia Cactii, etc., preliminary propagational trials were made with leaf cuttings of these. The results were encouraging enough to go into this advantageous method in that many plants can successfully be raised from a limited number of stock plants in a short time and without detriment to the stock plants too, as the leaf cuttings can be taken after flowering is over. Besides, varieties can also be multiplied true to their parent types unlike seeds.

(b) *Freak grafting.*—Freak grafting were attempted on Begonias, Coleus and Abutilons. In the case of Abutilons, 2 species, viz., *A. chinensis* and *A. variegata*, were successfully grafted on *A. megapotamicum*. These studies were undertaken for their academic interest.

III. *Improvements to the gardens.*—A new section of plants of the Nilgiris that are also suitable for the plains were started this year. This section contained perennials like Salivias, Begonias, Dahlias, Petunias, Gladioli, etc., along with annuals like Calendula, Marigold, Zinnia, Phlox and antirrhinum.

Ornamental lettering of this section as "Plants for the Plains" was made with Alternantheras, Santolina and Iresine all of which are also suitable for the plains.

IV. *Pests and diseases.*—The following pests and diseases were noticed on the various plants and shrubs and were effectively controlled by the insecticides mentioned against each item:—

	Spray of—
1 Aphids on—Chrysanthemums ..	H.E.T.P.—1 ounce in 3 gallons of water.
2 Cutworms on—annual seedlings..	Hexedol—dusting.
3 Scales on roses	1 per cent fish oil soap and Nicotine sulphate.
4 Cutworms in potatoes	Application of G. 2-05—powder.
5 Mites on cinerarias Schizanthus.	Sulphur dusting.
6 Rats on lawns	Zinc phosphide baiting.
7 Wilt in Antirrhinum and Larkspur.	0.5 per cent Bordeaux mixture.
8 Leaf spot on Dahlia, roses ..	1 per cent Bordeaux mixture.
9 Mildew on roses, Begonias, Gloxina.	Dusting of Sulphur.
10 Sooty mould on Cotoneaster, Ocimum.	1 per cent fish oil rosin soap.
11 Blight on Azalea	1 per cent Bordeaux mixture.
12 Lichens on trees, shrubs, etc. ..	1 per cent Lime solution or 1 per cent Bordeaux mixture.

Plant propagation.—Propagational activities were kept up in full swing during the period. A total of 30,748 cuttings of various types of ornamental plants were inserted, 20,181 plants and seedlings were potted and re-potted, 1,444 layers were prepared, 3,828 rooted cuttings and plants were transplanted in terraces, 2,373 plants—were top dressed and 16,090 seedlings were picked. For raising flower plants for conservatories and sale, 183 packets of flower seeds and a total of 37 packets and 13 lb., 1½ oz. of seeds

of trees were sown. From a total quantity of 4 packets and 1 lb., 10 oz., of seeds of English vegetables 12,937 seedlings were distributed apart from 700 planted at the nurseries.

The crop of potatoes planted during March 1951 and harvested by September 1951 gave a fair yield. Similarly, another crop of potatoes has been raised during the main crop season, 1952, on an area of 40 cents. Due to lack of rains in time, the growth of crop is far from satisfactory.

In addition, the nurseries were also responsible for the propagation of a total of 7,242 different kinds of flower and foliage plants in pots for supply to the conservatories in order to maintain their attractiveness, throughout the year.

Besides, in the Nursery section which includes glass houses the activities of which have been already detailed above, in the Garden Nursery, which serves the propagation purposes of the garden, a total of 387 packets and 2 lb., 4½ oz., of flower seeds were sown. Out of which 77,648 seedlings were picked and 89,450 were transplanted in beds all over the gardens. A total of 1,200 cuttings of Daises, etc., were inserted for rooting and 170 layers of Carnations made. Seed collection of annuals and other trees and shrubs were also in progress and a total of 50 lb., 6½ oz., of seeds of these were collected, dried, and stored for future use and sales.

VI. *Sales and transfers.*—A total of 944 orders for supply of plants, bulbs, cut flowers, bouquets, wreaths, and seeds of annuals and trees were complied with, to the extents of Rs. 8,415-8-6 as detailed below:—

	Sales.			Transfers.		
	RS.	A.	P.	RS.	A.	P.
Plants and bulbs	3,221	1	0	874	2	0
Cuttings, specimens, etc. ..	55	1	0	4	0	0
Cutflowers, buttonholes, bouquets etc.	1,437	1	0			
Seeds of trees and annuals ..	195	10	0	207	11	6
Flower seedlings	516	7	0	315	0	0
Vegetable seedlings	328	4	3			
Miscellaneous	1,302	2	3	159	0	6
	6,855	10	6	1,559	14	0

VII. *Exhibitions.*—On the occasion of the annual flower show conducted on 18th May 1952 at the Garden Grounds, the Government Botanic Gardens, participated by having stalls, where flower pots were tastefully decorated and economic plants and oils from Eucalyptus were exhibited, and a model rockery was formed. All these were much appreciated by the numerous visitors. Besides, a consignment of exhibits, consisting of samples of oils obtained from the different species of Eucalyptus, and ornamental plants in pots and in baskets both from Government Botanic Gardens, Ootacamund, and Sim's Park, Coonoor, were sent to the U.P.A.S.I. Exhibition, held from 23rd to 29th August 1951, at Coonoor.

VIII. *Vanamahotsava*.—In connection with the 'Vanamahotsava' Week of 1951, posters carrying slogans suitable for the occasion were prepared and displayed. A note on some of the ornamental and economic trees of the Nilgiris containing an appended list of tree seedlings available both at the Government Botanic Gardens, Ootacamund, and Sim's Park, Coonoor, were prepared and copies of this were widely distributed.

At the Gardens, and the other Parks a total of 2,415 tree seedlings were planted, 1,063 seedlings were distributed to the public for planting.

Similar preparations as for 1951 were made for the Vanamahotsava Week of 1952, also, and for raising sufficient seedlings 10 lb. and 11 oz. of seeds of different tree species were sown.

IX. *Advisory work*.—Advisory work on horticultural matters were continued to be rendered by both correspondence and in person to interested visitors to the gardens. It is estimated that such technical advice was extended to approximately 600 people during the year. Besides, advisory work on laying out of gardens, parks, lawns, etc., were rendered to many private garden owners.

In all 20 batches of students of Botany, Agriculture, Forestry, Horticulture, etc., representing more than eight Universities of the Republic were taken round and the work of the gardens and its importance were explained to them in detail.

P. N. NAYAR,

District Agricultural Officer in charge, Curator.

GOVERNMENT BOTANIC GARDENS,
OOTACAMUND.

ANNUAL ADMINISTRATION REPORT OF THE CURATOR, SIM'S PARK, COONOR (NILGIRIS), FOR THE YEAR 1951-52 (FASLI 1361).

1. *Season and rainfall*.—The total precipitation during the year was 57.14 inches on 89 rainy days as against 58.71 inches on 76 rainy days during the year 1950-51. The rainfall recorded this year was below normal and falls short of the average of the past ten years by 4.84 inches. The heaviest rainfall recorded on any single day was 3.65 inches on 11th November 1951.

The showers were fairly distributed all through the year, though the maximum precipitation was recorded during the north-east monsoon period. The absence of summer showers during the hot weather period from March 1952 to May 1952, necessitated the handwatering of the numerous flower and nursery beds. However, the unprecedented rainfall of nearly 8.47 inches especially during February 1952 was very helpful for most of the annual plants which were in their pre-blooming period. But the seasonal upset caused by the lack of timely rains was reflected in relatively poorer performance of the several shrubs and especially the standard roses.

This year was also characterized by unusual warm weather and the winter was rather severe. The maximum temperature ranged between 84° and 58° F., while the minimum varied from 72° to 32° F., and the humidity from 100 per cent to 18 per cent. Light ground frost was recorded on three days during December 1951 and January 1952.

2. *Research*.—(1) Growth, flowering and performance studies on annuals. —Systematic records on the annuals grown at the Sim's Park, giving basis data on various stages of growth and flowering from the time of sowing the seeds till the plants are lifted out, were collected during the season of 1952 as in the two preceding years 1951 and 1950, which are tabulated in Appendix I (a). The summary of such data collected during 1950, 1951 and 1952 have also been presented in Appendix I (b).

A scrutiny of the data in Appendix I (b) reveals, in general, differences in the performance between the three years for which data have been furnished for the same kind of annual. These differences in the performance of the annuals are as a result of various factors, chiefly varietal and climatic, but are of value in showing the range of behaviour of the same kind of annual and the effect of seasonal conditions on their performance. The seasons in the three years under comparison are indeed different, the second year, i.e., 1951, especially having been characterized by extreme drought in the initial stages followed by heavy rains in the subsequent stages.

The data collected on the performance of annuals so far, for a period of three seasons, enable the classification of these various annuals into distinct categories on the basis of their period of growth as, early, medium, and late; and on the basis of the duration of their bloom as short, medium and long duration and on their heights as dwarf, intermediate and tall, as have been shown below. Such groupings are found to be of immense use in the designing of mixed borders of annuals to the various types of gardens to obtain a maximum result of height, colour, combinations and landscape effects.

(a) Classification of annuals on the basis of the time taken for flowering.

Early bloomers. 3 months.	Intermediate bloomers. 3 to 4 months.	Late bloomers. 4 months and above.
Alyssum.	Candytuft.	Antirrhinum.
Balsam.	Clarkia.	Aster.
Calendula.	Dahlia.	Calcepsia.
Celosia.	Dianthus.	Cock's comb.
Delphinium.	Gypsophylla.	Cornflower.
Godetia.	Helichrysum.	Hollyhock.
Stock.	Linaria.	Lady lace.
Salvia.	Larkspur.	Nigella.
Portulaca.	Linum.	Salpiglossis.
	Nemesia.	Zinnia.
	Marigold.	
	Petunia.	
	Phlox.	
	Statice.	
	Sunflower.	
	Schizanthus.	

(b) Classification of annuals on the basis of their height.

Dwarf. 6" to 1'.	Intermediate. 1' to 2½'.	Tall. 2½' and above.
Alyssum.	Calendula.	Antirrhinum.
Balsam.	Candytuft.	Aster.
Cock's comb.	Clarkia.	Calcepsia.
Eschscholtzia.	Delphinium.	Celosia.
Cineraeria.	Dianthus.	Cornflower.
Carnation.	Larkspur.	Dahlia.
Nigella.	Linum.	Godetia.
Lobelia.	Nemesia.	Gypsophylla.
Pansy.	Phlox.	Helichrysum.
Portulaca.	Statice.	Hollyhock.
Saponaria.	Stock.	Lady lace.
Schizanthus.	Salvia.	Marigold.
Sweet William.	Lupinus.	Linaria.
Verbena.	Mignonette.	Petunia.
	Poppy.	Salpiglossis.
	Dimorphotheca.	Sunflower.
		Gilia.
		Didiscus.
		Heliotrope.
		Nicotiana.

2. Study on the performance of shrubs at the Sim's Park, Coonoor.—Data on the height, girth and spread measurements of various shrubs that exist at the Sim's Park, Coonoor, were collected on systematic lines as in the previous year. The data collected have revealed that the shrubs grown at the Sim's Park, Coonoor, can broadly be classified into three main groups on the basis of their flowering period, namely, those flowering between December to March, April to July and August to November as in the previous year as detailed below :—

Shrubs flowering from		
December to March. (1)	April to July. (2)	August to November. (3)
Asystasis chelonoides.	Abelia grandiflora.	Calliandra breirpus.
Dracarna species.	Allamanda species.	Cestrum aurantiacum.
Diervilla florida.	Colletia ferox.	Poinsettia pulcherrimum.
Exochorpa grandigina.	Cotoneaster frigid.	Abutilon varieties.
Fuchsia fulgens.	Datura arborea.	Azalea indica.
Ilex cornuta.	Dombeya spectabilis.	Buddleiya varieties.
Linum triyginaum.	Fuchsia gracilis.	Duranta phemeril.
Prunus laurocerasus.	Gardenia thumbergia.	Fuchsia corymbiflora.
Prunus pissardii.	Helianthemum variable.	Hibiscus rosa-imensis.
Spiraea peruviana.	Iachroma tubulosa.	Rhodomyrtus tomentosa.
	Justicia cornea.	Feijoa sellviana.
	Lantana species.	Hiptage Banghalensis.
	Lagerstroemia indica.	Holmskioldia sanginna.
	Pittosperum toberu.	Nerjum obander.
	Plumbago capensis.	Camellia Japonica.
	Strelitzia augusta.	Enostemon myoporidea.
	Spiraea corymbosa.	Strobilanthus species.

In general it was found that these observations have facilitated the classification of the various flowering shrubs into different categories as mentioned above, which information is being made use of in suggesting the layout for mixed shrubberies with stress on having flowers all the year round.

3. Study on the performance of trees in Sim's Park, Coonoor.—Observations on the height, girth and spread measurements of trees with their flowering and fruiting habits were made and a total of 130 trees were listed and observations recorded on them till the end of the period under report.

Here also, as in the case of shrubs, the trees could be classified into four groups, instead of three groups as in the previous year, according to their flowering periods, namely, trees flowering between (1) January and March, (2) April and June, (3) July and September and (4) October and November, as detailed in Appendix II attached. Besides these, the data on their height, girth and spread measurements are of help to gardeners to put the trees into various uses in a systematic horticultural way, as avenue trees, single specimens on lawns, etc., depending on the space available in the gardens.

4. Taxonomic studies on eucalyptus species.—With a view to study the relative responses of the 35 different species of Eucalyptus that exist at the Sim's Park, Coonoor, complete taxonomic description of each individual species were undertaken to form a key for the identification of the several species. Thirty-two species have so far been described and a summary of the data collected have been furnished in Appendix III. The data collected have given broader indications for the identification of the different species by such characteristics as the nature of the bark, nature of the flower and inflorescence, shape of the adult and juvenile leaves, etc. The data have also given some broader indication for the preparation of a descriptive blank.

5. Taxonomic studies on roses.—Detailed taxonomic descriptions of the numerous varieties of superior roses which number nearly 75, were made with the object of providing a key for the identification of the different varieties by purely vegetative characters. So far descriptions have been recorded on 55 different varieties. The data collected have given some hints for the identification of many of the rose varieties by such of the vegetative characters as the number of leaflets in the compound leaf; glossy or otherwise nature of the leaves, folding habits of the leaves, colour of the emerging leaves, colour of tender shoots, etc. A summary of the data collected so far have been furnished in Appendix IV.

6. Study of the dormancy of seeds of Eucalyptus Citriodora, Eucalyptus Ficifolia and Jacaranda Mimosaefolia.—Since information on the longevity of the seeds of the above three economic and ornamental trees of the Nilgiris, is lacking, to find out the longevity of these seeds in storage, from a stock collection of these seeds, 100 seeds of each of the three species were set out for germination at monthly intervals and their germination percentages were calculated. The data collected so far are tabulated in table below :—

Nature of seeds.	Percentage of germination.		
	Eucalyptus Citriodora.	Eucalyptus ficifolia.	Jacaranda mimosaefolia.
June 1951 fresh	80	60	94
July 1952 one month old	80	57	90
August 1951 two months old	60	48	80
September 1951 three months old	60	44	78
October 1951 four months old	60	44	78
November 1951 five months old	58	44	78
December 1951 six months old	58	42	76
January 1952 seven months old	58	42	76
February 1952 eight months old	58	42	74
March 1952 nine months old	58	42	74
April 1952 ten months old	58	42	74
May 1952 eleven months old	56	42	73
June 1952 twelve months old	56	42	73

The above data reveal that only fresh seeds have given the maximum percentage of germination of 80 per cent, 60 per cent and 94 per cent respectively, in *Eucalyptus Citriodora*, *E. Ficifolia* and *Jacaranda Mimosaeifolia*. It is also seen that the percentage of germination declines as the seeds get older. However, the data is incomplete, as such, to draw any definite conclusions.

7. *Propagation studies on 'Araucaria Bidiuilli'.*—With a view to find out the optimum month for rooting of the cuttings of this plant, 12 cuttings were planted every month since July 1951 and rooting counts were taken and the data collected so far have been tabulated below :—

Month of planting.	Number planted.	Number green.	Percentage of rooting.
1951—			
July	12	2	17
August	12	3	25
September	12	9	75
October	12	8	67
November	12	8	67
December	12	9	75
1952—			
January	12	3	25
February	12	2	17
March	12	..	..
April	12	..	..
May	12	All still green	..
June	12	..	..

The above data reveal that only the period between September to December is the best suited for the insertion of cuttings of *Araucaria Bidiuilli* for rooting.

8. *Plant introduction studies.*—Plant introductions were under way, as in the previous years to augment the collection of ornamental and economic plants and the existing collections are as a result of such introduction work. Among the successful introductions during 1951-52 the following deserve special mention :—

Annuals.—Cleome, *Didiscus*, *Lobelia*, Variegated petunia and a species of *Amaranthus*, namely, *Amaranthus Tricolour*.

Shrubs and bulbs.—A white flowering variety of *Nerium Obander*, *Caladium* varieties; *Mesembryanthemum* yellow flowered varieties and five new varieties of standard roses, namely, *Talisman*, *Hennich Wenland*; *W. E. Nickelson*; *McGredy's* yellow and *Eclipse* from a local garden.

Fruit and other economic plants.—A species of *Arancaria*, namely—*Arancaria Cunninghamii*, from a garden at Kotagiri.

Medicinal plants.—Sixteen kinds of medicinal plants, namely, *Achillea Melifolia*, *Althea Officinalis*, *Artemesia Absenthimum*, *Fragaria Alpura*, *Helliborus Niger*, *Iris Germaica*, *Marubium Vulgare*, *Mulina Officinalis*, *Nepita* species, *Potentilla* species, *Ruta Graveolens*, *Salvia Officinalis*, *Tar-nasetum Vulgare*, *Thymus Serpiloms*, *Varlevina Officinalis* and *Verbascum-thapsus* were introduced from a local garden at Coonoor, along with a new species of *Digitalis*, namely, *Digitalis Lauata* from Holland.

Besides the above, cuttings and seeds of creepers like *Glosiosa Superba* and *Abrus Precations* were also tried, but they failed to establish or germinate.

Propagation of the plant materials of the successful introductions being pursued to further the spread of these ornamental and economic plants, and the studies are also being continued as this is the only method by which the existing collections can be augmented.

9. *Miscellaneous trial*—(i) (a) *Experiments on ornamental designs.*—Experiments on mixed herbaceous borders with a mixture of annual and perennial plants were tried on a systematic line to study the effect of colour grouping, continuous blooming and landscape effect and unlike last year, the long beds in terraces were devoted to perennial plants like daisies of the *Marguerette*, *Pairs* and *Michaelmas* types; *Chrysanthemums*, *Penestemons*, *Geraniums* *Perennial Salvis*, *Cannas*, *Mesembryanthemum*, *Double Petunias*, etc., along with continuous blooming, long duration annuals like *Helichrysums*, *Salvias*, *Dahlias*, *Celosias*, *Zinnias*, *Dianthus*, *Petunia Antirrhinum*, etc., conditions found to be a great success from the following observations :—

(i) There was a harmonious colour effect because of the continuous blooming of the plants from the first week of April to the end of June.

(ii) The plants were found to be very hardy and withstood the almost dry weather of April, May and June; and

(iii) unlike annual borders, there were not much of casualties to be replaced.

Besides this, in the first terrace only dwarf and creeping annuals like *Portulacas*, *Pinks*, *Gazanias*, *Verbenas* and *Calendulas* were planted to give the maximum effect to the lawns.

Special beds were prepared to enhance the beauty of the lake margins and were planted with *Salvias*, *Daisies* and *Dahlias* in major individual groups to give a mass effect of colour. Colourful annuals like *Gaillardias*, *Portulacas*, *Pansys*, *Gerberas*, etc., were planted in tree pits to relieve the monotony of the greenness of the lawns and trees.

(b) *Propagational trials.*—Certain pilot trials on the propagation of *Camellia Japonica* by inserting leaf cuttings and by root grafting on root pieces of *Camellia Japonica* were attempted and it was found that the propagation of *Camellias* by leaf cuttings is very simple, easy and quicker method of propagation than by the semi-hardwood cuttings, while the root graftings were a thorough failure.

Attempts were also made to propagate the different species of *Pinus* by cuttings which were not successful.

(ii) *Pests and diseases.*—Shrubs like *Fuchsias*, *Cotaneaster*, *Abutilon*, *Colletia Ferox* and *Nerium* were susceptible to the attack of sooty mould and were given a spray of 1 per cent fish oil soap with starch solution, while spireas were found to be attacked by black leaf spots which are controlled by a spray of 1 per cent Bordeaux mixture.

Among trees only the different species of *Eugenias* were found to be infested with sooty mould which was brought under control to the maximum extent possible by a spray of 1 per cent of fish oil soap.

The other pests that were noted, the green aphids on roses deserve special mention which were again controlled by spraying *Nicotine Sulphate* solution 1 per cent.

(iii) *Items of improvement.*—The major items of improvement that were carried out in the park during the year 1951-52 are the following :—

The new rockeries were formed in the slope adjacent to the fountain terrace. A rustic summerhouse was newly erected inside the children's picnic ground. To facilitate the easy irrigation of the Nursery terraces, a new well 20 feet deep was constructed in the northern portion of the existing nursery. A single row of brick lining was given to all the box-wood edgings in all the terraces of the park. New footpaths and new flower-beds were laid

out in convenient places in the park. To augment the supply of cut flowers, arum lily bulbs were planted all along the sides of perennial stream and along the margins of the lake. The lawn in the northern boundary of the lake were cleared and planted with groups of cannas. Planting of perennial shrubs and trees were carried out in suitable places.

Besides the above, during the year, attention was paid to apiculture and nearly six hives were started afresh and were found to work satisfactorily especially in the Nursery area.

(iv) *Nursery activities*.—The Sim's Park, Coonoor, Nursery was very active throughout the year with several operations relating to propagation and multiplication work. The major demands were for standard and bush roses among roses and Camellias white and pink varieties among other ornamental plants.

In all, a total of 20,635 cuttings of various ornamental shrubs and economic plants were inserted for rooting of which 7,800 were that of briar roses alone which were raised as root swells for the propagation of superior varieties of roses. A total of 2,250 bud insertions were made of which over 55 per cent have taken up; nearly 250 Carnations and other plants were layered, while 600 seedlings mixed annuals were potted. Twenty thousand cuttings and seedlings of mixed annuals were transplanted in all the terraces of the park.

Major attention was paid to the collections of seeds of trees and flowering shrubs and annuals. A total quantity of 25 lb. and 13½ oz. of tree seeds of the different species of *Eucalyptus* and other hedge and ornamental plants were collected during the year and were sold or transferred to other Agricultural Research Stations. Collections of flower seeds also was in full swing and a total quantity of 6 lb. and 10½ oz. of different kinds and varieties of annuals were collected during the period.

There were very heavy demands for the supply of standard roses and Camellias and more than 850 plants of standard roses and 198 of Camellia Japonica were sold.

(v) *Sales and transfers*.—A total of 890 orders were received for the supply of plants, bulbs, cut flowers, wreaths, button holes, etc., and were complied with as against the 800 orders received during 1950-51 and a total revenue of Rs. 5,969-10-0 was realized under receipts as compared to Rs. 4,600-10-0 in the year 1950-51. The details are given below :—

	RS.	A.	P.
By cash sales of plants, cuttings, bulbs and specimens	2,784	11	0
By cash sales of tree and flower seeds	311	11	0
By cash sales of cut flowers, button holes, wreaths, bouquets, etc.	399	4	0
By cash sales of tree and flower seedlings	258	14	0
Miscellaneous receipts including rent on buildings.	1,079	3	0
Tree transfer of seeds, plants, bulbs, etc., to other farms	1,135	15	0
Total ...	5,969	10	0

(vi) *Advisory work*.—Advice on horticultural matters was rendered for over 410 enquiries of which 251 were in correspondence and 159 were in person and 17 private gardens were visited during the period and advisory work on layout of gardens and planting was rendered.

In all 20 batches of students of Botany, Forestry, Horticulture, Agriculture and Bacteriology representing more than six Universities in the country were taken round the park and the history of the park along with the details of research work that is being carried out were explained to them in detail.

(viii) *Vanamahotsava*.—During the Vanamahotsava week of 1951, more than 700 saplings of bluegum were planted in the Shola areas of the park, and more than 250 seedlings of ornamental and economic trees like the Jacaranda, Oak; Tung oil, Camphor and the pines were sold to the public. The months of May 1952 and June 1952 were very busy as a prelude to the succeeding weeks of Vanamahotsava and to raise large-scale nurseries of the seedlings, an area of nearly 55 cents were cleared and terraced in the area adjoining the present nursery area and in the Shola near the sowing place and were sown with eight pounds of seeds of different species of *Eucalyptii* like *E. Globulus*, *E. Teraticornis*, *E. Rostrata*, *E. Smithii*, *E. Robusta*, *E. Citriodora*, *E. Maculata*, *E. Pilularis*, *E. Ficifolia*. Passion fruit, Pinuses, Jacaranda to raise seedlings for large-scale distribution of seedlings of ornamental and economic plants and by the end of the period, nearly 200,000 of *Eucalyptus* seedlings and 4,000 of other tree seedlings and plants were ready for distribution.

Besides the above, 250 seeds of *Castanospermum* and 25 Tung oil—*Aleurites Fordii*—were also sown for raising seedlings of chestnut and tung oil.

(viii) *Visitors*.—The season was very bright this year and the park continued to attract visitors and thus was full with activity. Prominent among the visitors were the following besides the numerous batches of University students :—

- 1 Sri B. V. Baghawat, Superintendent, Gaueshkind Gardens, Poona.
- 2 Major A. R. Tainst, Pest Control, Ltd., Cambridge, United Kingdom.
- 3 H. F. Sasson, Parry and Co., Madras.
- 4 His Excellency Shri Prakasa, Governor of Madras.
- 5 Dr. Chan. Oppenheimer, Horticulturist, Palestine.
- 6 Dr. Shri Ranjan, Professor of Botany, University of Allahabad.

(ix) *Publications by the staff*.—The following were sent as publications from the Sim's Park, Coonoor :—

- 1 "Rose growing on the Nilgiris", by Sri V. Sampath—Article submitted for publication in the Madras Agricultural Journal
- 2 "Some observations of the Propagation of Camellia Japonica at Sim's Park, Coonoor", by Sri V. Sampath—Article submitted for discussion at the study group session at Coimbatore.

Statement of charges and receipts of Sim's Park, Coonoor, for 1951-52 is appended in Appendix V.

APPENDIX I (a).

Summary of data on annuals at the Sim's Park, Coonoor.

Number and name of annuals.	Range of time taken in days from date of sowing						
	For germination.		For trans-planting.	For first bloom.	For full bloom.	For casual-ting bloom.	Average height of the plant.
	From.	To.					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8) FT. IN.
Alyssum white	10	16	52	98	121	160	0 6
Antirrhinum mixed	29	36	70	121	142	178	2 6
Aster double mixed	10	22	66	174	202	219	2 6
Balsam mixed	9	15	53	94	116	152	2 6
Calendula mixed	6	11	50	93	121	148	1 6
Candytuft mixed	6	11	45	95	120	164	1 0
Celosia mixed	7	16	39	97	130	174	3 0
Calliopsis mixed	6	17	54	144	153	213	4 0
Clarkia mixed	9	18	55	107	132	170	2 0
Cock's comb mixed	10	25	51	118	165	190	1 0
Corn flower blue	5	12	45	120	142	157	2 9
Dahlia mixed	28	40	70	105	125	185	3 6
Delphinium blue Butterfly	16	24	38	75	89	119	1 6
Dianthus mixed	25	35	52	114	155	170	1 6
Didiscus carleus	30	46	65	100	125	139	2 6
Eschscholtzia mixed (Californian poppy)	7	20	45	67	100	125	1 0
Godetia white	9	23	46	98	120	150	3 0
Gypsophylla mixed	7	16	46	98	117	160	2 6*
Helichrysum mixed	7	25	45	115	145	202	3 6
Gillardia mixed	8	16	44	93	120	172	2 6
Hollyhock mixed	10	19	63	120	160	170	5 6
Gpomopsis mixed	9	17	50	115	148	170	3 6
Ladylace white	7	12	49	140	195	212	3 6

Serial number and name of annuals.	Time taken for first bloom to appear in days.				Duration of bloom in days during				Growth in terms of height in			
	1950.	1951.	1952.	(1)	1950.	1951.	1952.	(2)	1950.	1951.	1952.	(3)
	(2)	(3)	(4)		(5)	(6)	(7)		(8)	(9)	(10)	
(1)	(2)	(3)	(4)	(1)	(5)	(6)	(7)	(2)	(8)	(9)	(10)	(3)
1 Alyssum	97	98	98	..	65	60	62	..	0 7	0 6	0 6	..
2 Antirrhinum	120	132	121	..	60	45	57	..	2 6	2 6	2 6	..
3 Aster	173	174	174	..	52	45	45	..	2 6	2 6	2 6	..
4 Balsam	96	94	94	..	60	58	58	..	1 0	1 0	1 0	..
5 Calendula	93	94	93	..	52	55	55	..	1 3	1 6	1 6	..

* Flowering was not over at the time of the report.

† Flowering has not yet ceased.

APPENDIX I (b).

Serial number and name of annuals.	Time taken for first bloom to appear in days.				Duration of bloom in days during				Growth in terms of height in			
	1950.	1951.	1952.	(1)	1950.	1951.	1952.	(2)	1950.	1951.	1952.	(3)
	(2)	(3)	(4)		(5)	(6)	(7)		(8)	(9)	(10)	
(1)	(2)	(3)	(4)	(1)	(5)	(6)	(7)	(2)	(8)	(9)	(10)	(3)
1 Alyssum	97	98	98	..	65	60	62	..	0 7	0 6	0 6	..
2 Antirrhinum	120	132	121	..	60	45	57	..	2 6	2 6	2 6	..
3 Aster	173	174	174	..	52	45	45	..	2 6	2 6	2 6	..
4 Balsam	96	94	94	..	60	58	58	..	1 0	1 0	1 0	..
5 Calendula	93	94	93	..	52	55	55	..	1 3	1 6	1 6	..

APPENDIX I (b)—cont.

Serial number and name of annuals.	Time taken for first bloom to appear in days.				Duration of bloom in days during			Growth in terms of height in			
	(1)	1950.		1951.	1952.		(7)	1950.		1951.	1952.
		(2)	(3)		(4)	(5)		(8)	FT. IN.	(9)	FT. IN.
6 Candytuft	..	93	106	95	95	65	69	1 6	1 3	1 3	1 6
7 Callopsis	..	130	144	141	141	73	72	3 6	4 0	4 0	4 0
8 Celosia mixed	..	..	97	95	95	..	69	..	3 0	3 0	3 0
9 Clarkia mixed	..	110	108	107	107	55	63	2 5	2 0	2 0	2 0
10 Cock's comb	..	..	127	118	118	..	72	..	1 0	1 0	1 0
11 Cornflower blue	..	122	135	120	120	38	37	3 6	3 0	3 0	3 0
12 Dahlia mixed	..	102	105	105	105	62	80	3 6	3 6	3 6	3 6
13 Delphinium	..	71	75	71	71	50	48	1 6	1 6	1 6	1 6
14 Dianthus	..	112	113	114	114	57	56	1 4	1 6	1 6	1 6
15 Godetia	..	100	98	98	98	50	52	3 0	2 6	2 6	3 0
16 Gypsophylla	..	103	115	98	98	56	62	2 6	2 6	2 6	2 6
17 Helichrysum	..	110	107	115	115	90	87	3 6	3 6	3 6	3 6
18 Hollyhook	..	120	..	125	125	82	..	5 3	..	..	5 6
19 Lady lace	..	139	130	140	140	70	72	3 6	3 6	3 6	3 6
20 Linaria	..	101	102	92	92	65	43	2 6	2 6	2 6	2 6
21 Larkspur	..	..	111	110	110	..	48	..	2 0	2 0	2 0
22 Linum	..	105	104	96	96	60	62	1 6	2 0	2 0	1 6
23 Nemesis	..	101	107	93	93	60	59	1 3	1 6	1 6	1 6
24 Nigella	..	164	175	160	160	40	40	1 0	1 0	1 0	1 0
25 Marigold	..	100	..	102	102	72	73	2 1	..	..	2 9
26 Petunia	..	106	115	116	116	74	69	2 6	2 9	2 9	2 7
27 Phlox	..	108	105	102	102	62	61	1 6	1 6	1 6	1 6
28 Portulaca mixed	..	80	88	78	78	64	69	0 6	0 6	0 6	0 6
29 Statice	..	118	106	118	118	68	68	2 0	2 0	2 0	2 0
30 Salpiglossis	..	134	142	133	133	65	71	2 6	2 6	2 6	2 6
31 Salvia	..	98	100	95	95	67	70	2 0	1 6	1 6	2 0
32 Stock mixed	..	90	92	85	85	42	43	1 6	1 6	1 6	1 6
33 Sunflower	..	113	109	114	114	50	50	5 6	5 0	5 0	5 6
34 Schizanthus	..	..	102	100	100	..	25	..	1 0	1 0	1 0
35 Zinnia	..	133	135	136	136	60	59	2 0	2 0	2 0	2 0

APPENDIX II.
Classification of trees according to their flowering periods.

Trees flowering between.			
January and March.	April and July.	July and September.	October to December.
Aleurites Fordii.	Acer leavigatum.	Acer oblongum.	Acacia dealbata.
Alnus nepalensis.	Acacia melanorylm.	Acacia podalyrifolia.	Aesculus pandauna.
Betula alnoides.	Acacia ponvissiana.	Banksia manginata.	Acacia bailyana.
Cedrela toona.	Acacia confusa.	Camellia Japonica.	Biota orientalis.
Diospyros virginiana.	Arbutus rollissonii.	Castanosperrum australe.	Bucklandia populnea.
Elaeocarpus variculatus.	Albizia stipulata.	Elaeocarpus ganitrus.	Cinnamomum camphora.
Fagus sylvatica.	Baeckia virgata.	Elaeocarpus aldongus.	Callistemon lanceolatus.
Hynea trijuga.	Chaemorops fortunei.	Escallonia organesii.	Cameltra thea.
Hypericum myrsense.	Eugenia smithi.	Escallonia floribunda.	Cytis canoinensis.
Juniperus procera.	Eugenia calophyllifolia.	Grevillea hilliana.	Eriobotya Japonica.
Macaranga indica.	Hymenosperrum flavum.	Grevillea Bankosii.	Fuchsia arborescens.
Melaleuca leucodendross.	Ilex wightianum.	Grevillea robusta.	Macadomic tunifolia.
Melaleuca styphellides.	Jacaranda mimesefolia.	Prunus puddum.	Michellio nilaghenica.
Phoenix canariensis.	Koelerteria formosana.		Syncearpia laurifolia.
Podocarpus taxifolia.	Leptospermum scoparium.		Sauranja nepalensis.
Tereustroemia Japonica.	Magnolia Grandiflora.		Rhododendron arboreum.
Thuja gigantea.	Schinus terbenithifolias.		Vernonia monosis.
Quercus macrocarpa.	Spondias axillaris.		
Quercus sessifolia.	Widdingtonia wightii.		
Sterculia diversifolia.			

APPENDIX III.

Summary of the data collected on *Eucalyptus* Species.

Number and identifying Character.	Species identifiable.	Remarks.
1 Nature of bark.	<i>Eucalyptus viminalis</i> .	Highly peelable, hangs loosely on and around the stem.
	<i>Eucalyptus amygdalina</i> .	Peels off in strands leaving the twisted stem.
	<i>Eucalyptus citriodora</i> .	Completely peels off leaving smooth whitish stem.
	<i>Eucalyptus maculata</i> .	Completely peels off leaving with rudimentary patch of dark grey older bark.
	<i>Eucalyptus camphora</i> .	Peels off completely in vertical strands.
2 Flowers.	<i>Eucalyptus globulus</i> .	Flowers solitary, axillary.
	<i>Eucalyptus ficifolia</i> .	Panicles from 5 to 7 flowers.
	<i>Eucalyptus citriodora</i> .	Panicles from 6 to 10 flowers.
	<i>Eucalyptus leuconylon</i> .	Axillary clusters from 5 to 6 flowers.
	<i>Eucalyptus rostrata</i> .	Bright pink flowers borne on terminal clusters.
	<i>Eucalyptus maculata</i> .	Clusters of 4 to 6 flowers in umbels.
3 Shape of juvenile leaves.	<i>Eucalyptus hemiphloea</i> .	Paniculated umbels.
	<i>Eucalyptus globulus</i> .	Cordate shaped, whitish, coloured borne on quadrangular stems, leaves opposite and sessile.
	<i>Eucalyptus leuconylon</i> .	Obconical, opposite, bluish-white, or cylindrical stems.
	<i>Eucalyptus camphora</i> .	Oblong leaves on cylindrical stems dull green in colour.
4 Colour and nature of stem.	<i>Eucalyptus albens</i> .	Broadly oval shaped leaves, bluish-white, slightly alternate and sessile.
	<i>Eucalyptus citriodora</i> .	Smooth whitish stem.
	<i>Eucalyptus maculata</i> .	Smooth greyish stem with rudiments of dark greyish bark.
	<i>Eucalyptus smithii</i> .	Reddish grey in colour, smooth with occasional patches, reddish bark here and there.
5 Branching habits—	<i>Eucalyptus milliodora</i> .	Stem yellowish in colour the inner, portion of the bark being yellow.
	<i>Eucalyptus globulus</i> .	Highly branched.
6	<i>Eucalyptus amygdalina</i> .	Moderately branched.
	<i>Eucalyptus robusta</i> .	Sparsely branched.
7	<i>Eucalyptus globulus</i> .	<i>Eucalyptus caesia</i> .
	<i>Eucalyptus Daenii</i> .	<i>Eucalyptus rostrata</i> .
8	<i>Eucalyptus lugenoides</i> .	<i>Eucalyptus maculata</i> .
	<i>Eucalyptus hemiphloea</i> .	<i>Eucalyptus resinifera</i> .
9	<i>Eucalyptus saligna</i> .	<i>Eucalyptus citriodora</i> .
	<i>Eucalyptus viminalis</i> .	<i>Eucalyptus tereticornis</i> .
10		<i>Eucalyptus smithii</i> .
		<i>Eucalyptus bolivoides</i> .
11		<i>Eucalyptus leuconylon</i> .

APPENDIX IV.

Summary of the data collected on Rose varieties.

No.	Identifying features.	Varieties identifiable.	Remarks.
1	Number of leaflets in Compound leaf.	(a) Richardson; Cherry, Julien, Potin, Cuba and Condesa de sastago. (b) Radiance. (c) Other varieties.	(a) Seven leaflets in the compound leaf. (b) 3 leaflets in the compound leaf. (c) 5 leaflets normally.
2	Glossy or otherwise nature of the leaves.	(a) Shot silk and lady forteriot. (b) Golden dawn and Condesa de sastago.	(a) Characteristic oily reflection on the leaf. (b) Very shiny leaves.
3	Folding habits of the leaves.	(a) Colussia. (b) Scented daily Mail and E. G. Hill. (c) Richardson. (d) Captain Christy.	(a) 'U' folded. (b) 'V' folded. (c) Folded along the mid rib. (d) Tendency to fold upwards.
4	Thorny or otherwise nature of the leaves.	Lemon pillar, Alois Jiraciek and J. B. Clark.	Under-surface prickly.
5	Colour of the young leaves.	(a) Golden coin, Julien Potin, Cuba; Red, better day and J. B. Clarke. (b) E. G. Hill, Columbia and Lemon Pillor. (c) Lady Hillingdon; Golden dawn, lady Leslie and scented daily Mail. (d) Dady Roberts. (e) Captain Christy. (f) General one Arther.	(a) Reddish brown young leaves. (b) Pinkish green young leaves. (c) Shiny green leaves. (d) Yellowish green emerging leaves. (e) Ashy green young leaves. (f) Reddish thoray leaves.
6	Number of leaflets in the young leaves.	President Herbert Houver.	Seven leaflets, dark green, on reddish-shoots.

APPENDIX V.

Statement of Charges and Receipts of the Sim's Park, Coonoor (July 1951—June 1952).

Charges.						RS.	A.	P.
Pay of Establishment	..	..	..	..	..	1,966	4	0
Other compensatory allowances	..	..	..	..	..	324	0	0
Dearness allowance	..	..	..	..	..	762	11	0
Travelling allowance	..	..	..	..	..	40	7	0
House rent allowance	..	..	..	..	..	109	13	0
Contingencies—								
Petty construction and repairs	..	..	..	..	..	178	0	0
Deadstock	..	..	..	..	..	100	0	0
Working expenses	..	..	..	..	..	7,630	0	0
Dearness allowance to menials	..	..	..	..	..	1,920	1	0
Other contingencies	..	..	..	..	..	286	2	6
Receipts.								
XXIX—(a) Agriculture—								
Botanic gardens and parks	..	..	..	..	..	4,890	7	0
Miscellaneous	..	..	..	..	..	1,079	3	0
Total						5,969	10	0

ADMINISTRATION REPORT ON PLANT-PROTECTION SCHEME, ENTOMOLOGY, SOUTH ZONE, FOR 1951-52.

I submit below the report of work done by the Plant Protection (Entomology) Section, Southern Zone, for the period from July 1951 to June 1952.

2. *Staff*.—Sri K. P. Ananthanarayanan was in charge as Crop and Plant Protection Officer, Entomology, till 15th August 1951 when, as per the Director of Agriculture's Order K. 1-1022/51, dated 8th August 1951, I took charge and continued in the post for the remaining period.

In the districts there were no major changes except in Tanjore where Janab Ibrahim Ali, a trained hand replaced an untrained one. The assistants had a staff of one demonstration maistry and a messenger to help them in their work.

3. *Tours*.—Sri K. P. Ananthanarayanan was on tour for 16 days and visited eight districts. I toured for 174 days during the remaining period and visited all the 15 districts in my jurisdiction twice and in some cases thrice, for guiding and organizing plant protection measures. The assistants toured on an average for 18 days in the month and visited 3,078 villages in connexion with plant protection work.

4. *Season*.—The season was not favourable for agricultural work. The north-east monsoon was a partial failure in most districts and a complete failure in some tracts. The monsoon period was succeeded by a prolonged and severe drought which induced famine conditions in parts of North Arcot, Salem and Coimbatore districts and strained the resources of all the other districts also. The south-west monsoon set in about a month later than the usual period and was very weak.

The failure of the monsoons seriously affected the water-supply in irrigation sources like tanks and wells. Most of these were completely dried up and well irrigation was maintained with great difficulty and at much expense by deepening the wells. The area of irrigated crops, both in wet lands and garden lands was much restricted due to limitations of water-supply.

5. *General trends in plant protection work*.—The unseasonal and unfavourable weather factors had its own adverse effects on plant protection activities. The ryots were depressed and anxious about the possibilities of maintaining even the restricted areas under cultivation. Though there was a welcome awakening and awareness on the part of the ryots about the effectiveness of plant protection methods, they were reluctant to adopt such, due to uncertainties about the maintenance of the crops themselves. Added to this, the general depression of agricultural commodities' prices was not an inducement to increase the cost of cultivation. In spite of these handicaps, plant protection activities were on the increase in all districts and the use of insecticides to control pest outbreaks is becoming more and more popular day by day.

6. *Pest control operations*.—The following is a brief account of the important pest control operations carried out during the year. An abstract summary of the same is furnished in Appendix II.

I. Pests of paddy—

(i) *Spodoptera mauritia*, the Army Worm.—The insect is almost universal in distribution, appearing as a nursery pest in all districts from April-May to November-December, the periodicity of outbreak being governed

by the particular agricultural practices of a tract. Two severe outbreaks were recorded during the year—one during September-October in Chingleput-South Arcot belt on the samba nurseries and another in North Malabar-South Kanara belt on the dry-sown kuruvai nurseries and broadcast crops. Infestations on a lesser extent was recorded on samba nurseries in Tanjore, Pattukottai and North Arcot districts, an extension of the Chingleput-South Arcot belt and on kuruvai nurseries in Tirunelveli. Minor and localized outbreaks occurred on the third crop nurseries in South Kanara during March-April. The most effective control measure was that of dusting 5 per cent DDT or spraying 0.1 per cent DDT suspension, this latter method being found effective even during the heavy south-west monsoon showers on the West Coast. Dusting 10 per cent BHC gave equally good results in the younger stages of the caterpillars; this chemical being very cheap, its use was also popular. In all the districts, a total area of 2,754 acres were treated which may be estimated to have saved seedlings to plant 27,540 acres.

(ii) *Nephotettia bipunctatus*, the Green Jassid.—The insect was recorded from all the districts excepting Malabar, South Kanara and Nilgiris where apparently, the heavy south-west monsoon showers were not conducive to their multiplication. The heaviest incidence was found during the samba season from October to December and on a lesser scale right throughout the year. Its worst effect was on the samba crop immediately after transplantation, the plants being completely dried up. The pest appeared in its severest form doing the maximum damage in areas irrigated from wells and tanks whereas in areas commanded by irrigation canals as in Tanjore, Tiruchirappalli, South Arcot and Madurai, there was no total loss of the crop as occurred in Salem and Coimbatore districts. The largest area infested was in Salem district and the adjacent areas of Coimbatore.

It was found that dusting of 5 per cent DDT effected almost complete control but in some cases a second course of treatment was also found inevitable due to reinfestation 2-3 weeks later. Trials were conducted this year with Toxaphene 10 per cent and this was found even superior to DDT. An area of 8,475 acres was treated on the whole in the various districts estimated to have saved a loss of 941.7 tons of paddy valued at Rs. 2,63,676.

(iii) *Nephotettia bipunctatus* and *Nymphula depunctatis* (green jassid and case-worm).—It is a recorded fact that green jassid infestations invariably bring in its wake outbreaks of other pests. In Chingleput district incidence of case-worm was severe along with that of green jassids, the damage being accelerated. As dusting 5 per cent DDT was found insufficient to effectively control both the pests, a mixture of this with 10 per cent BHC was used after draining the fields. An area of 1,958 acres was thus treated, leading to an estimated saving of 117.5 tons of paddy valued at Rs. 32,900.

(iv) *Nephotettia bipunctatus* and *Nilaparvata* sp. (green jassid and paddy fulgorid).—The association of the fulgorids with green jassids was a special feature in the Cauvery irrigation basin in Tiruchirappalli, Tanjore and South Arcot districts. The crop affected was kuruvai and the infestation was noted only in years when due to insufficiency of water, kuruvai planting was late and there was an overlapping of the kuruvai with the samba crops. The fulgorids were noted in the almost mature kuruvai crop, usually attacking the basal portion of the plants, causing the lodging of the crop and leading to the development of sclerotium and the complete rotting of the crop. The green jassids were noted on the leaves and evidently, the kuruvai which is usually free of serious jassid damage, succumb to the combined attack of both the insects. The most interesting feature of the outbreak was that the fulgorids did not infest the samba seedlings or transplants but disappeared with the

harvest of the kuruvai. The use of 5 per cent DDT for the control of jassids was found absolutely ineffective against fulgorids which were, however, amenable to 10 per cent BHC. In all cases of the combined infestation, a dust mixture of 5 per cent DDT and 10 per cent BHC was used with fairly good results. Trials conducted with Toxaphene indicated that it controlled both the insects. An area of 572 acres was treated leading to an estimated saving of 63.5 tons of paddy estimated at Rs. 17,780.

(v) *Tettigoniella spectra*, the white jassid.—The insect, though widely distributed in all paddy tracts, was noted in a pest form in Tiruchirappalli and North Arcot districts. Though the effects of infestation were not as acute as in the case of green jassids, it caused stunted growth and unhealthy stand. The infestation was most pronounced on late samba crop and short-duration third crops. The insects were effectively controlled by dusting 10 per cent BHC. An area of 299 acres was treated leading to an estimated saving of 33.1 tons of paddy valued at Rs. 9,268.

(vi) *Nymphula depunctalis*, the case-worm.—This was a major pest only in South Kanara district and occurred in restricted areas in South Malabar, Nilgiris, Pattukkottai and Chingleput. The main infestation and damage was on the samba crop and in the succeeding third crop and the areas of infestation were characterized by water stagnation due to improper drainage. The period of susceptibility of the crop is only in the early stages of growth, even half mature crops being immune to damage. The insects were controlled satisfactorily with 10 per cent BHC if the fields could be drained but as this is not feasible in most cases, trials of spraying of 0.1 per cent DDT suspension was found to give equally fair results. An area of 1,866 acres was treated, leading to an estimated savings of 51.7 tons of paddy valued at Rs. 14,476.

(vii) *Schoenobius incertellus*, the stem-borer.—This is the most cosmopolitan of all the paddy pests and the only one which has defied any specific method of insecticide control. The insect was widely prevalent in all districts and particularly in the districts of Tanjore, Tirunelveli and Chingleput. In the last district it was combined with case-worm infestation also, in extensive areas. The peak infestation was on the samba crop from October to March. In cases where the initial infestation was noted in the nurseries a spray with 0.4 per cent strength of BHC suspension gave very satisfactory results. It was reported that a heavy dusting with a mixed dust of 5 per cent DDT and 10 per cent BHC also gave good results in Chingleput. These measures were adopted in 1,845 acres and is estimated to have saved a loss of 158 tons of paddy valued at Rs. 44,240.

(viii) *Hispa armigera*, the rice hispa.—Mostly a pest of nurseries and young transplanted crops, it was most serious from October to December on the samba crops. The first and third crops were also infested but not to such an extent as the samba. The principal centres of infestation were Salem and South Kanara districts and lesser outbreaks were recorded from South Malabar, North and South Arcot and Tirunelveli districts. Dusting of 10 per cent BHC was effective as well as a spray with 0.1 per cent DDT suspension. If insecticidal treatment was preceded by a top-clipping to remove eggs and larvae almost cent per cent control resulted. In all the districts an area of 1,773 acres was treated, estimated to have saved 49.2 tons of paddy valued at Rs. 13,776.

(ix) *Leptispa pygmoea*, the paddy blue beetle.—Though this was the most serious of the paddy pests in Malabar during the previous season it was reported only in a very restricted area of 97 acres in Malabar during the current period. The control measure of dusting 10 per cent BHC was so well

known to the ryots that the adoption of control measures in the early stages prevented any further spread of the pest. This is estimated to have saved a potential loss of 10.7 tons of paddy valued at Rs. 2,996.

(x) *Scotinophora lurida*, the black bug of paddy.—This insect commonly found in association with a bigger one, the striped bug was noted in a pest form principally in Chingleput district. The area under infestation was originally confined to Madurantakam taluk but has gradually spread to practically all the other taluks in Chingleput district and also to the neighbouring taluks of North and South Arcot districts. The insects infest paddy in all the stages of growth but was observed most prolific on crops in ear-heads; breeding was noted practically confined to almost mature crops. The insects usually congregate towards the basal portions of the plants, sucking plant juice from the stem portions. In some instances the crops lodged and as in the case of fulgorids there was an acute development of Sclerotium. In other cases the crops became stunted, developed a bunchy appearance and ear-head production was inhibited or poor. Treatment with 10 per cent BHC after draining the fields was found to give fairly effective control and on recent trials, Toxaphene 10 per cent or 20 per cent dust gave much better results. The latter insecticide is being used on a field scale now in Chingleput district. On the whole 4,040 acres was treated, estimated to have saved a potential loss of 449 tons of paddy valued at Rs. 1,29,720.

(xi) *Hieroglyphus banian* and *Oxya velox*, the paddy grasshoppers.—The Hieroglyphus hoppers were recorded only from Malabar, Coimbatore, Tanjore and Madurai while the lesser grasshopper was recorded from Pattukkottai, Tanjore, Ramanathapuram, South Kanara, Coimbatore, Tirunelveli and Chingleput. The infestation of Hieroglyphus was reported from July to December while Oxya infestation was most serious on the third crop from February to March. Dusting of 10 per cent BHC was found an effective control measure and this was done in 1,276 acres which is estimated to have saved a loss of 141.7 tons of paddy, valued at Rs. 39,676.

(xii) *Leptocorissa acuta*, the rice bug.—This pest was reported from practically all the districts, throughout the year, the maximum infestation being recorded in November-December on the samba crop. Dusting of 10 per cent BHC effected complete control and this treatment was done in 3,690 acres leading to the saving of a loss of 297.7 tons of paddy, valued at Rs. 83,356.

(xiii) *Ripersia oryzae*, the 'Soorai'.—The paddy mealy bug was prevalent extensively in the Tanjore and Pattukkottai districts on the samba crop. A number of insecticides were tried as sprays on the affected crops but all were failures. The ryots were persuaded to remove the affected patches and replant. This was done in nearly 1,860 acres leading to the prevention of the pest spreading to other areas. The savings are estimated at 206.6 tons valued at Rs. 57,848.

(xiv) *Cnaphalocrocis medinalis*, the leaf-folder.—Though a minor pest the insect was reported from Coimbatore, Tiruchirappalli, Tanjore, North Arcot, Malabar and South Kanara as causing damage by webbing the leaves and interfering with the growth of the crop. Effective control was given by dusting 10 per cent BHC and 472 acres were thus treated leading to the saving of a loss of 13.1 tons of paddy valued at Rs. 3,368.

(xv) *Miscellaneous pests*.—Besides the pests listed above, a number of interesting minor outbreaks were recorded. In Ramanathapuram and South Arcot, the paddy stem-fly, *Atherigona* sp. was reported in about 136 acres. The insects caused the breaking of the leaf-blades at the base, so that attacked clumps appeared as stubbles. It was controlled and further spread prevented.

by spraying 0.1 per cent DDT suspension. In Ramanathapuram *Gryllotalpa* sp. (mole crickets) caused damage in about 8 acres by cutting the plants. Spraying with 0.4 per cent BHC suspension prevented further trouble. In the same district termites caused severe damage in 7 acres of newly reclaimed land. Spraying of 0.4 per cent BHC suspension gave good control. In North Arcot, earth worms were a serious problem in some areas maintained under well irrigation. The burrowings of these worms caused rapid absorption of the water into the soil. Addition of copper sulphate in the irrigation water at 3-4 lb. per acre gave complete relief. In Tirunelveli, the paddy ear-head beetle, *Oides affinis*, was noted doing some amount of damage; it was controlled by dusting 10 per cent BHC. In the same district, flea-beetles were observed attacking paddy and control was obtained in 3 acres by dusting 10 per cent BHC. All these measures are estimated to have saved a potential loss of 22.3 tons valued at Rs. 6,350.

II. Pests of millet crops—

All millets were badly affected by drought. The areas under irrigated cholam, ragi and other millets were cut down considerably due to water scarcity. The following were the important pests recorded on these crops :—

A. Cholam.

(i) *Calocoris angustatus*, the cholam ear-head bug.—Owing to the extreme condition of drought or other seasonal factors, the infestation by this insect was on a far smaller scale this year than in the previous one, in all districts. The principal centres of outbreak were Coimbatore, Madurai, Ramanathapuram and South Arcot districts. The practice of dusting 10 per cent BHC has become one of the best known and popular of the insect control measures and is widely followed by all ryots in the districts where the pest occurs. An area of 2,343 acres was treated leading to an estimated savings of 293 tons of cholam valued at Rs. 65,632.

(ii) *Paratetranychus indicus*, the cholam mite.—This pest was widely spread, particularly, in the southern districts, Salem, Madurai, Ramanathapuram and Tirunelveli. Effective control was established by dusting sulphur and an area of 668 acres was treated. It is estimated that a loss of 43 tons of cholam was saved due to the adoption of this measure.

(iii) *Miscellaneous pests of cholam*.—Successful attempts were made in Ramanathapuram and Tirunelveli districts to control the cholam stem-borer, *Chilo zonellus* by dusts and sprays of BHC. Dusting 10 per cent BHC very early in the growth of the plants or spraying a 0.2 per cent BHC suspension was found to give a very fair amount of control. The flea-beetle, *Chaetocnema* sp. appeared in some severity on young cholam crops in Ramanathapuram and Madurai districts and was controlled by dusting 10 per cent BHC. Other minor pests like leaf aphid and leaf-eating caterpillars were also controlled by dusting 10 per cent BHC. These measures are estimated to have saved about 4.8 tons of cholam valued at about Rs. 660.

B. Ragi.

(i) *Laphygma exigua*, the ragi cutworm.—There was an unprecedented outbreak of this pest in October-December in Coimbatore and Ramanathapuram districts. Minor outbreaks were recorded all throughout the year in Pattukkottai, Madurai, North Arcot and Chingleput also. Dusting with 10 per cent BHC was found fairly effective but spraying with 0.1 per cent DDT suspension was better. These measures were adopted in 1,178 acres leading to a saving of 147.2 tons of ragi valued at Rs. 32,973.

(ii) *Chaetocnema* sp., the ragi flea-beetle.—This was a serious pest of nurseries and young transplanted crops, particularly in Madurai, Ramanathapuram and Tirunelveli districts. The insects were controlled by dusting 10 per cent BHC or 5 per cent DDT and this was done in 192 acres, which is estimated to have saved a loss of 12 tons of grains valued at Rs. 2,688.

(iii) *Tetraneura hirsuta*, the root aphid.—This important pest of ragi had no satisfactory control measure so far. Preliminary trials conducted in Salem and Coimbatore districts of applying BHC to the soil either by surface application followed by hoeing in or as a spray to the affected patches gave satisfactory control. This was adopted in 36 acres during the season. This measure is estimated to have saved a loss of 4.5 tons of grains valued at Rs. 1,008.

(iv) *Thrips* sp.—In Chingleput and South Arcot, severe infestation of thrips was recorded in 52 acres. The outbreak was successfully controlled by dusting 10 per cent BHC or spraying of 0.2 per cent BHC suspension, leading to the savings of an estimated loss of 3.2 tons valued at Rs. 717.

(v) *Chrotogonus* sp.—Surface grass-hoppers. Infestation of these was fairly severe in some areas in Salem and Ramanathapuram districts. It was completely controlled in 49 acres by dusting 10 per cent BHC, thereby saving an estimated loss of 3 tons of grains valued at Rs. 672.

(vi) *Delphacid* hopper.—A very interesting and hitherto unrecorded pest on ragi was a Delphacid hopper, prevalent in Madurai district, specially in Madurai and Melur taluks. The insects infested only the nursery crops, causing yellowing of the leaves, stunted growth and very often the wilting of the entire nursery beds. Dusting with 10 per cent BHC or spraying of 0.1 per cent DDT suspension gave good control. This was adopted in 5 acres of nurseries.

(vii) *Nezara viridula*, the green shield bug.—In Ramanathapuram these bugs were found in a pest condition on ragi crops causing severe damage. The outbreak was successfully controlled by dusting 10 per cent BHC and this was adopted in 18 acres effecting the saving of a potential loss of 1.1 tons valued at Rs. 246.

C. Cumbu.

The crop was affected in Ramanathapuram district by *Calocoris*, the cholam ear-head bug in 5 acres, flea-beetle in 14 acres, grasshoppers in 32 acres and *Nezara* in 3 acres. All these were controlled by dusting 10 per cent BHC. In South Arcot district, an area of 40 acres was saved from damage by the red hairy caterpillar pest by spraying the crop with 0.4 per cent BHC suspension. All these measures are estimated to have saved the crop in about 86 acres leading to the saving of 86 tons of grains valued at Rs. 1,100.

D. Samai.

Prodenia sp.—An unexpected and severe outbreak of this pest was recorded from Coimbatore, Madurai and Tirunelveli districts in October-November. Dusting 10 per cent BHC or spraying 0.1 per cent DDT suspension gave complete control. These measures were adopted in 617 acres leading to an estimated saving of 25 tons of grains valued at Rs. 4,500.

III. Pests of vegetables—

1. Brinjal—

Epilachna beetles were the most important pest of the brinjal crop. It was reported from all districts except the West Coast and Nilgiris and prevailed throughout the year with a peak incidence from April to June. The

control advocated was the dusting or spraying of Calcium arsenate and this was widely popular. The largest area of brinjals treated was in Ramanathapuram district. In all the districts 2,184 acres were treated on the whole, leading to a saving of a potential loss of 218 tons of brinjal fruits, valued at Rs. 30,516.

Another fairly serious pest of the crop which was successfully tackled was jassids, *Empoasca* sp. This insect caused very serious injury to brinjal plants, causing the leaves to crinkle and develop chlorotic patches. The pest was controlled by dusting 5 per cent DDT but as the use of DDT alone on brinjal tended to induce the development of mites, a combined dust with 5 per cent DDT and 50 per cent sulphur was used. The pest was prevalent mostly from January to June and was reported from North Arcot and Ramanathapuram and Tirunelveli. An area of 185 acres was treated, which is estimated to have saved a loss of 18.5 tons of the fruits, valued at Rs. 2,590.

Amongst the other pests of the crop, reported and treated from different districts, the most important was *Urentius echinus*, the lace-wing bug. It was controlled by spraying 0.2 per cent BHC suspension or 0.1 per cent DDT suspension, the latter being immediately followed by a sulphur dust, to check the development of mites; 107 acres were thus treated, effecting a saving of 5.3 tons of fruits valued at Rs. 742. Other important pests recorded were mites in 49 acres controlled by dusting sulphur; mealy-bugs in 30 acres controlled by spraying fish-oil soap or 0.4 per cent BHC suspension and Aphis in 52 acres controlled by spraying fish-oil resin soap. These measures are estimated to have saved a loss of 10.5 tons of the produce valued at Rs. 1,470.

B. Potatoes—

The potato crop in Nilgiri district was one of the crops which was severely affected by the failure of the north-east monsoon and the late and weak south-west monsoon. Practically the entire area was withering and the drought induced an abnormally severe outbreak of cut-worms and cock-chaffer grubs. The cut-worms (*Euxoa* sp.) attacked the stem portion above the ground, either cutting it neatly at the base or in some cases attacking the leaves, completely denuding the plants, to mere stalks. Dusting the surface area round the plants with 5 per cent DDT successfully kept the pest under control. The maximum prevalence of the pest was from April to June though it was present and reported all the year round. An area of 158 acres was treated, estimated to have saved a potential loss of 15.8 tons of tubers, valued at Rs. 5,467.

The cock-chaffer grubs lived under ground in the top 6 inches layer of the soil and attacked the tubers. The biology of this insect is not completely understood. Grubs of all sizes were present in infected fields and these attacked the tubers, excavating it almost entirely. No treatment of a standing crop was possible. It was found that BHC mixed in the soil gave almost complete control of the grubs within 4-7 days. The method now in vogue was to dust 50-60 lb. of 5 per cent BHC on the soil surface immediately after the potatoes were lifted, work this into the soil by means of hoes and plant a succeeding crop of cruciferous vegetables. An area of 143 acres was treated, which is estimated to have saved 14.3 tons of the produce, valued at Rs. 4,950.

C. Cabbage—

The most important pest of this crop was the cut-worm, *Agrotis* sp. the maximum damage being recorded from April to June. The caterpillars attacked the young crop, cutting the seedlings at the base entirely. The

hand-sprinkling of 10 per cent BHC round the plants was found to give effective control and as 1 lb. of the dust sufficed to treat about 1,000 plants, was extremely cheap. An area of 354 acres was treated and this is estimated to have saved 354 tons of the produce valued at Rs. 1,06,200.

Of other pests of the crop, plant lice was controlled in 95 acres by spraying fish-oil resin soap and tobacco decoction; root maggot was checked in 12 acres by treating the affected rows with freshly slaked lime and *Plutella maculipennis*; the diamond-back moth in 18 acres by spraying 0.1 per cent DDT suspension. These measures are estimated to have saved 62.5 tons of the produce, valued at Rs. 18,750.

D. Miscellaneous vegetables—

Other vegetables like Bendai, Cucurbits, Lab-lab and gourds were treated in different districts against mites, leaf-eating beetles and caterpillars and plant lice, by dusting sulphur, spraying of arsenates and spraying of fish-oil resin soap and tobacco decoction or HETP, respectively. An area of 87 acres was tackled on the whole and this is estimated to have saved about 4.3 tons of vegetables worth about Rs. 1,290.

IV. Pests of fruit crops—

A. Mango—

The most important pest on this crop was the mango hopper, *Idiocerus* sp. The prevailing conditions of drought and the late receipt of rains resulted in late and sparse flowering of mangoes during the year. The incidence of hoppers was also not severe. Spraying of 0.1 per cent DDT suspension gave fairly effective control of the pest; to get the maximum benefit, it was found that the spray should be given before bud burst as once the flowers open, spraying caused abnormal flower shedding. In Chingleput and Salem districts, it was observed in some gardens that DDT spray induced the incidence of mealy bugs on the inflorescence stalks. About 8,056 trees were treated in Chingleput, North Arcot, Salem, Tirunelveli, Ramanathapuram and Madurai. This is estimated to have saved a loss of about Rs. 16,112 worth of the produce.

In various districts, other minor pests of the crop were treated and controlled as and when reported. The leaf-webber, *Orthaga evinacea* was controlled on 663 trees by spraying with 0.1 per cent DDT suspension. Mealy-bugs was controlled on 290 trees by spraying 0.4 per cent BHC suspension. Red ants, *Oecophylla smaragdina* on 150 trees and white ants on 385 trees were controlled by dusting 10 per cent BHC. As these treatments were administered to young trees or to vegetative parts, it is not possible to estimate the benefits accruing, either in yield or money value.

B. Citrus—

Citrus is affected by a number of important pests, the treatment and control of which requires further detailed investigations. The control methods now adopted are the results of the experience gained during the course of work during the last two years.

The most widely spread of the insect pests is the leaf-caterpillar, *Papilio demoleus*. These are controlled by sprays of 0.1 per cent DDT or 0.2 per cent BHC but these in some localities foster the development of scales, mealy-bugs and mites, especially when DDT is used. Arsenate sprays also keep the caterpillars under control and this was being used in some districts. On the whole 4,359 trees were treated.

Citrus mite was another pest that was present extensively in all citrus gardens. Very little attention has been paid so far to this pest and the miticides available are not quite satisfactory. Dusting of sulphur, though fairly effective, was not practicable when fairly grown up trees had to be tackled. Lime sulphur and a proprietary liquid sulphur preparation known as Thiovit were tried in Tirunelveli and Chingleput, respectively, with satisfactory results. A total of 1,433 trees were treated.

Plant lice on 1,040 trees was controlled by sprays of fish-oil resin soap and tobacco decoction or HETP and scales on 700 trees with fish-oil resin soap boiled with washing soda. Attempts to control the citrus leaf-miner on lime trees with sprays of parathion or wettable BHC were only partially successful on 550 trees.

C. Grape-vine—

The grape-vine flea-beetle, *Scelodonta strigicollis* was controlled with sprays of either 0.1 per cent DDT or 0.2 per cent BHC suspensions but as the former induced mealy-bug infestation, the latter was being more widely adopted. An area of 84 acres was treated which is estimated to have saved a loss of 8.4 tons of fruits valued at Rs. 1,176. Mites and thrips were controlled in 10 acres by using a combined spray of BHC suspension and sulphur in Madurai and Tiruchirappalli districts. This is estimated to have effected a saving of 0.5 tons valued at Rs. 70.

V. Pests of oil-seed crops—

A. Groundnuts—

(i) *Amsacta albistriga*, the red hairy caterpillar.—It was found that the caterpillars in the early stages, before the characteristic red covering was formed, was amenable to control with 10 per cent BHC dust. In later stages, sprays with 0.4 per cent BHC suspensions were also found effective. But considerable practical difficulties were encountered in the successful practice of these methods. The main factor was the indifference of the ryots who have a rooted belief that the pest was uncontrollable. Any insecticide to be successful on groundnut crops must be a dust formulation since availability of water for spraying purposes will not be easy in such tracts. As the pest usually has 3-4 emergences, for successful control, insecticidal treatment also must be repeated, an equal number of times—a work which the ryots refuse to undertake as they want to control the pest by one treatment. For these reasons, the method of dusting was not much in vogue but BHC spraying was adopted successfully in 483 acres in North Arcot and South Arcot, Salem and Coimbatore, thus saving a potential loss of 19 tons of the produce, valued at Rs. 9,130.

Recent trials with Toxaphene has given indications that even grown up caterpillars may be amenable to insecticidal treatment.

(ii) *Stomopteryx nerteriae*, the groundnut surul.—The insect was reported from Tiruchirappalli, Ramanathapuram, South Arcot, Tanjore and Pattukkottai. The pest was readily controlled by treatment with 10 per cent BHC dusts but the absence of co-operative action from ryots in the same locality brought in reinfestation from untreated fields to treated ones and nullified the results. An area of 433 acres was treated which is estimated to have effected a saving of 17.4 tons of the produce valued at Rs. 8,526.

Of other pests recorded, thrips were controlled in 69 acres in South Arcot and aphids in 58 acres in Coimbatore district by dusting 10 per cent BHC; a loss of 5 tons of the produce valued at Rs. 2,400 is estimated to have been saved.

B. Coconuts—

The only important pest of this crop was *Nephantis serinopa*, the black-headed caterpillar. Except in South Kanara, there were only small-scale infestations in Coimbatore, Malabar and Tirunelveli. Experimental sprayings with 0.4 per cent BHC suspensions gave very satisfactory control but there was considerable practical difficulties in administering sprays particularly on grown up trees. Parasites were liberated in Coimbatore and Tirunelveli. In all 1,682 trees were treated.

Termites on 320 trees were controlled in Tanjore and Malabar by 0.4 BHC suspensions sprays.

C. Castor—

Achoea janata, the semi-looper. This pest was reported from Salem in about 31 acres and was controlled by spraying calcium arsenate.

D. Gingelly—

(i) *Antigastra catalaunalis*, leaf and pod caterpillar.—The pest occurs throughout the gingelly area but is usually left as an unavoidable factor. Trials with DDT suspension sprays at 0.2 per cent strength showed that effective control could be established and 32 acres were sprayed in Pattukkottai. This is estimated to have saved 0.4 tons of the produce valued at Rs. 305.

(ii) *Eusarcocoris ventralis*, the gingelly bug.—This insect was found infesting gingelly crop and causing serious damage in Ramanathapuram district. Dusting with 10 per cent BHC completely controlled the insects in 30 acres and effected a savings estimated at 0.4 ton valued at Rs. 305.

VI. Pests of pulses—

There were very few reports and requisitions for the control of pests on pulses crops. A few which were received were promptly attended to.

A. Blackgram—

Nezara viridula, the green shield bug was found infesting 14 acres of blackgram crop in Ramanathapuram district. It was effectively controlled by dusting 10 per cent BHC, effecting a saving of 0.14 ton of produce valued at Rs. 62. The red hairy caterpillar found infesting the crop in 20 acres was controlled by 0.4 per cent BHC sprays, effecting a saving of Rs. 91.

B. Greengram—

Azasia rubricans, the gram leaf-caterpillar.—This was found doing severe damage in Pattukkottai in about 40 acres and was controlled by dusting 10 per cent BHC. This estimated to have saved 0.41 ton of the produce, valued at Rs. 209.

C. Redgram—

Control of some pests on this crop was undertaken at Ramanathapuram district alone. The green shield bug, *Nezara viridula* and the leaf and shoot folder, *Eucosma critica*, in 49 acres were controlled by dusting 10 per cent BHC. Redgram pod-boring caterpillars were controlled in 20 acres by dusting with 5 per cent DDT with 50 per cent sulphur. These measures are estimated to have saved a loss of 1.3 tons of the produce valued at Rs. 455.

VII. Pests of cotton—

The control of cotton pests was subsidized and the insecticides permitted to be sold at half rates. Permission was also granted to employ special staff as per the Director of Agriculture's Endorsement No. Y. 2-987/51, dated 22nd August 1951. As the sanction for this subsidized scheme was received a bit late, full advantage could not be availed of for the September sowings. Further, the failure of rains combined to the sharp decline of raw cotton prices deterred the ryots from utilizing insecticide control of cotton insects to any appreciable degree.

As the cotton crop was liable to the attacks of a series of major pests, either all together or consecutively, it was felt that individual treatment for each insect with different insecticides, at different times would be neither feasible nor economical. To avoid such a programme, a combination insecticide containing 5 per cent DDT, 25 per cent BHC and 20 per cent sulphur was specially formulated, to be effective against all the commonly recorded pests on cotton and this was used with highly beneficial results.

The major pests recorded were aphids, thrips, jassids, leaf-folders and bollworms. The 5-25-20 dust at 10-12 lb/ac was found to give fairly effective control against all the insects mentioned above. In all, 2,350 acres of cotton were treated and this is estimated to have saved a loss of Rs. 7,05,000.

VIII. Pests of miscellaneous crops—

A. Chillies—

Scirtothrips dorsalis, the chilli thrips.—The control of this pest by using either 10 per cent dusts or 0.2 per cent sprays of BHC has become the most widely popular amongst all the control measures. It is practised by all chilli cultivators throughout all the districts. An area of 18,007 acres was treated during the period under report and this is estimated to have saved a loss of 818.5 tons of the produce valued at Rs. 9,82,200.

A few minor outbreaks of *Prodenia* caterpillars boring into chilli pods were reported from Ramanathapuram district. It was controlled in 54 acres by dusting 5 per cent DDT. Scales and Aphis were reported in 11 and 7 acres, respectively, and were controlled by spraying 0.4 per cent BHC. These measures effected a saving of 2.2 tons of the produce valued at Rs. 3,880.

B. Onion—

Thrips tabacci, the onion thrips.—The insects were effectively controlled by a single spray of 0.4 per cent BHC suspension. An area of 162 acres in Chingleput, Coimbatore, Tiruchirappalli, Salem and South Arcot districts was treated, leading to the saving of 81 tons of onions valued at Rs. 13,365.

Laphygma exigua, the cut-worm.—This was reported in 42 acres from Coimbatore and Ramanathapuram districts and was controlled by spraying 0.1 per cent DDT suspension. This is estimated to have effected a savings of 21 tons of produce valued at Rs. 3,465.

C. Sugarcane—

Argyria sticticrasis, the early shoot borer.—This pest appeared in severe form in parts of South Arcot, Tiruchirappalli and Salem districts. The decline of jaggery prices discouraged cultivators to adopt control measures and

very few responded to the intense propaganda conducted in these tracts. An area of 63 acres was sprayed with either 0.2 per cent BHC or 0.1 per cent Toxaphene suspension in Chingleput, Coimbatore, Tiruchirappalli, Salem and South Arcot. It is estimated that the measures adopted has effected a saving of 63 tons of canes valued at Rs. 2,520.

Aleyrodid bugs were noted doing severe damage in Tiruchirappalli district. Various insecticides were tried and finally fish-oil resin soap was found to be the most economical and effective. An area of 35 acres was sprayed, effecting a saving of 35.0 tons of canes valued at Rs. 1,400.

An area of 5 acres affected with termites was controlled by adding 10 per cent BHC in the furrows and hoeing it in the soil; this is estimated to have saved a loss of 2.5 tons of cane valued at Rs. 4,760.

D. Tobacco—

Aphis.—This was reported from Coimbatore and Pattukkottai. At Coimbatore, HETP was introduced and was found more economical and effective than tobacco decoction. An area of 109 acres was treated. The cutworms, *Prodenia litura*, were reported from Coimbatore, Salem, Pattukkottai and Madurai. Spraying with 0.1 per cent DDT suspension gave good control. These measures are estimated to have saved a loss of 6.2 tons of tobacco leaves valued at Rs. 10,880.

IX. Control of rodents—

The damage of field rats was abnormally high in Tanjore and South Arcot from July to September. In all other districts also damage, was reported. Other than paddy, very many crops were also subject to rat damage. The control measure of poison baiting with zinc phosphide was widely appreciated and practised by ryots. The following gives a gist of the extent of various crops treated, loss saved and its money value :—

Crop.	Acres.	Tons.	Value. rs.
Paddy	69,443	1,930	5,40,400
Potato	2,222	111	38,406
Tapioca	150	15	1,050
Chillies	324	16	19,200
Groundnut	138	5.5	2,695
Gingelly	26	0.3	229
Vegetables	441	22.1	3,094

In South Kanara poison baiting was found very successful against arboreal rats attacking coconut trees. It is estimated that about 27,820 trees have been baited so far.

X Store pests—

The seed stocks in Agricultural Depots were periodically examined for the incidence of pests and remedial measures undertaken. During the period under report, there was not much trouble from such pests and only 740 bags of paddy, 360 bags of potatoes and 150 lb. of bean seeds were treated. About 300 bags of cotton seeds were sun-dried and rebagged, to eliminate insect infestation.

The groundnut stores in Pollachi, Cuddalore and Salem were examined by the assistants of the respective districts and the correct method of storage demonstrated in about 22 cases.

Advice and assistance to control rat incidence in grain godowns was given in all cases and about 368 godowns treated by poison baiting with very good success.

XI. Bee-keeping—

No special bee-keeping schemes were working under my control. The Assistants took a keen interest in the work and 108 new colonies were hived in the different districts, for interested parties.

XII. Port fumigation work—

Port fumigation was conducted for thirteen consignments of outgoing or incoming plant materials at Madras and for one consignment at Tuticorin.

XIII. Pesticides and equipment—

No fresh equipments were purchased during the period under report. All the district headquarters and taluk depots were kept with a basic stock of insecticides which was periodically replenished as and when depleted by sales. During the year 518 tons were purchased. No equipments were purchased during the year.

Every district and taluk headquarters is equipped with a fair number of dusters of the best types available—Appendix III furnishes a list of serviceable dusters available in each district.

Remarks and conclusion.—The Plant Protection section has accomplished a great deal of good work during the year. Its popularity may be gauged by the fact that in every agricultural depot, the sale of insecticides is a major item of receipts now. But so far, with the extremely limited staff of one assistant and one demonstration maistry for one district and one Officer for fifteen districts, we have touched only the very fringe of the problem of intensive plant protection. As the insecticides are available only in the agricultural depots, ryots from outlying villages find it too costly to travel 30–40 miles and spend one whole day in the taluk or district headquarters for the purchase of a small quantity of insecticides. Unless the staff is expanded and some mobile units provided for a group of three to four districts, the work cannot expand any further.

COIMBATORE,
2nd August 1952.

E. R. GOPALA MENON,
Crop and Plant Protection Officer (Entomology).

APPENDIX I.

STATEMENT SHOWING TOTAL NUMBER OF SANCTIONED POSTS OF OFFICERS AND STAFF IN THE OFFICE OF THE CROP AND PLANT PROTECTION OFFICER (ENTOMOLOGY), COIMBATORE, AS IT STOOD ON 30TH JUNE 1952.

[Sanctioned in G.O. No. 4720, Development, dated 17th September 1948, communicated in Director's D. Dis. E.E. No. 622/48, dated 28th September 1948, and continuance sanctioned in G.O. Ms. No. 102, Food and Agriculture (Food Production), dated 14th March 1952, communicated in Director's D. Dis. L. No. 2237/51, dated 29th March 1952.]

Budget head.—40-D. Agriculture—Agricultural Demonstration and Propaganda including Public Exhibition and Fairs—1. Ordinary area—d. 1. (i) 14. Scheme for Crop and Plant Protection—Pay and allowances.

Name of service and post.	Number of sanctioned posts.	
	Permanent.	Temporary.
I Madras Agricultural Service—		
Crop and Plant Protection Officer (Entomology), Coimbatore.	Nil.	1 (a)
Rs. 340.		
Rs. 230—30/2—260—40/2—500—50/2—700.		
II Madras Agricultural Subordinate Service ..	Nil.	Nil.
III Madras General Subordinate Service	Nil.	Nil.
IV Madras Ministerial Service—		
Upper division—head clerk	Nil.	1 (a)
Rs. 100.		
Rs. 80—3—95—3—110.		
Typist	Nil.	1
Rs. 45.		
Rs. 45—3—60/2—90.		
V Madras Inferior Service—		
Peons—		
(i) Rs. 25	Nil.	1 (a)
Rs. 18— $\frac{1}{2}$ —25.		
(ii) Rs. 18	Nil.	1
Rs. 18— $\frac{1}{2}$ —25.		

(a) The incumbents of these posts hold lien on other permanent posts.

APPENDIX II.

Summary of pest control operations and losses saved.

Crop and pest.	(1)	(2) Remedial measures adopted.	Area treated. (3)	Percentage of loss. (4)	Nett loss saved.	
					Tons. (5)	Rupees. (6)
Paddy—					Seedlings saved.	
Army-worm ..	..	Dusting 10 per cent BHC at 20 lb./acre or spraying 0.1 per cent DDT suspension.	2,754		Do.	
Rice thrips ..	..	Dusting 5 per cent DDT or 10 per cent Toxaphene at 20 lb./acre.	193	20	941.1	2,63,076
Green jassid ..	..	Draining the water and dusting a mixture of 5 per cent DDT and 10 per cent BHC at 20 lb./acre.	8,475	20	117.5	32,900
Jassid and case-worm ..	..	Draining the water and dusting 10 per cent BHC at 20 lb./acre or spraying 0.1 per cent DDT suspension.	1,866	5	51.7	14,476
Case-worm ..	..	Dusting a mixture of 5 per cent DDT and 10 per cent BHC at 20 lb./acre.	572	20	63.5	17,780
Jassid and fulgorid ..	..	Dusting a mixture of 5 per cent DDT and 10 per cent BHC at 20 lb./acre.	1,235	10	68.5	19,180
Stem-borer ..	..	Dusting 10 per cent BHC at 20 lb./acre or spraying 0.1 per cent DDT suspension.	1,773	5	49.2	13,776
Rice hispa ..	..	Dusting 10 per cent BHC at 20 lb./acre	299	20	33.1	9,268
White jassid ..	..	Removing affected clumps and preventing further spread	1,860	20	206.6	57,848
Mealy bug ..	..	Dusting 10 per cent BHC at 20 lb./acre	1,276	20	141.7	39,676
Grass-hopper ..	..	Do.	97	20	10.7	2,996
Leptispa ..	..	Draining the water and dusting 10 per cent BHC	4,040	20	449.0	1,29,720
Scotinophora ..	..	Draining the water and dusting a mixture of 10 per cent BHC and 5 per cent DDT at 20 lb./acre.	1,610	10	89.5	25,060
Stem-borer and case-worm ..	..	Dusting 10 per cent BHC at 20 lb./acre	2,690	20	297.7	83,356
Rice bug ..	..	Spraying 0.2 per cent DDT suspension	136	20	15.0	4,200
Stem-fly ..	..	Dusting 10 per cent BHC at 20 lb./acre	472	5	13.1	2,368
Leaf folder ..	..	Do.	8	10	0.2	56
Mole-crickets ..	..	Mixing 4 lb./acre of copper sulphate in water	80	10	4.5	1,260
Earth-worm ..	..	Dusting 10 per cent BHC at 20 lb./acre	82	5	2.3	644
Earhead beetle ..	..	Do.	3	5	0.08	22
Flea-beetle ..	..					
Cholam—						
Mites ..	..	Dusting sulphur at 20 lb./acre	688	20	43.0	9,632
Ear-head bug ..	..	Dusting 10 per cent BHC at 20 lb./acre	2,343	20	293.0	65,632
Stem-borer ..	..	Do.	58	10	3.6	864
Flea-beetle ..	..	Do.	15	10	1.0	224
Aphis ..	..	Do.	2	10	0.06	13
Millet.						
Ragi—						
Flea-beetle ..	..	Dusting 10 per cent BHC at 20 lb./acre	192	10	12.0	2,688
Root aphid ..	..	Application at 30 lb./acre of 10 per cent BHC in soil	36	20	4.5	1,008
Thrips ..	..	Dusting 10 per cent BHC at 20 lb./acre	52	10	3.2	717
Surface grass-hopper ..	..	Do.	49	10	3.0	672
Cut-worm ..	..	Dusting 10 per cent BHC at 20 lb./acre or spraying 0.1 DDT suspension.	1,178	20	147.2	32,973
Green bug ..	..	Dusting 10 per cent BHC at 20 lb./acre	18	10	1.1	246
Aphis ..	..	Do.	3	10	0.2	45
Delphacid hopper ..	..	Do.	5		Seedlings saved.	
Cumbu—						
Ear-head bug ..	..	Dusting 10 per cent BHC at 20 lb./acre.	5	10	0.5	110
Red hairy caterpillar ..	..	Dusting 10 per cent BHC at 20 lb./acre or spraying 0.4 per cent BHC suspension.	40	10	2.3	506
Flea-beetle ..	..	Dusting 10 per cent BHC at 20 lb./acre	14	10	0.7	154
Grass-hopper ..	..	Do.	32	10	1.7	374
Green bug ..	..	Do.	3	10	0.1	22
Samai—						
Cut-worm ..	..	Dusting 10 per cent BHC at 20 lb./acre or spraying 0.1 per cent DDT suspension.	68		3.0	667
	..		617	20	25.0	4,500
Vegetables.						
Brinjal—						
Epilachna ..	..	Dusting or spraying of arsenates at 2.4 lb./acre	2,184	20	218.4	30,574
Jassids ..	..	Dusting 5 per cent DDT with 50 per cent sulphur at 20 lb./acre	185	20	18.5	2,590
Mites ..	..	Dusting sulphur at 20 lb./acre	49	20	4.9	686
Mealy-bug ..	..	Spraying 0.4 per cent BHC	30	20	3.0	420
Lace-wing ..	..	Spraying 0.1 per cent DDT suspension	107	10	5.3	742
Aphis ..	..	Spraying fish-oil resin soap	53	10	2.6	364
Potato—						
Cut-worms ..	..	Dusting 5 per cent DDT at 20 lb./acre	158	20	15.8	5,467
Chafar grub ..	..	Mixing 25-30 lb./acre of 10 per cent BHC in soil	143	20	14.3	4,950
Cabbage—						
Cut-worm ..	..	Dusting 10 per cent BHC at 25-30 lb./acre	354	20	35.4	1,06,200
Aphis ..	..	Spraying fish oil resin soap	95	10	47.5	14,250
Root maggot ..	..	Application of freshly slaked lime to planting holes	12	10	6.0	1,800
Diamond-back moth ..	..	Spraying 0.1 per cent DDT suspension	18	10	9.0	2,700
Miscellaneous vegetables.						
Beetles caterpillars, mites and aphids, etc.	..	Spraying or dusting arsenates, HETP, sulphur or fish-oil soap ..	87	20	2.3	312

Crop and pest.	(1)	Remedial measures adopted.	(2)	Area tackled.	Percentage of loss.	Nett loss saved.	
						Tons.	Ruppes.
				(3)	(4)	(5)	(6)
<i>Fruit plants.</i>							
Mango—							
Hopper ..	..	Spraying 0.1 per cent DDT suspension	..	8,058	10	..	16,112
Termites ..	..	Application of 0.4 BHC suspension	..	385	..	Young trees.	..
Leaf-webber ..	..	Spraying 0.1 DDT suspension	..	663	..	..	..
Red ants ..	..	Dusting nests with 10 per cent BHC	..	120	..	..	..
Mealy bug ..	..	Spraying 0.4 per cent BHC suspension	..	250	..	..	..
Citrus—							
Leaf caterpillar ..	..	Spraying 0.2 per cent BHC suspension or calcium arsenate	..	8,528	..	..	..
Aphids ..	..	Spraying 0.1 per cent BHC suspension of fish oil resin soap	..	1,040	..	..	..
Mites ..	..	Dusting sulphur or spraying lime sulphur	..	1,433	..	..	..
Scales ..	..	Spraying fish oil resin soap with washing soda	..	700	..	..	..
Leaf-miner ..	..	Spraying 0.4 per cent BHC	..	550	..	..	..
Termites ..	..	Do.	..	60	..	..	..
Grape vine—							
Flea-beetle ..	..	Spraying DDT 0.1 per cent or BHC 0.4 per cent suspension	..	84	10	84.0	25,200
Mites ..	..	Dusting sulphur	..	10	10	10.0	3,000
Groundnut—							
Surul ..	..	Dusting 10 per cent BHC at 20 lb./acre	..	433	70	17.4	8,526
Thrips ..	..	Do.	..	69	10	2.7	1,323
Red hairy caterpillar ..	..	Spraying 0.4 per cent BHC suspension	..	483	10	19.0	9,310
Aphis ..	..	Dusting 10 per cent BHC at 20 lb./acre	..	58	10	2.3	1,127
Coconut—							
Nephanis ..	..	Spraying 0.2 per cent BHC suspension, cutting and burning affected leaves or liberating parasites.	..	1,682	..	..	..
Termites ..	..	Spraying 0.4 per cent BHC suspension	..	320	..	..	..
Castor—							
Semilooper ..	..	Spraying calcium arsenate	..	31	10	0.3	113
Gingelly—							
Pod borer ..	..	Spraying 0.1 per cent DDT suspension	..	32	10	0.4	305
Leaf-bug ..	..	Dusting 10 per cent BHC at 20 lb./acre	..	30	10	0.4	305
Blackgram—							
Green bug ..	..	Dusting 10 per cent BHC at 20 lb./acre	..	14	10	0.15	62
Red hairy caterpillar ..	..	Spraying 0.4 per cent BHC suspension	..	20	10	0.22	91
<i>Pests of pulses.</i>							
Greengram—							
Leaf-caterpillar ..	..	Dusting 10 per cent BHC at 20 lb./acre	..	40	10	0.41	209
Redgram—							
Green bug ..	..	Dusting 10 per cent BHC at 20 lb./acre	..	18	10	0.27	94
Pod borers ..	..	Dusting 5 per cent DDT at 20 lb./acre	..	20	10	0.3	104
Leaf-foller ..	..	Do.	..	49	10	0.74	257
Cotton—							
Aphids, thrips Jassids, Leaf-rollers and bugs.	..	Dusting a mixture of 5 per cent DDT, 25 per cent BHC and 20 per cent sulphur at 10-12 lb./acre.	..	2,350	20	587.5	7,05,000
<i>Pests of miscellaneous crops.</i>							
Chillies—							
Thrips ..	..	Spraying 0.2 per cent BHC suspension or dusting 10 per cent BHC at 20 lb./acre.	..	18,007	20	818.5	9,82,200
Pod borer ..	..	Dusting 5 per cent DDT at 20 lb./acre	..	54	20	2.4	2,880
Scales ..	..	Spraying 0.2 per cent BHC suspension	..	11	20	0.5	600
Aphis ..	..	Do.	..	7	20	0.3	400
Onion—							
Thrips ..	..	Spraying 0.4 per cent BHC suspension	..	162	20	81.0	13,365
Cut-worm ..	..	Spraying 0.2 per cent DDT suspension	..	42	20	21.0	3,465
Sugarcane—							
Early shoot borer ..	..	Spraying 0.2 per cent DDT or 0.1 per cent Toxaphene suspension.	..	63	10	63.0	2,520
Aleyrodids ..	..	Spraying fish oil resin soap	..	35	10	35.0	1,400
Termites ..	..	Application of BHC in soil	..	5	5	2.5	100
Tobacco—							
Aphis ..	..	Spraying tobacco decoction or HETP.	..	109	10	3.6	6,120
Cut-worms ..	..	Spraying 0.1 per cent DDT suspension	..	84	10	2.8	4,760
<i>Rodent control.</i>							
Paddy field rats ..	..	Poison baiting with zinc phosphide	..	69,443	5	1,930.0	5,40,400
Potato field rats ..	..	Do.	..	2,222	5	111.0	38,406
Tapiooa field rats ..	..	Do.	..	150	5	15	1,050
Chillies field rats ..	..	Do.	..	324	5	16	19,200
Groundnut field rats ..	..	Do.	..	138	5	5.5	2,695
Gingelly field rats ..	..	Do.	..	26	5	0.3	229
Vegetables field rats ..	..	Do.	..	441	5	22.1	3,084

APPENDIX III.

List of serviceable dusters available in each district as it stood on 1st July 1952.

Name of the district.	Number of dusters.			Remarks.
	Rotary	Bellows and other types.	Total.	
(1)	(2)	(3)	(4)	(5)
1 Chingleput	1	6	7	
2 North Arcot	11	9	20	
3 South Arcot	20	3	23	
4 Tanjore	18	10	28	
5 Pattukkottai	6	6	12	
6 Tiruchirappalli	16	15	31	
7 Madurai	25	4	29	
8 Ramenathapuram	32	4	36	One Midget power duster is also in stock in this district.
9 Tirunelveli	20	3	23	
10 Coimbatore	23	12	35	One Midget power duster is also in stock in this district.
11 Salem	24	3	27	
12 Nilgiris	12	4	16	
13 South Malabar	58	8	66	
14 North Malabar	8	5	13	
15 South Kanara	6	2	8	
Total	280	94	374	

ADMINISTRATION REPORT OF PLANT PROTECTION SCHEME. ENTOMOLOGY WORK IN THE NORTHERN REGION FOR THE FASLI YEAR 1361 (1951-52).

I submit the following annual administration report for the fasli year 1361 (1951-52) on the working of the Plant Protection Scheme in Entomology in Northern districts.

The continuation of the scheme was sanctioned in G.O. Ms. No. 421, Food and Agriculture (Food Production), dated 17th September 1951, and in G.O. No. 102, Food and Agriculture (Food Production), dated 14th March 1952. The unit of a Plant Protection Officer, an upper division clerk, a typist and two peons continued to work at Bapatla and a Plant Protection Assistant, a demonstration maistri and a messenger for Entomology at the district level.

Charge.—Sri V. Thirumala Rao, B.sc. (Ag.), continued to act as Crop and Plant Protection Officer (Entomology), Bapatla, till 21st January 1952 from the beginning of the year. Sri P. Govinda Rao, B.sc. (Ag.), Crop and Plant Protection Officer (Mycology), Bapatla, was in additional charge of the post up to 27th January 1952. Sri K. R. Nagarajan, B.sc. (Ag.), took charge of the post on 28th January 1952 and continued for the rest of the year.

Office staff.

Upper division clerk.—Sri M. V. Raghavaiah for the whole year except between 5th May to 18th May 1952, during which period he was on leave on average pay.

Typist.—Sri Challa Venkateswarlu for the whole year.

District staff.

The following personnel as shown below were in charge of the post of the Plant Protection Assistants at District headquarters under the administrative control of the District Agricultural Officers :—

Serial number and district.	Head quarters.	Post held by
(1)	(2)	(3)
1 Srikakulam ..	Srikakulam ..	Sri K. Valsi Naidu, B.sc. (Ag.), for the whole year. He was deputed for training in Entomology and Mycology for two months from 16th February 1952.
2 Visakhapatnam ..	Anakapalle ..	Sri V. Ramanna up to 9th June 1952. He was placed under suspension from 10th June 1952.
3 East Godavari ..	Kakinada ..	Sri A. Ramamohana Rao, B.sc. (Ag.), for the whole year.
4 West Godavari ..	Eluru ..	Sri P. Ammiraju, B.sc. (Ag.), for the whole year.
5 Krishna ..	Vijayavada ..	Sri P. Ramadoss, B.sc. (Ag.), for the whole year.
6 Guntur ..	Guntur ..	Sri M. Koteswara Rao, B.sc. (Ag.), from 1st July to 21st December 1951 and again from 9th March to 30th June 1952. He was on leave on medical grounds from 22nd December 1951 to 8th March 1952 during which period Sri P. Sankara Rao, B.sc. (Ag.), Plant Protection Assistant in Mycology, Guntur, was in additional charge.

Serial number and district.	Headquarters.	Post held by
(1)	(2)	(3)
7 Nellore	Nellore	Sri J. Job Servai, B.Sc. (Ag.), for the whole year.
8 Chittoor	Chittoor	Sri D. Krishnaswamy Naidu, B.Sc. (Ag.), for the whole year.
9 Cuddapah	Cuddapah	From 1st July to 26th September 1951 Sri P. V. Ranga Rao, B.Sc. (Ag.). He was deputed for post Graduate course in Entomology at Agricultural Research Institute, Delhi. From 26th October to 19th November 1951 Sri S. Krishna Murthy Rao, B.Sc. (Ag.), Plant Protection Assistant in Mycology, Cuddapah, was in additional charge. From 20th November 1951 to end of the year Sri A. Peraraju, B.Sc. (Ag.), throughout the year.
10 Kurnool	Kurnool	Sri C. Mahananda Reddi, B.Sc. (Ag.), throughout the year.
11 Bellary	Bellary	Sri Y. Viswanadham, B.Sc. (Ag.). Leave on average pay from 26th July to 20th September 1951. Plant Protection Assistant in Mycology was in additional charge of the post of the Personal Assistant to the District Agricultural Officer, Bellary, from 16th November to 15th December 1951, from 16th April to 25th April 1952.
12 Anantapur	Anantapur	Sri W. Raghavendra Rao, B.Sc. (Ag.), for the whole year.

The Plant Protection Assistants continued to act as Personal Assistants to the respective District Agricultural Officers as far as their subjects are concerned.

Staff of Nephantis Parasites Breeding Laboratory, Razole.

I continued to have technical control of the Nephantis Parasites Breeding Laboratory at Razole. Sri Edwin Dharmaraju, B.Sc. (Ag.), continued to hold charge of the laboratory throughout the year excepting for the periods from 31st October to 24th November 1951 and from 1st to 10th June 1952.

Tours.

Sri V. Thirumala Rao, B.Sc. (Ag.), was on tour for 113 days and Sri K. R. Nagarajan, B.Sc. (Ag.), Crop and Plant Protection Officers (Entomology), Bapatla, for 65 days during the year. Plant Protection Assistants in Entomology in the districts toured for periods varying from 131 to 250 with an average of 218 days.

Seasonal conditions of the year.

The season started with erratic monsoons. The season in the coastal districts can be said to be satisfactory excepting during the major part of September when the drought conditions adversely affected the paddy crop even in deltaic area and dry crops especially the groundnut crop which could not be lifted though ready for harvest for want of rains. The rains towards the end of September 1951 eased the situation. Nellore and Cuddapah districts except Bellary were very much affected in most of the areas by drought.

The north-east monsoon was a failure during the year. The season in Nellore and Rayalaseema was disappointing. Crops were badly affected excepting in Bellary.

The summer was very severe this year till the end of May 1952 when there was a sudden depression in the Bay of Bengal which was responsible for the welcomed heavy showers throughout the northern region. These rains were again followed by drought conditions.

Effect of the season on the crop pests in the region.

With the occurrence of pre-monsoon rains and early brake of monsoon the paddy root weevil (*Echinocnemus oryzae*) and the paddy stem borer (*Schoenobius incertellus*) were found occurring in many areas of the region. Due to constant rains and the humid conditions so created, the paddy Fulgorid bug (*Nilaparvata lugens*) became a serious pest even as early as the middle of August in Srikakulam, Visakhapatnam and uplands of Godavari districts.

With the drought conditions prevailing in the month of September there was an outbreak of swarming caterpillar of paddy (*Spodoptera mauritia*) in Chittoor and Nellore districts. Due to the frequent rains in May and part of June this pest did not occur in its usual severity in East and West Godavari districts. The cholam earhead bug (*Calocoris angustatus*) occurred as a pest on late sown jonna in Guntur district.

Due to the drought conditions cut worms like *Prodenia* and *Laphygma*, Ground beetles (*Opatraides*), thrips, jassids, coccids and mites found favour and were in prominence.

It was, however, found that the following were the pests that were in prominence during the year—

- (1) Paddy root grubs (*Echinocnemus oryzae*) in Guntur district due to pre-monsoon showers and early south-west monsoon.
- (2) Paddy leaf roller (*Cnaphalorocis medinalis*)—absence of heavy rains during growing season of paddy.
- (3) Paddy Fulgorid bug (*Nilaparvata lugens*) for the dry period in Srikakulam, Visakhapatnam and parts of Godavari districts.
- (4) Swarming caterpillar of paddy (*Spodoptera mauritia*)—drought prevailed in Nellore and Chittoor districts.
- (5) Chillies thrips (*Scirtothrips dorsalis* H) for the failure of north-east monsoon and absence of washing rains.
- (6) Lace Wing bug (*Urentius echinus*) on brinjals—absence of monsoon showers.
- (7) Groundnut plant lice—On the crop sown in wet lands after paddy in Guntur district.
- (8) Mango hoppers (*Idiocerus* spp).

Field rats (*Gunomys kok*), Swarming caterpillar of paddy (*Spodoptera mauritia*), Black headed caterpillar (*Nephantis serinopa*) of coconuts, Leaf beetles (*Epilachna* spp) and tingids (*Urentius echinus*) on brinjals, Pumpkin beetles (*Aulacopora* sp) thrips, White ants, mites, Papilio, the Citrus caterpillars, Red tree ants (*Oecophylla*), shoot and stem borer (*Arbela*), mealy bugs, scales, paddy grain moth (*Sitotroga cerebelli*), Paddy grain beetles (*Rhizopertha dominica*), Hippoboscids and cattle ticks were recorded as pests during the year.

Research.

1. *Paddy pests*.—Treatment of paddy nurseries in the second-crop season with BHC spray or dust in two rounds, the second just before the lifting of seedlings gave useful results in reducing the incidence of the pest in the planted crop.

2. BHC. 5 per cent dusting after draining water from the fields proved very helpful in putting an effective check for the snail damage to paddy crop.

3. For dealing with the climbing cut worm of paddy BHC. 10 per cent was more effective than the 5 per cent dust.

4. BHC-10 per cent was giving more spectacular results than 5 per cent with the small grasshopper (*Oxya velox*).

5. *Sugarcane*.—Spraying Guesarol 550 at 1 lb. in 20 gallons has given satisfactory results against the early shoot borer of cane.

6. *Groundnut*.—Treating soil with DDT-5 per cent dust for the Verpuchi (the Buprestid grub) in groundnut not only mitigated its damage but improved the groundnut crop.

7. *Vegetables*.—Baiting with Metaldehyde against slugs damaging vegetables continued to give satisfactory results.

8. Paddy B.A.M. 32 reputed for resistance to silver shoot in Visakhapatnam district tried in West Godavari did not show any remarkable resistance to the silver shoot fly. The yield also was not impressive when compared with the local varieties.

9. Hortex (Deodourised BHC) proved useful for controlling plant lice on beans.

Campaigns conducted during the year.

Large scale campaigns were conducted against field rats (14,304 acres), paddy root weevil (2,782 acres), paddy Fulgorid bug (2,559 acres), paddy grasshoppers (2,019 acres) and other paddy pests (3,622 acres). In all a total of 15,326 acres of paddy was treated for pests.

Epilachna on brinjal, thrips on chillies and onions, rats damaging vegetables, mango hopper, citrus, butterfly, red tree ants, white ants, mites and bark eating caterpillar on citrus, black headed caterpillar of coconut, tobacco caterpillar and beetles were the other pests dealt with in large scale campaigns.

The details concerning work done in plant, stores and cattle protection are enclosed to the report as Appendix I.

EXHIBITIONS.

The following was the list of exhibitions conducted at various districts during the year. The Plant Protection Assistants in Entomology, attended to these exhibitions with Entomological and apiculture exhibits and contributed their share in making the shows educative and helpful to ryots:—

1951—			
July	..	Kalyandrug, Anantapur district.	Conference of village officers.
October	..	West Godavari ..	Sarvodaya Exhibition.
		Guntur ..	Farmer's Day at the Agricultural Research Station, Lam.
		Nellore ..	Farmer's Day at the Rice Research Station, Buchireddipalem.
		Anantapur ..	Hon'ble Minister for Rural Development Inspection tour.
December	..	Srikakulam ..	Cottage Industries.
1952—			
January	..	East Godavari ..	Agricultural Exhibition.
February. Six Exhibitions were conducted.			
March	..	Nellore ..	Agricultural Exhibition.
Do.	..	Kurnool ..	Do.
Do.	..	Guntur ..	Do.
April	..	Nellore ..	Do.
Do.	..	East Godavari ..	Do.
Do.	..	West Godavari ..	Do.
June	..	Srikakulam ..	Fruit and Vegetable Exhibition opened by Hon'ble Minister for Agriculture.

CONFERENCES.

During the year the Crop and Plant Protection Officer (Entomology), Bapatla, attended the following conferences.

At the district level, the Plant Protection Assistants in Entomology attended to the District Work Officers' Conference at their respective district headquarters:—

1951—			
July	..	..	Agricultural College Day Conference at Coimbatore.
August	..	..	District Work Officers' Conference at Chittoor.
November	..	..	Conference at Madras to meet the Deputy Plant Protection Adviser.
1952—			
February	..	..	District Work Officers' Conferences at Anantapur and Guntur.
March	..	..	District Work Officers' Conferences at Kakinada (East Godavari).

PUBLICATIONS.

The following were the publications contributed by Sri V. Tirumala Rao, B.Sc. (Ag.), Crop and Plant Protection Officer (Entomology), Bapatla, and others during the year:—

1. Rat menace to paddy and other crops—Control by poison baiting—By Sri V. Tirumala Rao, B.Sc. (Ag.), Crop and Plant Protection Officer (Entomology), Bapatla, Volume I, Nos. 2 and 3 of Plant Protection Bulletin published by Government of India.

2. Note on uninvited guests in vegetable cultivation and methods of dealing with them by Sri V. Tirumala Rao, B.Sc. (Ag.), Crop and Plant Protection Officer (Entomology), Bapatla, published in *Padipantalu* of July-August 1951 issue.

3. Important pests of paddy and their control by Sri V. Tirumala Rao, B.Sc. (Ag.), Crop and Plant Protection Officer (Entomology), Bapatla. Submitted for publication in *Padipantalu* (published in *Padipantalu* in December issue).

4. Notes on Plant Protection work done in Entomology by Sri V. Tirumala Rao, Crop and Plant Protection Officer (Entomology), Bapatla, submitted to the Director of Agriculture for publication in Grow More Food Journals.

5. Note on causes and cure of yellowing of paddy crop submitted by Sri V. Tirumala Rao, B.Sc. (Ag.), Crop and Plant Protection Officer (Entomology), Bapatla, for publication in *Padipantalu* (published in *Padipantalu*, October 1951).

6. *Nilaparvata lugens* as a pest of paddy cultivation in North Madras and its control in Indian Journal of Entomology, Volume XII. Part II, December 1950.

7. Note on minor pests becoming serious during adverse seasons and a note on preventive treatment of chillies before planting for thrips was prepared and submitted by Sri V. Tirumala Rao, B.Sc. (Ag.), Crop and Plant Protection Officer (Entomology), Bapatla, for publication in *Padipantalu*.

8. A note on control measures that have become popular with the ryots in North Region by Sri K. R. Nagarajan, B.Sc. (Ag.), Crop and Plant Protection Officer (Entomology), Bapatla, for publishing in *Padipantalu*.

9. Snails and their control by Sri K. R. Nagarajan, B.Sc. (Ag.), Crop and Plant Protection Officer (Entomology), Bapatla, for publishing in *Padipantalu*.

10. An article on the black headed caterpillar of coconut by Sri Edwin Dharmaraj, B.Sc. (Ag.), Entomology Assistant, Razole, was published in September issue of *Padipantalu*.

11. A note on the control of red hairy caterpillar written by Sir Mahanandi Reddy, B.Sc. (Ag.), Plant Protection Assistant in Entomology, Kurnool, was published in *Padipantalu*.

INSPECTION.

Sri V. T. Subbaiah Mudaliar, L.A.G., Headquarters Deputy Director of Agriculture, Madras, inspected the office of the Crop and Plant Protection Officer (Entomology), Bapatla, on 18th October 1951.

Sri V. K. Subramanya Mudaliar, L.A.G., Headquarters Deputy Director of Agriculture, Madras, again inspected the office on 27th March 1952.

INSECTICIDES AND APPLIANCES.

The following stock of pesticides and appliances were purchased during the year :—

	TONS	CWT.	QRS.	LB.
1 B.H.C.—5 per cent dust	200	12	0	0
2 B.H.C.—10 per cent dust	58	5	0	0
3 B.H.C.—50 per cent wettable	19	6	0	0
4 D.D.T.—50 per cent wettable	4	15	0	0
5 Calcium arsenate	0	17	2	0
6 H.E.T.P.	0	4	2	0

	Purchased during the year.	Total stock in North Region.
1 Hand operated rotary dusters	200	348
2 Hand operated bellows dusters	200	477
3 Power dusters	Nil.	4

BEE-KEEPING SCHEME.

The Agro-industry, Bee-keeping which has a very close association with agriculture is yet another branch of Plant Protection Service and special scheme with the employment of special demonstration maistries was in operation during the year in Srikakulam, Visakhapatnam, East and West Godavari, Krishna, Guntur and Chittoor districts. The staff was increased in 1951-52 in East Godavari with the addition of two more demonstration maistries, one for Tuni and the other for Bhadrachalam taluks in G.O. Ms. No. 1239, Food and Agriculture, dated 15th June 1951.

The following are the details concerning the bee-keeping scheme in the North Region :—

Serial number and name of the district.	Sanctioned strength of demonstration maistries.	Total number of bee hives maintained in the district.
1 Srikakulam	3	495
2 Visakhapatnam	3	141
3 East Godavari	8	933
4 West Godavari	6	1,350
5 Krishna	3	606
6 Guntur	3	219
7 Chittoor	3	58
Total	29	3,002

The income to the region through the bee-keeping can be estimated over Rs. 90,060.

The benefit derived through the pollinating activities of bee kept under rearing cannot be quantitatively estimated.

NEPHANTIS BREEDING STATION AT RAZOLE.

The parasite breeding laboratory was intended to control the black-headed caterpillar of coconut—*Nephantis serinopa* and the main functions of the laboratory were—

(a) Rearing of the larval and pupal parasites of *Nephantis* in the laboratory.

(b) Release of the parasites in *Nephantis* infested coconut gardens.

The following were the parasites reared in the laboratory during the period under report :—

1 Bethylids	629,130
2 Eulophids	1,354,420
3 Microbracons	191,060
4 Elasmus	43,920
5 Trichogramma	8,909,000
Total	11,127,530

The following releases were conducted in *Nephantis* infested coconut gardens during the year :—

Serial number and name of the district.	Bethylid.	Elasmus.	Microbracons.	Eulophids.	Trichogramma.
1 East Godavari	141,750	6,390	44,300	168,000	2,585,000
2 West Godavari	315,750	33,790	61,600	749,900	2,330,500
3 Guntur	500	..	..	..	..
4 Visakhapatnam	1,000	..	..	..	..

In addition to the above releases, the following parasites were despatched to the places noted below :—

1 Government Entomologist, Coimbatore.	(1) Bethylids	150
	(2) Eulophids	600
2 Lecturer in Entomology, Agricultural College, Bapatla.	(1) Bethylids	150
	(2) Microbracons	150

The total area covered by the release of parasites was 5,923 acres and the taluks that reported the pest were Amalapur, Razole, Narasapur, Bhimavaram, Tanuku, Bhimilipatnam and Bapatla.

Five lakhs, forty-four thousand Trichogramma parasites were despatched from time to time to the Agricultural Demonstrator, Repalle, Guntur district, for release in paddy fields affected by paddy leaf folder (*Cnaphalo-crosis medinalis* G).

OTHER COCONUT PESTS.

Rhionceros beetle (*Oryotes rhionceros*).—This pest was prevalent in East and West Godavari districts and BHC-10 per cent dusting was advocated as it was found to be successful to a certain extent.

NATADA NARARIA.

The coconut sing.—This pest did not occur in any scale this year except in Bhimavaram taluk where it was immediately checked by timely rains.

MISCELLANEOUS ITEMS.

Examinership.

Sri V. Tirumala Rao, B.Sc. (Ag.), Crop and Plant Protection Officer (Entomology), Bapatla, was the Examiner in Agricultural Zoology and Agricultural Entomology for First and Second Year University Examinations of B.Sc. (Ag.) for both the Andhra and Madras Universities.

In the districts the Plant Protection Assistants attended to the following miscellaneous items of work:—

(a) Acting as Personal Assistants to the District Agricultural Officers with reference to Plant Protection Work—attending to stocking, distribution and disposal of insecticides, rodenticides and dusters.

(b) Attending to green manure seedlings planting on field bunds (*Sesbania Speciosa*).

(c) Participating in Vanamahotsava celebrations.

(d) Assessing the losses in paddy fields due to loss caused by insects.

(e) Conducting proper storage of groundnuts.

(f) Attending to the upkeep of dusting appliances.

Programme of work in Entomology in Northern districts is enclosed to the report as Appendix II.

Statement showing the strength of the staff as on 30th June 1952 is enclosed as Appendix III and Financial Statement as Appendix IV.

BAPATLA,
27th July 1952.

V. THIRUMALA RAO,
Crop and Plant Protection Officer (Entomology).

APPENDIX I.

Details of pest control work.

Serial number.	Crop and pest.	District where occurred.	Area tackled.	Remedial measures adopted.	Gain in	
					Tons.	Rupees.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
			ACS.			
1	Swarming caterpillar (<i>Spodoptera mauritia</i>)	East and West Godavari, Guntur, Nellore, Chittoor, Bellary and Srikakulam.	825	Dusting B.H.C.—5 per cent or 10 per cent.	133.7	26,740
2	Field rats (<i>Gunomys</i>)	.. .. .	14,304	Baiting with phosphide-zinc.	2,035.6	4,07,320
3	Grasshoppers (<i>Heiroglyphus</i> and <i>Oryza</i>).	Srikakulam, Visakhapatnam, East and West Godavari, Krishna, Nellore, Guntur, Bellary and Kurnool.	2,019	B.H.C.—5 per cent or 10 per cent dusting.	154.5	27,000
4	Fulgorid bug (<i>Nilaparvata lugens</i>)	Srikakulam, Visakhapatnam and Godavari.	2,599	B.H.C.—5 per cent dusting after draining out the water.	370.0	74,000
5	Root weevil (<i>Echinocnemus oryzae</i>).	West Godavari, Krishna and Guntur ..	2,782	Application of neem cake or super-phosphate.	400.0	80,000
6	Leaf roller (<i>Chaphalocnecis medialis</i>).	Srikakulam, West Godavari, Krishna, Guntur, Chittoor, Nellore and Kurnool.	608	Dusting of B H C 5 per cent after disturbing the rolls.	59.0	15,780
7	Case worm (<i>Nymphula depunctalis</i>).	Srikakulam, Anakapalli, Chittoor, Bellary and Anantapur.	289	Flooding and draining fields and kerosenating.	42.0	8,400
8	Stem borer (<i>Schoenobius incertellus</i>).	Krishna, Cuddapah, East and West Godavari, Chittoor, Nellore, Kurnool and Bellary.	496	Draining fields pulling up crop with stimulating manures.	350.0	69,940
9	Green spotted Jassid (<i>Nephotettix bipunctatus</i>).	Srikakulam, Chittoor, Cuddapah and Anantapur.	354	Spraying Guesarol 550 ½ oz. per gallon. About 100 gallons per acre.	32.0	6,380
10	Mealy bugs (<i>Bespersia oryzae</i>)	.. .. .	39	Treating with fish oil rosin soap 1 lb. in 4 gallons.	..	..
11	Rice Hispa (<i>Hispa armigera</i>)	.. .. .	664	B.H.C.—10 per cent dusting.	11	2,200
12	Silvershoot fly (<i>Pachydiplax oryzae</i>).	Visakhapatnam, Chittoor and Cuddapah ..	9	B.H.C.—5 per cent dusting as preventive.	..	..
13	Semiloopers (<i>Pelania frugalis</i>)	Srikakulam and West Godavari ..	44	B.H.C.—5 per cent dusting ..	6	1,200
14	Horned caterpillar (<i>Melanitis ismene</i>).	Chittoor ..	53	B.H.C.—5 per cent dusting ..	7	1,400
		Do.		Do.		

Serial number.	Crop and pest.	District where occurred.	Area tackled.	Remedial measures adopted.	Gain in	
					Tons.	Rs.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
15	Rice bug (<i>Leptocoris acuta</i>)	Chittoor	ACS.	B.H.C.—5 per cent dusting ..	1	100
16	Rice thrips (<i>Thrips oryzae</i>)	Do.	4	Agroicide spraying 1 oz. per gallon.	3	600
17	Root caterpillars (<i>Ancyrtornia</i> sp.)	..	31	Application of agroicide to soil.	..	..
18	Snails ..	Guntur	10	B.H.C.—5 per cent dusting after draining the water.	..	..
19	Cut worms (<i>Cirphis albistigma</i>)	Nellore	10.4	B.H.C.—10 per cent dusting at 40 lb. per acre.	1.5	300
20	Hispa ..	Kurnool	6.0	B.H.C.—5 per cent dusting.	0.6	120
21	Ear head bug (<i>Calocoris angustatus</i>)	Guntur	233	B.H.C.—10 per cent or 5 per cent dusting.	30	6,000
22	Wingless grasshopper	Nellore	149	B.H.C.—10 per cent dusting.	18	3,600
23	Ground grasshopper (<i>Chrotogonus</i> spp. <i>Aclopus</i> spp.)	East Godavari, Kurnool, Anantapur and Guntur.	90.5	Do.	9	1,800
24	Fulgorid bug ..	Kurnool	2	B.H.C.—5 per cent dusting ..	..	..
25	Plant lice ..	Chittoor	6.5	Agroicide spraying ..	..	..
26	Mite (<i>Peridermatus indicus</i>)	East Godavari and Guntur	19	Sulphur dusting ..	1	200
27	Stem borer (<i>Chilo zonellus</i>)	Chittoor	6.5	D.D.T. spraying ..	1½	200
28	Field rats ..	Srikakulam	6	Zinc phosphide baiting ..	..	..
29	Laphygma ..	All districts	1,047.8	B.H.C.—5 per cent dusting ..	189	37,840
30	Caterpillars ..	Anakapalli, Chittoor, Guntur and Nellore.	30	Do.	2	400
31	Plant lice ..	Cuddapah	101	Agroicide spraying ..	3	1,800
32	Thrips ..	Cuddapah and Chittoor	111.6	Do.	11.3	3,160
33	Stem borer ..	Chittoor and Nellore..	38.5	D.D.T. spraying ..	3.5	650
34	Grasshopper ..	Nellore	237	B.H.C.—5 per cent dusting.	29.5	5,900
35	Millet grasshopper (<i>Heteroglyphus nigrorepletus</i>)	Nellore	97	Do.	28	5,600

36	Ground grasshopper (<i>Chrotogonus</i> <i>Allopus</i>)	Kurnool	Varugu.	19 B.H.C.—10 per cent dusting ..	..	..
37	Cut worm ..	East and West Godavari	..	40 Do.	5.6	1,100
38	Grasshoppers ..	Kurnool and Bellary	Korva.	450 B.H.C.—10 per cent dusting ..	46.5	9,300
39	Caterpillar ..	Cuddapah	Agathi.	5 D.D.T. sprayings ..	..	250
40	Early shoot borer ..	East Godavari	..	45½ D.D.T. sprayings ..	..	9,100
41	Mealy wings ..	Krishna	..	1 Agroicide spray ..	..	250
42	Leaf hoppers ..	West Godavari	..	6 Do.	..	1,200
43	Mites ..	Visakhapatnam	..	1 Sulphur spraying ..	..	100
44	Cane fly ..	Srikakulam and Chittoor	..	5 B.H.C.—5 per cent dusting.	..	1,000
45	Termites ..	..	..	7 Agroicide spraying ..	..	660
46	Scales ..	Srikakulam	..	4 Fish oil spraying ..	..	..
47	Pod borer ..	Bellary	..	2.5 B.H.C.—5 per cent dusting ..	..	..
48	Gram caterpillar ..	East Godavari and Cuddapah	Bengalgram.	6.5 B.H.C.—5percent dusting ..	..	..
49	Epilochana ..	All districts	Brinjals.	1.875 D.D.T. or arsenate spray ..	..	3,67,150
50	Tingids ..	East and West Godavari, Krishna, Guntur, Kurnool and Bellary.	..	23½ Spraying agroicide D.D.T. (double strength) ..	..	39,240
51	Plant lice ..	Chittoor, Bellary, East and West Godavari and Guntur.	..	200.3 Agroicide spraying ..	..	4,00,600
52	Mealy bugs ..	Guntur, West Godavari and Cuddapah	..	18½ Fish oil rosin soap spray ..	..	2,860
53	Caterpillar ..	West Godavari	..	7 Calcium arsenate spray ..	..	1,400
54	Field rats ..	Bellary, Krishna and Nellore	..	60 Zinc phosphide baiting ..	..	5,800
55	Jassids ..	Bellary and Guntur ..	..	42½ D.D.T. spraying ..	..	8,500

Serial number.	Crop and pest.	District where occurred.	Area tackled.	Remedial measures adopted.	Gain in	
					Tons.	Rupees.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Vegetables—cont.</i>						
<i>Gourds.</i>						
56 Mites ..	..	Guntur, Krishna and Nellore	1	Agroicide spray	..	20
57 Margarona ..	..	Krishna, West Godavari and Guntur	50-8	Calcium arsenate spraying	..	5,660
58 Mealy bugs ..	..	West Godavari	10	Fish oil rosin soap spraying	..	900
59 Beetles ..	..	West Godavari, Krishna, Chittoor and Guntur.	52½	Calcium arsenate spraying	..	7,850
60 Plant lice ..	..	Srikakulam and Bellary	9½	Fish oil rosin soap spraying	..	1,800
61 Root grubs ..	..	West Godavari	15	Digging in B.H.C.—5 per cent around the plots.	..	1,500
62 Beetles ..	..	..	3-0	Calcium arsenate spray	..	500
63 Aphids ..	..	Anantapur	4-0	Fish oil spray	..	700
64 Jassids ..	..	Bellary and Cuddapah	..	..	..	..
65 Caterpillars on Cabbage	..	Bhendai.	54	D.D.T. spray	..	5,400
66 Grasshoppers ..	..	Krishna, Anantapur, Guntur	..	..	..	..
67 Hairy caterpillars ..	..	English vegetables.	286½	B.H.C. 5 per cent dusting or spraying Guesarol 550..	..	28,600
68 Plant lice ..	..	All districts	2	B.H.C. 5 per cent dusting	..	400
69 Stem weevil ..	..	Bellary	40 trees	Agroicide spraying	..	100
70 Mites ..	..	Bellary and Krishna	..	..	..	..
71 Noctuid caterpillar ..	..	Moringa.	44	Fish oil rosin soap spraying	..	8,800
72 All vegetable pests (miscellaneous).	..	Beas.	6	Agroicide spraying	..	600
73 Rats in vegetable gardens	..	Sweet Potato.	3	Dusting sulphur	..	600
74 Thrips ..	..	Cuddapah	3	Spraying Agrolide	..	300
75 Rats ..	..	Visakhapatnam, Krishna, Bellary, Guntur and Nellore.	369	Insecticidal treatment	..	36,900
76 Thrips ..	..	Nellore and Bellary	208	Zinc phosphide baiting	..	20,800
77 Scales ..	..	Chillies.	684	(a) B.H.C. treatment in nurseries.	..	68,400
78 Flea beetles ..	..	All districts (mostly in Guntur district)	777	(b) Dipping of seedlings in agroicide prior to transplantation.	..	..
79 Leaf webber caterpillar	..	..	22,225	(c) B.H.C. treatment in field.	..	22,22,500
80 Mango hopper ..	..	Chittoor and Nellore	83	Zinc phosphide baiting	..	3,875
81 Red ants ..	..	Onions.	546	Agroicide spraying	..	1,09,200
82 Termites ..	..	All districts	25 trees	Fish oil rosin spraying	..	25
83 Butterfly ..	..	Bellary	4	Agroicide spraying	..	200
84 Leaf miners ..	..	Bellary	530 trees	Calcium arsenate spraying	..	530
85 Red Tree ants ..	..	Anantapur and Kurnool	80,753	Do. Guesarol 550 spraying	..	80,753
86 White ants ..	..	All districts	400	Do. Agroicide spray	..	400
87 Mites ..	..	West Godavari	200	Do. Bordeaux paste appli- cation.	..	200
88 Mealy bugs ..	..	Kurnool	6,171	Do. Spraying agroicide or calcium arsenate.	..	6,171
89 Bark eating caterpillar	..	Anantapur, Kurnool, Bellary, Cuddapah and Nellore.	2,400	Do. Agroicide spraying	..	2,400
90 Plant lice ..	..	Anantapur, Kurnool and West Godavari.	6,496	Do. Do.	..	6,496
91 Scales ..	..	Bellary, West Godavari and Anantapur..	20,084	Do. Application of bordeaux paste.	..	20,084
92 Fruit borer ..	..	Guntur, Nellore, Cuddapah, Krishna and Bellary.	4,512	Do. Sulphur spraying	..	4,512
93 Rats ..	..	Nellore, Kurnool, Cuddapah and Krishna.	292	Do. Fish oil rosin soap spraying.	..	292
94 Beetles ..	..	Guntur	3,970	Do. Paradichlore Benzene application of petrol or B.H.C.—5 per cent treatment.	..	3,970
95 Caterpillars on Cabbage	..	Cuddapah, Krishna, Kurnool and Bellary.	1,545	Do. Agroicide spraying	..	1,545
96 Grasshoppers ..	..	Nellore and Chittoor	250	Do. Fish oil spray	..	250
97 Hairy caterpillars ..	..	Cuddapah, Kurnool, Bellary and Ananta- pur.	14	Do. Agroicide spraying	..	..
98 Mites ..	..	Guntur	..	Do. Agroicide spraying	..	..
99 Beetles ..	..	..	..	Do. Agroicide spraying	..	..
100 Rats ..	..	..	..	Do. Agroicide spraying	..	..
101 Flea beetles ..	..	..	..	Do. Agroicide spraying	..	..
102 Thrips ..	..	..	..	Do. Agroicide spraying	..	..
103 Scales ..	..	..	..	Do. Agroicide spraying	..	..
104 Flea beetles ..	..	..	..	Do. Agroicide spraying	..	..
105 Butterfly ..	..	..	..	Do. Agroicide spraying	..	..
106 Leaf miners ..	..	..	..	Do. Agroicide spraying	..	..
107 Red Tree ants ..	..	..	..	Do. Agroicide spraying	..	..
108 White ants ..	..	..	..	Do. Agroicide spraying	..	..
109 Mites ..	..	..	..	Do. Agroicide spraying	..	..
110 Mealy bugs ..	..	..	..	Do. Agroicide spraying	..	..
111 Bark eating caterpillar	..	..	..	Do. Agroicide spraying	..	..
112 Plant lice ..	..	..	..	Do. Agroicide spraying	..	..
113 Scales ..	..	..	..	Do. Agroicide spraying	..	..
114 Fruit borer ..	..	..	..	Do. Agroicide spraying	..	..

Serial number.	Crop and pest.	District where occurred.	Area tackled.	Gain in		
				Tons.	Rupees.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
		<i>Fruit trees—cont.</i>				
			ACS.			
		<i>Grape Vine.</i>				
93	Cavepillars	Bellary	630	Agroicide spraying	..	315
94	Flea beetles	Bellary	500	Do.	..	300
		<i>Oil Seeds.</i>				
		<i>Groundnut.</i>				
95	Red hairy caterpillar..	Srikakulam and West Godavari	36	B.H.C. 10 per cent dusting	..	1,800
96	Plant lice	Guntur, Krishna, Chittoor and Cuddapah	271	Do.	..	27,100
97	Leaf miners	Cuddapah, Kurnool and Anantapur	131	B.H.C. 5 per cent dusting..	..	2,550
98	Thrips	Chittoor	2-7	Agroicide spraying	..	125
99	Rats	West Godavari	47	Bathing with zinc phosphide	..	2,350
		<i>Gingelly.</i>				
100	Red hairy caterpillar	West Godavari	122	B.H.C. 10 per cent dusting	..	6,100
		<i>Coconuts.</i>				
101	Blackheaded caterpillars	East Godavari and West Godavari	14,110	Biological control	..	14,110
102	Rats	Nellore	1-5	Baiting with zinc phosphide	..	..
103	Rhinoceros beetle	Bellary	63	Mechanical method	..	..
		<i>Castor.</i>				
104	Semiloopers	Guntur, Nellore, East Godavari and Cuddapah.	121	Spraying agroicide or calcium arsenate.	..	6,050
		<i>Fibre crops.</i>				
		<i>Cotton.</i>				
105	Semilooper	Kurnool	3	Agroicide spraying	..	..
106	Pink Boll worm	Srikakulam	1	Guesarol 550 spraying	..	..
107	Stem weevil	Nellore	3	Pulling out and burning	..	..
108	Jasids	Bellary	61	Guesarol 550 spray	..	1,250
109	Flea beetles	Srikakulam	2	B.H.C. 5 per cent dusting..	..	..

No.	Pest	Localities	Time	Remedy	Cost
110	Prodenia	Guntur, East and West Godavari and Krishna.	1,039	Spraying of calcium arsenate or agrocidide or Guesarol 550	2,07,800
111	Plant lice	East Godavari and West Godavari	215	Spraying tobacco decoction	21,500
112	Ground beetles	Guntur and Krishna	1,072	B.H.C. 5 per cent dusting, putting up poison traps.	1,07,200
113	Betel vine bug	Cuddapah, Kurnool and Visakhapatnam	260	Guesarol 550 spraying	1,300
114	Swarming caterpillar	Cuddapah	55	Do.	5,500
115	Laphygma	Guntur, East and West Godavari	30-00	Guesarol 550 spraying	1,500
116	Scales	Nellore	14	Fish oil rosin soap spraying	..
117	Stem borer	East Godavari	30	Application of paradichloro-benzene.	30
118	Red ants	Anantapur	60	Agrocidide spraying	60
119	White ants	Visakhapatnam	100	Agrocidide application	100
120	Thrips	Guntur, Krishna and Kurnool	38½	Agrocidide spraying	3,025
121	Thrips	Guntur and Krishna	3	Agrocidide spraying	200
122	Scales	Guntur	48 plants	Fish oil rosin soap spraying.	48
123	Moth	Bellary	48	B.H.C. 10 per cent dusting	400

Serial number.	Crop and pest.	District where occurred.	Area tackled.	Remedial measures adopted.		Gain in	
				Tons.	Rupees.		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	
		Stored products pests (pernicious dusting for storage in bags).					
			ACS.				
			Paddy.				
124	Moth and beetle	..	..	All districts, 18,945 bags	Preventive dusting of	..	
125	Weevil and beetle	..	..	..	Hortex, Guesarol 410,	..	
126	Bruchids	..	..	..	Geigy 33 (external dust-	..	
				..	ing).	..	
127	Bruchids	..	..	Guntur	Standing at the top of the	..	
				..	grain in godowns.	..	
128	Aphanus	..	..	Kurnool	12 tons. B.H.C. dusting	..	
129	Rodents in godowns.	..	..	..	No. 516 Zinc phosphide baiting	..	
130	Stored pests	..	..	..	235 Disinfecting the godowns	..	
				Turneric.		..	
131	Beetles	..	..	West Godavari and Kurnool	3 tons. Mixing Geigy 23 A.	..	
132	Cattle pests	..	..	..	External treatment on cattle	..	
133	Cattle pests	..	..	..	Dusting of cattle sheds with	..	
				..	B.H.C.	..	
			Area.	Production.	Value.		
			ACS.	..	RS.		
	Food crops	..	27,860	3,941	7,99,110		
	Other crops	..	45,909	..	37,73,798		
	Fruit trees, etc.	..	128,547	..	12,282,152		

APPENDIX II.

Programme of work for the districts—Season 1952-53.

Programme common to all districts.

The items of work which are common to all the districts are enumerated below. The control measures recommended will be adopted for doing propaganda and carrying on intensive work by the Plant Protection Assistants and the District Staff.

I. Vegetable pests.

- 1 Pests on brinjals—
 - (a) Epilachna Spraying or dusting calcium arsenate or DDT.
 - (b) Tingids Spraying BHC or DDT.
 - (c) Aphids Spraying BHC in the early stages and H.E. T.P. at all times.
 - (d) Shoot-borer Spraying DDT.
2. Jassids on all vegetables—Spraying DDT.
3. Pumpkin beetles and other leaf-eating caterpillars—Spraying or dusting calcium or lead arsenate.
4. Aphids on vegetables—Dusting of Hortex or Lindane (BHC containing pure Gama Isomer) or spraying with H. E. T. P.
5. Sweet potato weevil—Dusting or spraying BHC or DDT.
6. Caterpillar pests cruciferous crops (English vegetables)—Spraying DDT at regular intervals.

II. Fruit pests

Citrus—Citrus butterfly—Spraying BHC or calcium arsenate. Plant lice and leaf miner—Spraying BHC. Mites—Dusting or spraying sulphur. Bark borer—Pouring in petrol or putting in few crystals of paradichlorobenzene and plugging has been found to be a very effective remedy.

Red ant (in all trees)—Spraying or dusting BHC.

Fruit moth (on other trees also)—Spraying DDT.

Mango-hopper—Spraying DDT.

Ber fruit—Fruit fly—Spraying DDT.

III. Field rats.

Baiting with zinc phosphide.

IV. Stored products pests.

Paddy and other grains in bags—Dusting BHC (deodorised) or DDT. Cholam seed kept in bags—Seed to be well mixed with Geigy 33 at 1 lb. per 1,000 lb. of seed.

Gogo seed (kept for seed purpose only)—Seed to be well mixed with Geigy 33 at 1 lb. per 100 lb. of seed.

Vegetable seeds—Seed to be well mixed with Geigy 33 at 1 lb. per 100 lb. of seed or stored in bottles with Paradichlorobenzene after the seeds are well dried.

V. Cattle pests.

Ticks, lice, fleas and flies on cattle—BHC 5 per cent to be applied as a paste on the affected regions.

Ticks, lice, fleas and flies on cattle in stall—Spray or dust BHC.

VI. Crop pests.

With the insecticides now on hand, it is possible to tackle most of the important pests on crops. There are still a few pests which are found very difficult to be controlled. In such cases trials will be made with all the

available insecticide and the best of the lot selected will be taken up for propaganda. The improvement in work that are to be carried forward in the districts are given below district wise in each district cropwise:—

1. Srikakulam.

Paddy—

1. Control of paddy grasshopper pest—By dusting BHC 5 per cent.
2. Rice case worm—By flooding, draining, trapping and kerosinating the stagnant water. To pull up the crop a stimulating manure has to be applied.
3. Rice hispa—Dusting with BHC 5 per cent in two rounds.
4. Paddy leaf-roller—Disturbing leaf-folds and dusting with BHC 5 per cent.
5. Swarming caterpillar—Dusting BHC 10 per cent or DDT. spraying or dusting.
6. Stem-borer—Draining fields—With young crops draining water from fields and pulling up the crop with a stimulating manure.
7. Field rats—Baiting with zinc phosphide.
8. Silver shoot fly—Trial of B.A.M. 32 and preventive dusting of BHC.

Sugarcane—

9. Grasshopper—Dusting BHC 5 per cent 10 per cent according to the species.
10. Shoot-borer—Spraying DDT to be popularised.

Groundnut—

11. Red hairy caterpillar—Dusting BHC 10 per cent.
12. Plant lice—Dusting BHC 10 per cent.

Gingelly—

13. Shoot and pod-borer—Spraying or dusting DDT or BHC.
14. Chillies—Thrips—Spraying or dusting BHC.
15. Onions—Thrips—Spraying BHC.
16. Grams—Plant lice—Dusting BHC.
17. Gogu—Mealy bugs—Spraying fish oil rosin soap or BHC with petroleum oil spray mixed with 2:4 D compound to be tried.
18. Coconut—Nephantis—Parasites to be obtained from the parasite-breeding laboratory and released.
19. Rhinoceros beetle—For nurseries BHC 10 per cent to be tried as preventive dusting.
20. White ants—(In nurseries) Dipping nuts before planting in wettable DDT 1 lb. in 20 gallons and planting and applying DDT to soil.
21. Rats—Baiting with zinc phosphide.

2. Visakhapatnam district.

Same as for Srikakulam district with the following additional items:—

Sugarcane—(a) Cane fly—Spraying or dusting BHC to be organised when the pest is noticed.

(b) Mealy wings—Petroleum spray with 2:4 D compound to be tried besides fish oil rosin soap and agroicide.

(c) Shoot-borer—Spraying of DDT to be popularised.

Betel vine—Betel vine bug—Spraying DDT to be organised.

Tobacco—(a) Prodenia—Spraying of calcium arsenate or agroicide or guesarol 550.

(b) Plant lice—BHC may be used in the early stages. H.E.T.P. to be popularised at all stages of the crop.

Mango-hopper—This district has a very large area under mangoes (30,000) and hence large-scale campaigns should be organised for the control of this pest.

3. East Godavari district.

Ragi—Leaf noctuid—Dusting BHC 5 per cent.

Paddy—Swarming caterpillar, leaf roller, Grass hopper, case worm, hispa, stem-borer, silver shoot fly and field rats are the common pests of this district and should be dealt with as instructed already. The other pests of paddy that occur in this district are—

(a) Paddy root grubs—Application of ammonium sulphate and super-phosphate.

(b) Paddy small grasshopper—BHC 10 per cent dust.

(c) Paddy fulgorid bug—Draining fields and dusting BHC 5 per cent.

Sugarcane—Grass hopper, cane fly, mealy wings and field rats to be controlled whenever noticed.

Gingelly—Shoot webbers to be controlled as stated already.

Chillies—Thrips large-scale campaign to be continued in Gollaprola and Lanka areas.

Onion and garlic—Thrips—Spraying of BHC 50 per cent (wetable) to be carried on.

Mango-hopper—This will also be an important item of work.

Coconut—This is an important district in as much as 50,000 acres are under coconut. The whole area will be kept under observation, for the incidence to black-headed caterpillar pest and the release of parasites will be done from Rajole laboratory.

For Rhinoceros white ants and coconut slug BHC and DDT will be dusted.

Groundnut—Aphids and leaf-miner—To be treated as already indicated.

Betelvine—If bug infestation is noticed DDT (50 per cent) spraying will be taken up.

Tobacco—The pests like Prodenia, Aphids and Ground beetle to be dealt with as already stated.

Turmeric—Rhizome (preservation)—Geigy 33 A to be mixed with the rhizomes in bags at 2 oz. per maund.

4. West Godavari district.

Same as for the East Godavari district, with one addition. The anti-leech ointment will be supplied, if fresh stock is available with the manufacturers to swamp areas in Bhimavaram taluk.

5. Krishna district.

Same as for the East Godavari district with the following special items:—

(a) Snails attacking paddy .. To be treated with BHC 5 per cent before transplanting.

(b) Slugs damaging vegetables .. To be controlled with Metaldehyde bait 2 per cent in bran.

(c) Cholam—Grasshopper and shoot caterpillar—Dusting BHC.

Mites—Dusting sulphur.

Ear head bug—Dusting BHC.

(d) The prawn damage to salt cotawrs in Bandar taluk to be investigated.

(e) Groundnut pests—To be tackled as and when observed.

6. Guntur district.

Same as for Krishna with the following additions:—

Panivaragu—Flea beetles—Dusting BHC.

7. Nellore district.

Paddy.—Important pests of the tract are (a) swarming caterpillar, (b) climbing cut worm, (c) small grasshopper, (d) paddy stem-borer, (e) leaf-roller, (f) root grubs, (g) field rats, etc.

They will be tackled as described above.

Millets.—Grasshopper—Dusting BHC 5 per cent or 10 per cent Blister beetles on Cumbu—Spraying or dusting with BHC or DDT to be tried.

Chillies.—Thrips and rats to be tackled as indicated.

Coconut.—The usual pests to be controlled.

8. Chittoor district.

Paddy.—(a) Swarming caterpillar of paddy, (b) silver shoot fly, (c) thrips, (d) jassids and field rats are the common pests and the control measures will be taken up on large areas.

Ragi.—Leaf noctuid and thrips are the important pests and they will be controlled with BHC.

Chillies and onions.—Thrips effectively controlled by BHC.

9. Cuddapah district.

Paddy.—Swarming caterpillar, stem-borer, gall fly and jassids will be dealt with as usual.

Millets.—Ground grasshopper, Millets grasshopper, cholam mites, and cumbu blister beetles are the pests of the tracts and will be controlled.

Chillies and onions.—Thrips—Control measures to be pushed through.

Betelvine-bug.—The campaign on this pest has already gained ground and it will be taken up still further.

Tobacco.—Prodenia and Aphids—To be dealt with as already stated.

Melon.—Plant lice and fruit flies are the two pests to be controlled.

Fumigation.—Fruit plants exported to places outside the Presidency are to be fumigated and certified.

10. Kurnool district.

Paddy.—The important pests of the tract are given below and they will be controlled with available pesticides—Grass hopper and Swarming caterpillar.

Millets.—Ground grass hopper, Red hairy caterpillar, Cholam earhead bug and the ragi leaf noctuid are the important pests of this tract that are to be dealt with.

Groundnut.—Red hairy caterpillar, Aphids, leaf miner and the seed store bug are to be tackled.

Tobacco.—Tobacco caterpillar, ground beetle and plant lice will be controlled as stated above.

Chillies and onions.—Thrips—Campaign on this to be organized well.

Betel vine.—Bug—Campaign on this to be organized well.

11. Bellary district.

Paddy.—Paddy grasshopper, swarming caterpillar, case worm and jassids will engage the attention of the staff.

Onion and garlic.—Thrips—The treatment to be popularised.

12. Anantapur district.

Same as for Bellary district.

VII. Other items of work.

(a) *Bee keeping*.—This scheme is in progress in seven districts; Srikakulam, Visakhapatnam, East Godavari and West Godavari, Krishna, Guntur and Chittoor. The Plant Protection Assistant will look to the working of the scheme in the districts.

(b) *Fumigation*.—(i) The fumigation of imported plants and their products at Visakhapatnam port will be attended to by the Plant Protection Assistant in Entomology, Anakapalli.

(ii) The fumigation of grafts and plants intended for export for Cuddapah district will be attended to by the Plant Protection Assistant in entomology, Cuddapah.

(c) *Pest Act*.—The enforcement of the Pest Act Regulations against cattle pest, notified in G.O. Ms. No. 1728, Food and Agriculture dated 30th December 1949, will have the technical supervision of the Plant Protection Assistant in Entomology, Cuddapah.

APPENDIX III.

Statement showing the strength of the staff as on 30th June 1952.

1. Madras Agricultural Service—		
Crop and Plant Protection Officer (Entomology), Bapatla ..	1	
2. Madras Ministerial Service—		
(1) Upper division clerk	1	
(2) Typist	1	
3. Inferior Service—		
Peons	2	
4. Madras Agricultural Service—		
Upper subordinates—		
Plant Protection Assistants in Entomology	12	

APPENDIX IV.

Financial statement of the office of the crop and Plant Protection Officer (Entomology), Bapatla, for the year under report (1951-52).

1. Crop and plant protection—

	RS.
1 Pay of officers	4,422
2 Pay of establishment	2,156
3 Allowances	4,272
4 Contingencies	922
Total ..	11,772

II. Control of pests and diseases of crops—

Cost of chemicals	330
Other charges	585
Total ..	915

III. XXIX. Agriculture—Receipts—

Refund of customs duty received from various companies on pesticides purchased.	5,214
Budget sanctioned—Sanctioned budget for 1952-53.—	
1 Crop and Plant Protection Scheme	11,024
2 Control of pests and diseases of crops (for North region).	3,20,200
3 Bee-keeping scheme	20,069
4 Zonal Parasites Breeding Station, Rajole ..	5,830
5 (a) Expenditure for 12 Plant Protection Assistants in Entomology for one year.	27,360
(b) Expenditure for 12 demonstration maistries	8,784
(c) Expenditure for 12 messengers	7,200
Total ..	4,16,767

ANNUAL ADMINISTRATION REPORT OF PLANT PROTECTION OFFICER, MYCOLOGY, COIMBATORE, FOR THE YEAR ENDING 30TH JUNE 1952.

I submit hereunder the annual administration report for the year 1951-52.

2. *Staff.*—The extension of the Plant Protection Scheme for a further period of one year from 1st April 1952 with a special staff consisting of four Plant Protection Officers, two in Mycology and two in Entomology for the State, and two Plant Protection Assistants, two demonstration maistries and two messengers for each district was sanctioned in G.O. No. 102, Food and Agriculture, dated 14th March 1952 (Director of Agriculture's Endorsement No. L-2237/51, dated 29th March 1952).

3. *Charge.*—I was in charge of the plant protection work in Mycology throughout the year under report.

4. *Season and rainfall.*—Seasonal conditions and rainfall were not altogether favourable for agricultural operations in many parts of southern districts excepting the West Coast. The north-east monsoon was a failure in almost all the districts. In the West Coast districts of South Malabar, North Malabar and South Kanara the south-west monsoon commenced in proper time and the showers were evenly distributed with the result that normal agricultural operations were carried out in time. The crop yields were normal in these districts. The timely rains of the south-west monsoon in the Nilgiris helped the main crop of potato in 1951 but the standing crop of potato for the main season in 1952 has badly suffered due to the drought and the stand is very poor. A late monsoon and an uneven distribution of rainfall adversely affected paddy, irrigated cholam and vegetables in the districts of Salem, North Arcot and Coimbatore. The dry crops in these districts also suffered severe drought. In Ramanathapuram and Tirunelveli more favourable weather conditions prevailed and both wet and dry crops were fairly satisfactory. In Tanjore and Tiruchirappalli the south-west monsoon was helpful for the first crop paddy.

5. *Diseases of crops.*—Seasonal factors that prevailed did not favour the onset of any major crop diseases on any large-scale proportions during the year under report. Crop diseases of major importance that were prevalent during the year and the appropriate measures for their control were carried out by the department and are detailed below:—

(a) *Paddy—'Blast' (Piricularia oryzae).*—This disease occurred in almost all the rice growing areas of the State. While it is possible to control this disease in the nursery stage, its spread in the planted crop is not as easily tackled. The use of fungicidal sprays in large areas of transplanted crop is not a feasible proposition. Yet a large measure of success was attained in localising infection in the transplanted crop by giving a spray of Bordeaux mixture or perenox. An area of about 1,600 acres of paddy was thus treated in the districts of Salem, Ramanathapuram, North Arcot, Tirunelveli, Chingleput, Coimbatore and Tiruchirappalli. The more effective method of control is the introduction of disease resistant strains. The two departmental strains, Co. 25 and Co. 26 which are highly resistant to 'blast', are becoming very popular in the southern districts and the area under these strains has considerably increased over last year's.

(b) *Foot-rot (Fusarium moniliforme)*—and *seedling blight (Helminthosporium oryzae)*.—Foot-rot is mainly a nursery disease. The leaf spot disease caused by *Helminthosporium oryzae* can cause severe blight under conditions favourable for its spread in an epidemic form. These two diseases are seed-borne. Pre-treatment of seed with organo mercury compounds like agrosan GN of ceresan effectively controls foot-rot and reduces infection in the case of seedling blight. Seed to sow an area of about 86,000 acres was treated with agrosan GN. in the districts of Salem, Ramanathapuram, North Arcot, Nilgiris, Tirunelveli, Pattukkottai, Coimbatore, Chingleput, South Arcot, Tiruchirappalli, Tanjore and Madurai.

(c) *Cholam—Grain smut (Sphacelotheca sorghi)*.—This disease is of major importance and occurs in all the cholam growing areas. Seed treatment with sulphur is the easiest and most effective remedy for the disease. Seed to sow about 84,600 acres was treated with sulphur in the districts of Tirunelveli, North Arcot, Ramanathapuram, Salem, Coimbatore, Madurai, and Tiruchirappalli.

(d) *Ragi—Blast (Piricularia sp.)*.—This disease is found to attack the crop in all its stages of growth. The nursery phase of infection can be controlled by spraying Bordeaux mixture or perenox. Dipping the seedlings in the fungicide before transplantation prevents the spread of infection. As in the case of paddy it is difficult to tackle the disease when it appears in the transplanted crop. But if a timely spraying of Bordeaux mixture is given infection can be localised. About 50 acres of nursery and about 130 acres of planted crop were sprayed with Bordeaux mixture in the districts of Ramanathapuram, Coimbatore and South Arcot.

(e) *Cumbu 'Green ear' (Ccelerospora graminicola)*.—This disease occurs in all areas where cumbu is grown. The disease is carried over from season to season by the oospores. Systematic eradication of affected plants before the formation of oospores is the only remedial measure. In the districts of Tirunelveli and Coimbatore about 70 acres were tackled for eradication of the disease.

(f) *Vegetables.—Early blight of potato, leaf spot and fruit-rot of tomato and onion blight* were the most important of the vegetable diseases that were noted during the year. About 135 acres of potato, about 34 acres of tomato and about 25 acres of onions were sprayed with Bordeaux mixture in Salem, Ramanathapuram, North Arcot, Nilgiris, Chingleput, South Arcot and Coimbatore. About 16 acres of plantain were also sprayed with Bordeaux mixture against *leaf-spot* disease in Tirunelveli, North Arcot and Chingleput.

(g) *Fruit crops—(i) Grapevine.—Downy mildew (Plasmopara viticola), powdery mildew (Uncinula necator) and Anthracnose (Elsinæ ampelina)* were the important diseases attacking grapevine in the State. The third mentioned disease is not, however, as common as the first two. Downy mildew and Anthracnose are controlled by giving a Bordeaux mixture spray once as soon as the shoots grow to a few inches, again just before flowering and afterwards at fortnightly intervals when the fruits have set. Powdery mildew responds to dusting of sulphur and the dusting should be given at the same time and intervals as the spray treatment mentioned above. The growers are aware of the efficacy of the treatments prescribed and they follow a systematic programme of control measures. Under departmental supervision an area of 204 acres was treated for grapevine diseases in Tirunelveli, Ramanathapuram, Chingleput, Coimbatore, Tiruchirappalli and Madurai.

(ii) *Citrus.—Leaf fall and fruit rot (Phytophthora palmivora)*.—The leaf fall and fruit rot disease of citrus is confined to the Wynad taluk of

North Malabar district and it causes heavy damage to the orange crop during the monsoon. It is, however, effectively controlled by spraying Bordeaux mixture. One spray has to be given prior to the outbreak of the south-west monsoon and another in July-August. The orange growers are conversant with the method of control and spraying operations are becoming more and more popular every year. The plant protection staff did intensive propaganda during the year and as a result of it substantial areas were covered by treatment.

Mildew (Oidium tingtonum).—This is another disease found in all the citrus tracts of the State. Sulphur dusting is an effective control measure. About 1,650 trees were treated by the plant protection staff in the districts of Nilgiris and Madurai.

'Wither tip and canker' (*Colletotrichum gloeosporioides Xanthomonas citri*).—These diseases commonly occur in the citrus areas. Limes are more susceptible to the disease than other species. Removal of diseased twigs and spraying Bordeaux mixture control the disease. About 19,300 trees were thus treated under departmental supervision in the districts of Salem, Ramanathapuram, South Arcot, Tirunelveli, Pattukkottai, Chingleput, Tiruchirappalli and Madurai.

Foliocellosis.—This is a disease caused by zinc deficiency. The deficiency is rectified by giving a spray of zinc sulphate lime mixture at intervals of four months. About 15,600 citrus trees are treated for the disease in the districts of Salem, Ramanathapuram, North Arcot, Nilgiris, Tirunelveli, Chingleput, Coimbatore, Tiruchirappalli and Madurai.

(iii) *Mangoes—Mildew (Oidium mangiferae)*.—Pink (*Corticium salmonicolor*), and leaf spot were among the important diseases met with during the year under report. Of these, mildew was more widespread in occurrence. Sulphur dusting is the most effective remedy for this disease. Pink disease is controlled by removing the diseased tissues and drenching the portions with Bordeaux mixture. Leaf spot disease is also controlled by spraying with Bordeaux mixture.

(h) *Non-food crops—(i) Turmeric—Leaf spot disease (Collectotrichum capsici)*.—This disease was noticed to occur in parts of Coimbatore and Tirunelveli. About 240 acres were sprayed with Bordeaux mixture and the spread of infection was arrested.

(ii) *Chillies—'Die back and fruit rot' (Colletotrichum capsici)*.—This disease was of widespread occurrence in all the chilli growing areas. In recent years perenox spraying has become more popular with the ryots as it is found easier to prepare it than the Bordeaux mixture. Over 2,000 acres were treated for the disease in the districts of Tirunelveli, Ramanathapuram, Madurai, Coimbatore, South Kanara, Chingleput, Tiruchirappalli, Pattukkottai, Tanjore and Salem.

(iii) *Tobacco.—'Frog eye' disease* was noted in the districts of Coimbatore and timely spraying with perenox checked further spread of the disease. About 45 acres were treated in Coimbatore.

(iv) *Betelvine.—'Wilt' disease* caused by *Phytophthora palmivora* was noticed to occur in the betelvine areas of Tiruchirappalli and Salem. The disease would appear to be assuming serious proportions in these districts. Drenching of foot of the vines and the soil with Bordeaux mixture at intervals of two months from the second month of planting is found to

effectively check the spread of infection. The ryots were allowed to take up preventive measures in time. As a demonstrative measure, four acres of crop in Salem district were treated under departmental supervision.

(v) *Sugarcane*.—'Smut' disease (*Ustilago scitaminae*) occurred in the districts of North Arcot, South Arcot, Tiruchirappalli and Coimbatore. The remedial measures for the disease consists in the removal of the smutted whips and eradication of the affected clumps. Control measures were carried out by the plant protection staff in about 770 acres in the above districts.

(vi) *Palms*.—(a) *Coconut*.—The common diseases occurring in the crop are (1) Bud rot (*Phytophthora palmivora*), (2) stem bleeding (*Ceratostomella paradoxa*), (3) leaf spot diseases (*Pestalozzia palmarum*), and (4) root disease (*Ganoderma lucidum*). Prophylactic spraying against bud rot was carried out for 620 palms in Ramanathapuram, Pattukkottai, Malabar and South Kanara. Operations for stem bleeding diseases were done for 3,000 palms in Pattukkottai, Tirunelveli, Malabar, South Kanara, Salem, Coimbatore and North Arcot. Spraying Bordeaux mixture for control of leaf spot disease was done for 9,000 seedlings in Tiruchirappalli district. Nearly 300 palms in South Kanara and Malabar were treated with sulphur application to the soil for root disease.

(b) *Arecanut*.—Mahali disease caused by *Phytophthora palmivora* is the commonest disease occurring in Malabar and South Kanara during the south-west monsoon period. Although the disease appeared this year in many parts of these districts the incidence of the disease was not of very great virulence. The plant protection staff advised the ryots about the correct method of preparation and application of Bordeaux mixture. Demonstrative sprayings also were conducted in many places.

(i) *Assessing losses caused to paddy by diseases*.—The incidence of 'blast' (*Piricularia oryzae*), *Helminthosporium oryzae* and false smut (*Ustilagoideia virens*) of paddy was recorded from 174 crop sampling plots and submitted as per the circular of the Directorate of Plant Quarantine and Storage, New Delhi.

6. *Tours*.—The plant protection staff in Mycology were on tour for 2,715 days visiting 2,365 villages to demonstrate the preventive and control measures for crop diseases.

7. *Review*.—The immense benefit derived out of the recently organized plant protection service in the State is already in evidence from the fact that the farmers are now familiar with the symptoms of common crop diseases and are ready to adopt the simple and effective control measures placed at their disposal. The plant protection organization has helped to detect fungoid diseases in the field and to induce the cultivator to take timely measures of control. The Government depots were supplying fungicides at concessional rates and spraying equipment free of charge to the farmers. Adequate stocks of spraying equipment and fungicides were always maintained. The experience of the past three years has shown that the farmers are not slow to realise the advantages and usefulness of the plant protection services. There has been no difficulty either on the part of the field staff or on the part of the farmer in putting forth their co-operative effort to take effective and timely measures to prevent a major outbreak of crop diseases in the State. It may be mentioned that the need for a permanent organization of plant protection service in the State has been fully established. In order

that the work may be more effectively executed, a reinforcement of the extension service by additional staff and provision of quicker transport facilities for the field staff are necessary.

The plant protection assistants in Mycology have done excellent work in the field and I wish to record my appreciation of the good work done by them. I also wish to express my thanks to the Government Mycologist and the District Agricultural Officers for their ready help and co-operation.

COIMBATORE,
23rd July 1952.

K. KRISHNA MENON,
Crop and Plant Protection Officer (Mycology).

APPENDIX I.
Administration Report for the year 1951-52

Crop.	Disease.	Control measures adopted.	Area tackled.	Estimated gains in tons.
(1)	(2)	(3)	(4) ACS.	(5)
1 Paddy	(a) 'Blast' (<i>Piricularia oryzae</i>).	Sprayed with Bordeaux mixture or Perenox to localise the infection and prevent further spread.	1,600	116
	(b) 'Foot-rot and seedling blight' (<i>Fusarium moniliforme</i> and <i>Helminthosporium oryzae</i>).	Preventive—Treated the seeds with Agrosan GN at 1 oz. per 30 lb. of seed.	86,000	3,071
2 Cholam	'Grain smut' (<i>Sphacelotheca sorghi</i>).	Preventive treatment. Seeds were treated with sulphur at 1 oz. per 15 lb. of seed.	84,800	1,514
3 Regi	'Blast' (<i>Piricularia sp.</i>)	Sprayed with Bordeaux mixture to localise the infection.	180	13
	Total ..		172,580	4,714
4 Vegetables—				
(a) Potatoes	'Leaf-spot' (<i>Alternaria solani</i>)	Sprayed with Bordeaux mixture	135	68
(b) Tomato	'Leaf-spot' (<i>Alternaria sp.</i>)	Do.	34	17
(c) Onion	Do.	Do.	25	12
(d) Plantains	'Leaf-spot'	Do.	16	8
	Total ..		210	Rs. 21,000
5 Fruit crops—				
(a) Grapevine	'Downy mildew' (<i>Plasmopara viticola</i>) 'Powdery mildew' (<i>Uncinula necator</i>).	Sprayed with Bordeaux mixture Dusted with sulphur	200	20,000
	Total ..		410	41,000
(b) Citrus ..	(a) 'Canker' (<i>Xanthomonas citri</i>).	Removed the diseased twigs and sprayed with Bordeaux mixture.	19,300 trees.	38,600
	(b) 'Mildew' (<i>Oidium tingsi-</i> <i>taninum</i>).	Dusted with sulphur	1,650 "	4,950
	(c) 'Folliculosis' (<i>Zinc deficiency</i>).	Sprayed with zinc sulphate lime mixture	15,600 "	31,200
(c) Mangoes	(a) 'Mildew' (<i>Oidium mangiferae</i>)	Dusted with sulphur	3,700 "	18,500
	(b) 'Leaf-spot'	Sprayed with Bordeaux mixture	1,350 "	2,700
	(c) 'Pink' (<i>Colletotrichum salmoni-</i> <i>colletr</i>).	Removed the diseased portions and drenched with Bordeaux mixture.	420 "	12,600
	Total ..		31 "	23
	Total ..		42,020 "	1,08,550
6 Chillies ..	'Fruit-rot' (<i>Colletotrichum capsici</i>).	Sprayed with Bordeaux mixture or perenox	2,200 Acres.	2,50,000
7 Turmeric	'Leaf-spot' (<i>Colletotrichum capsici</i>).	Sprayed with Bordeaux mixture	240 "	48,000
	Total ..		2,440 "	2,98,000
	Value.			
	Area.	Production.	RS.	
	ACS.	TONS.		
Food crops	172,580	4,714	9,42,800	
Other crops	410	..	41,000	
	2,440	..	2,98,000	
	2,850	..	3,39,000	
Fruit plants	42,920	..	1,08,550	

APPENDIX II.

(Statement No. 1.)

Name of the service and post.	Number of sanctioned posts.	
	Permanent.	Temporary.
(1) Madras Agricultural Service—		
Crop and Plant Protection Officer (Mycology) ..	..	1
(2) Madras Agricultural Subordinate Service	..	..
(3) Madras General Subordinate Service	..	..
(4) Madras Ministerial Service	..	2
(5) Madras Inferior Service	..	2

(Statement No. 2.)

Statement of expenditure for the year ending 30th June 1952.

	RS.
A. Non-recurring expenditure	Nil.
B. Recurring expenditure—	
Pay of officer	4,080
Pay of establishment	2,021
Dearness allowance	1,681
Travelling and other compensatory allowance	1,621
Other charges	360
Total ..	9,763

(Statement No. 3.)

Statement showing the receipts during the year ending 30th June 1952.

	RS.
XXIX. Agriculture—A. Agricultural receipts—	
Recoveries of overpayments—	
(a) Recovery of excess incremental pay paid to peon ..	18
M. Perumal.	
(b) Refund of Customs duty paid on fungicides ..	483
Total ..	501

ADMINISTRATION REPORT OF THE PLANT PROTECTION SCHEME,
MYCOLOGY, NORTHERN REGION OF MADRAS STATE, FOR 1951-52.

I submit below my annual administration report for the fasli year 1951-52. The progress of work done under each scheme is detailed separately.

I. Scheme for the control of pests and diseases of crops.—The scheme was first sanctioned in G.O. No. 5519, Development, dated 6th November 1948, for the year 1948-49. Extension of the same for the years 1949-50, 1950-51 and 1951-52 was sanctioned in G.Os. No. 3189, Development, dated 14th June 1949; No. 59, Food and Agriculture, dated 24th July 1950, and Government Memorandum No. 9627-51, Food and Agriculture, dated 24th April 1951, respectively.

The Director of Agriculture, Madras, addressed the Government of Madras in letter No. L. I. 533-52, dated 1st April 1952, for extending the scheme during the year 1952-53 and the Government orders are awaited.

The scheme is being run with an open budget under the administrative control of the Director of Agriculture.

The following is a statement showing the equipment purchased during the year under report:—

Name of the district.	Power sprayers supplied.	Hand operated sprayers supplied.
(1)	(2)	(3)
Srikakulam	1	20
Visakhapatnam	2	50
East Godavari	1	20
West Godavari	1	30
Krishna	..	40
Guntur	2	30
Nellore	..	40
Chittoor	1	30
Cuddapah	1	24
Kurnool	..	30
Bellary	..	15
Anantapur	..	15
Total ..	9	344

Including these sprayers, there are 17 power sprayers and 587 hand operated sprayers in this region of twelve districts.

In order to cope up with the demand of the ryots, sufficient quantities of fungicides were stocked in the agricultural depots and the following are the details of fungicides sold during the year :—

Serial number and name of fungicide.	Quantity sold during the year.
(1)	(2)
1 Dusting sulphur	11 tons, 29 lb.
2 Copper sulphate	7 „ 1,520 „
3 Zinc sulphate	5 „ 580 „
4 Ferrous sulphate	353 „
5 Magnesium sulphate	8 „
6 Manganese sulphate	3 „
7 Agrosan GN	1 ton 390 „
8 Perenox	1 „ 1,736 „
9 Fernoxone	29 „
10 Borax	4 „
11 Agri-Tree-killer	11½ gallons.
12 Albolonium	½ gallon.
13 Phymone tablets	1½ tablets.
14 Shell Mac. R.C. 3	15 gallons liquid.
15 Agroxone	11 lb. dust.

II. Scheme for the employment of plant protection staff.—The scheme was first sanctioned in G.O. No. 4720, Development, dated 17th September 1948. It was continued in G.O. No. 888, Food and Agriculture, dated 3rd September 1949, up to 31st October 1950. It was again sanctioned in G.O. No. 247, Food and Agriculture, dated 12th December 1950, from 1st November 1950 to 31st October 1951, and it was continued up to 31st March 1952 in G.O. Ms. No. 421, Food and Agriculture, dated 17th September 1951. Extension of the same up to 31st March 1953 was sanctioned in G.O. Ms. No. 102, Food and Agriculture (Food Production), dated 14th March 1952.

The staff sanctioned and employed for the Mycology section of the Northern Region are given below :—

- 1 Plant Protection Officer, Mycology—One on Rs. 230—700.
- 2 Plant Protection Assistants, Mycology—Twelve on Rs. 100—220.
- 3 Upper division clerk—One on Rs. 80—110.
- 4 Typist—One on Rs. 45—90.
- 5 Peons—Two on Rs. 18—25.
- 6 Messengers—Twelve on Rs. 12.
- 7 Demonstration maistris—Twelve on Rs. 20—30.

The Plant Protection Officer, Mycology, is stationed at Bapatla with the ministerial establishment of one upper division clerk and one typist and inferior establishment of two peons. The twelve Plant Protection Assistants are stationed at the headquarters of each District Agricultural Officer to assist the District Agricultural Officer on plant protection work in the district. The Plant Protection Assistants are given one Demonstration maistri and one messenger each to help them in their work.

The Plant Protection Officer, Mycology, will be touring all over the 12 districts and supervising the technical work of the Plant Protection Assistants and guiding them.

III. Pest Act for the control of bud-rot of palms.—The Pest Act for the control of bud-rot of palms is in operation in three districts, viz., East Godavari, West Godavari and Krishna.

(1) *The Pest Act in the East Godavari district.*—The Act was ordered to be enforced in G.O. No. 315, Food and Agriculture, dated 1st March 1950, for three years from 1st April 1950. The special staff for operating the scheme was first sanctioned in G.O. Ms. No. 515, Food and Agriculture, dated 21st March 1950, for one year from 1st April 1950. Continuance of the same for a further period of one year from 1st April 1951 was sanctioned in G.O. Ms. No. 790, Food and Agriculture, dated 18th April 1951. Sanction for continuing the staff for one year more from 1st April 1952 was accorded in G.O. Ms. No. 632, Food and Agriculture.

The Pest Act operations are being carried on by one Special Agricultural Demonstrator assisted by seven lower division clerks working as Special Revenue Inspectors, 14 maistris, 8 peons and 1 attender. The entire staff is under the administrative control of the District Agricultural Officer, Kakinada, and the technical control of the Crop and Plant Protection Officer, Mycology, Bapatla, since 1st October 1950.

(2) *Pest Act in the West Godavari district.*—The Act in this district was enforced in G.O. Ms. No. 514, Food and Agriculture, dated 21st March 1950, for one year from 1st April 1950, and the staff was sanctioned in G.O. Ms. No. 881, dated 24th March 1951, for the same period. Continuance of the staff and enforcement of the Act for another year from 1st April 1951, was sanctioned in G.O. No. 787, Revenue, dated 30th March 1951, and G.O. Ms. No. 591, dated 28th March 1951, respectively. Sanction was accorded in G.O. Ms. No. 649, Food and Agriculture, dated 12th April 1952, for continuing the staff for one year more from 1st April 1952.

The Act was extended to the partially excluded areas of the Polavaram taluk in G.O. Ms. No. 2453, Food and Agriculture, dated 26th December 1951, from the date of joining of the staff to 31st March 1952. A staff consisting of 1 lower division clerk to work as Special Revenue Inspector, 3 demonstration maistris and 1 peon were sanctioned in Government Memorandum No. 81290 R/51-3, dated 2nd February 1952. The staff was continued in G.O. Ms. No. 472, Food and Agriculture, dated 21st March 1952, for a period of one year from 1st April 1952.

The total staff in the West Godavari district consist of 5 lower division clerks working as Special Revenue Inspectors, 16 maistris and 5 peons. They worked under the administrative control of the Revenue department up to 25th May 1952. Since 26th May 1952, the administrative control over the staff was transferred to the District Agricultural Officer, West Godavari, Ellore, and the technical control to the Crop and Plant Protection Officer, Mycology, Bapatla.

(3) *Pest Act in the Krishna district.*—The Act is in force in Krishna district also in Bandar taluk. The staff sanctioned for the enforcement of the Act is only one lower division clerk working as Special Revenue Inspector and a peon. He was under the administrative control of the Revenue department up to 31st March 1952 and from 1st April 1952 he is working under the administrative control of the District Agricultural Officer, Krishna, and the technical control of the Plant Protection Officer, Mycology, Bapatla.

IV. *Pest Act for the control of broom rapes on tobacco.*—This Act was enforced in G.O. Ms. No. 1271, Food and Agriculture, dated 2nd July 1950, in the districts of Nellore, Guntur, Krishna, West Godavari, East Godavari and Visakhapatnam and it will be in force up to 10th July 1953, i.e., for a period of three years.

No special staff were sanctioned for the enforcement of this Act. The concerned District Agricultural Officers, Agricultural Demonstrators, Fieldmen, demonstration maistries of the Agricultural department, Tahsildars, Deputy Tahsildars, Revenue Inspectors and village officers of the Revenue department are entrusted with the duties specified in the Act in connexion with the enforcement of the notification.

V. *Charge.*—I was in charge of the post of the Plant Protection Officer, Mycology, Bapatla, throughout the period under report and was in additional charge of the post of the Crop and Plant Protection Officer, Entomology, Bapatla, for a short period of six days from 22nd to 27th January 1952.

VI. *Staff.*—Sri A. V. Raghava Rao and Sri D. Sarabhaiah continued to be the upper division clerk and the typist throughout the period.

The following are the details of staff working in the Northern Region as assistants in Plant Protection of Mycology section:—

(1) *Plant Protection Assistant, Mycology, Srikakulam.*—Sri D. Rama Rao was in charge of the post till 31st July 1951 when he was transferred and Sri K. Valisi Naidu, Plant Protection Assistant, Entomology, took charge of the post and handed over to Sri S. Koteswara Rao the very next day. Sri S. Koteswara Rao continued to be the Plant Protection Assistant, Mycology, till 17th October 1951 and handed over charge to Sri P. Appalanarasaiah who continued to be Plant Protection Assistant (Mycology) till the end of the year.

Sri P. Appalanarasaiah was in additional charge of the post of the Plant Protection Assistant, Entomology, from 13th February to 30th April 1952 as the assistant was deputed for undergoing training in Plant Protection at Coimbatore.

(2) *Plant Protection Assistant, Mycology (Visakhapatnam), Anakapalle.*—Sri B. Seshavatharam was in charge of the post throughout the year.

(3) *Plant Protection Assistant, Mycology (East Godavari), Kakinada.*—Sri V. L. N. Sastri was in charge of the post throughout the year. He was in additional charge of the post of Personal Assistant to District Agricultural Officer from 17th to 25th June 1952 consequent on the promotion of the then Personal Assistant.

(4) *Plant Protection Assistant, Mycology (West Godavari), Eluru.*—Sri S. Ramanjaneyulu was in charge of the post throughout the year. He was in additional charge of the post of the Personal Assistant to District Agricultural Officer from 11th to 29th September 1951.

(5) *Plant Protection Assistant, Mycology (Krishna), Vijayavada.*—Sri C. V. Anjaneyulu was in charge of the post throughout the year.

(6) *Plant Protection Assistant, Mycology, Guntur.*—Sri P. Sankara Rao was in charge of the post throughout the year except for a short period of 11 days from 16th to 25th May 1952. He was in additional charge of the post of the Plant Protection Assistant, Entomology, for two months and seventeen days (from 22nd December 1951 to 8th March 1952).

(7) *Plant Protection Assistant, Mycology, Nellore.*—Sri T. Venkatarama Reddi continued to be the Plant Protection Assistant, Mycology, throughout the year.

(8) *Plant Protection Assistant, Mycology, Chittoor.*—Sri C. Sreenivasan was in charge of the post throughout the year except for November 1951 when he was deputed to take up fruit survey in the Agency tracts of Visakhapatnam district; the Plant Protection Assistant, Entomology, Sri D. Krishnaswami Naidu was in additional charge of the post of the Plant Protection Assistant, Mycology.

(9) *Plant Protection Assistant, Mycology, Cuddapah.*—Sri S. Krishnamurthi Rao was in charge of the post throughout the year. He was in additional charge of the Plant Protection Assistant, Entomology, from 27th September to 19th November 1951.

(10) *Plant Protection Assistant, Mycology, Kurnool.*—Sri P. Ramakrishna Rao continued to be the Plant Protection Assistant, Mycology, Kurnool, throughout the year.

(11) *Plant Protection Assistant, Mycology, Bellary.*—Sri J. Subbaiah continued to be Plant Protection Assistant, Mycology, Bellary, throughout the year. He was in additional charge of the post of the Plant Protection Assistant, Entomology, from 26th July to 20th September 1951.

(12) *Plant Protection Assistant, Mycology, Anantapur.*—Sri M. Ramachandra Rao was in charge of the post throughout the year but for the last five days. He was on earned leave from 26th May to 2nd June 1952 and, during that period, the Plant Protection Assistant, Entomology, was in additional charge of the post of the Plant Protection Assistant, Mycology. Sri S. Shanmukham was posted in the place of Sri M. Ramachandra Rao and the former took charge of the post on 26th June 1952 forenoon.

(13) *Special Agricultural Demonstrator, Palm duty, Kakinada.*—Sri K. V. Chelamayya Sastri was in charge of the post throughout the year.

VII. *Tours.*—I was on tour for 155 days during the year and visited all the districts. On an average, the Plant Protection Assistants in Mycology visited 139 villages and conducted 76 demonstrations. The Special Agricultural Demonstrator, Palm duty, Kakinada, was on tour for 229 days and visited 147 villages during the year.

VIII. *Season and incidence of diseases.*—The south-west monsoon was normal in all the districts except Nellore, Chittoor, Cuddapah, Kurnool and Anantapur. There were heavy rains in July-August in the East and West Godavari districts with the result there were floods and some of the paddy areas in those districts had to be replanted. The tail-end areas in the Krishna and Guntur districts also suffered due to these rains.

The north-east monsoon was weak and the rainfall in most of the districts was below normal. Extreme drought conditions prevailed in the Chittoor, Cuddapah, Kurnool, Anantapur and parts of Nellore and Guntur. Although the summer was not very severe, the continued drought and lack of rains in all the districts between November and May have made conditions unbearable to cattle and people. Great scarcity was felt even for drinking water in most towns and villages.

Unusually there was a depression in the Bay of Bengal near about Masulipatnam accompanied by heavy rainfall in the fourth week of May. Most of the tanks in Chittoor and Rayalaseema districts were filled up and it was considered a very good augury for the coming year 1952-53.

Blast in paddy occurred in the Srikakulam, Visakhapatnam, West Godavari, Nellore, Cuddapah, Kurnool and Chittoor districts. Nurseries were blasted in a few villages in the Nellore district, while the planted crop in Chittoor was heavily blasted due to the prevailing drought conditions and late planting. Brown spot was reported from Chittoor, Visakhapatnam, East Godavari and Srikakulam. Algae occurred as a menace smothering the growth of paddy in the Srikakulam district. Blast in ragi (*Piricularia sp.*) was reported from Chittoor, Srikakulam and Anantapur. Smut in sugarcane was reported from West Godavari, Srikakulam, Bellary and Krishna districts while red-rot in the same crop occurred in the West Godavari district. Fruit-rot and mildew in chillies was reported from almost all the districts. Damping off in the nurseries occurred in the Kurnool, Bellary, Srikakulam, West Godavari and Krishna districts, while the incidence of virus diseases was noted in the Krishna, Guntur and Kurnool districts. Wilt in chillies was reported from Guntur. Leaf-blight in onion occurred in Cuddapah, Visakhapatnam, Kurnool, Bellary, Srikakulam and Anantapur districts. Wilt in groundnut (*Rhizoctonia*) was reported from East and West Godavari districts. Leaf-spot in turmeric (*Colletotrichum capsici*) occurred in Cuddapah, Nellore, Guntur, West Godavari, Kurnool, Srikakulam, East Godavari and Krishna districts while the leaf-spot in ginger was reported from the East Godavari district. Damping off in tobacco occurred on a large scale in the Guntur, Krishna, West Godavari and East Godavari districts. Stenosis in cotton was reported from Kurnool district. Wilt in betel vine occurred in the Krishna and Visakhapatnam districts while blight of leaves was reported from the Chittoor and Kurnool districts. Wilt in plantain occurred in the Visakhapatnam district while leaf-spotting was reported from the Anantapur district. Stem bleeding in coconut was reported from the Visakhapatnam and East Godavari districts, while bud-rot was reported from the East Godavari and Anantapur districts. Citrus diseases were reported from all the districts. In addition to the deficiencies of zinc and copper other deficiencies like those of boron, manganese, iron and magnesium were also noted. Septobasidium in limes was conspicuously absent during this year. Pink disease in mango was reported from Cuddapah and Bellary. Powdery mildew and anthracnose in grapevine were reported from the Anantapur and Bellary districts. Little leaf (virus disease) in brinjal was reported from Srikakulam, Visakhapatnam, East Godavari, Krishna, Bellary, Cuddapah, Kurnool and Guntur. Leaf-blight and fruit-rot in tomato were reported from the Bellary district while wilt was reported from the Guntur district. Damping off, mildews and other leaf-spots in the vegetable crops were reported from the Chittoor, Kurnool, Guntur, Srikakulam, Anantapur and Krishna districts. Powdery mildew and leaf-spots in roses were reported from the East Godavari and Srikakulam districts.

IX. Plant Protection work, Mycological, attended to in the Northern Region of the Madras State—1. Paddy—(a) Blast (*Piricularia oryzae*).—Blast was reported to have occurred on a large scale in the Srikakulam and Chittoor districts. Nurseries were blasted in the taluks of Kavali, Kandukuru and Nellore of the Nellore district and in most of the taluks in the Srikakulam district. As a preventive, nurseries to the extent of nearly 620·37 acres were sprayed with the copper fungicides. Seeds of resistant varieties like BCP1 and BCP2 sufficient to cover an area of 85,803 acres were distributed in the Nellore and Chittoor districts. Co.25 and Co.26 were distributed in the Chittoor, Cuddapah and Nellore districts to see if they prove more

resistant to blast than the existing varieties. Of these two varieties Co. 25 seems to suit these districts. It was found to be more resistant to blast than the existing varieties and yield better. But it is longer in duration than molakolukulu, and inferior in quality. Because of its higher yield and resistance to blast it may become popular in the coming years.

(b) Foot-rot and brown spot [*Fusarium moniliforme* (Var) *Majus* and *Helminthosporium oryzae*].—The seed treatment of paddy was popularized during this year also. Agrosan GN was stocked in all depots and demonstrations of seed treatment were conducted by the Plant Protection Assistants. Seeds sufficient to cover an area of nearly 42,741 acres were pretreated with Agrosan GN at the rate of 1 gm. per pound of seeds.

Sixty-five acres of paddy crop in the districts of Visakhapatnam, East Godavari, Chittoor and Srikakulam was also sprayed with copper fungicides to prevent the spread of the brown spot infection.

(c) Algal growth in the paddy fields.—Demonstrations for the control of algal growth in the paddy fields by dusting Fernoxone mixed with ashes, were conducted in most of the taluks in the Srikakulam district. Only 36·15 acres could be treated. The response was not very encouraging. For the treatment to be effective the water in the paddy fields had to be let out before dusting the algae with Fernoxone. Algal growth occurs in ill-drained fields and from where it was not possible to drain off water. So the treatment could be effected only in limited areas.

2. Sorghum—(Grain smut) (*Sphacelotheca sorghi*).—Sulphur packeted in 2 oz. and 4 oz. was stocked in all the Agricultural depots for sale to ryots during the sowing season. Large numbers of ryots have availed of this opportunity and purchased sulphur for pretreating their seeds to prevent the disease. An area of 325,720 acres were sown with the treated seed during this year.

3. Korra smut (*Ustilago crameri*).—A total area of 24,700 acres were sown with sulphur treated korra seeds during this year in the two districts of Bellary and Anantapur where this occurs.

4. Ragi blast (*Piricularia eleusine corocanae*).—Demonstrations of spraying with the copper fungicides were conducted in the Chittoor, Anantapur and Srikakulam districts, in an area of 11·0 acres.

5. Sugarcane—(a) Smut (*Ustilago scitamineae*).—This occurred in the districts of Srikakulam, West Godavari, Krishna and Bellary districts. The disease is more in ratoon crop. The ryots were advised to use disease-free seed material taken from uninfected fields and give up the habit of ratooning as far as possible.

(b) Red-rot (*Colletotrichum falcatum*).—Red-rot has appeared this year in the West Godavari district. Twenty acres were infected. Remedial measures were demonstrated and ryots were advised not to take seed material from those fields.

6. Chillies—(a) Fruit-rot (*Colletotrichum capsici*).—Fruit-rot occurred in all the districts except West Godavari and preventive sprayings were advocated either with Perenox or with Bordeaux mixture. A total area of 266·15 acres were sprayed during the year.

(b) Powdery mildew (*Oidiopsis taurica*).—This occurred on a mild scale in the Nellore, Krishna and Guntur districts. 126·5 acres were sprayed with Perenox 1 lb. in 40 gallons to control this disease.

(c) *Virus diseases*.—Occurrence of virus diseases in chillies was noted in the Krishna, Guntur and Kurnool districts and the remedial measures were demonstrated in about 92 acres.

(d) *Damping off* (*Pythium aphanidermatum*).—This occurred in the Kurnool, Bellary, Srikakulam, and Krishna districts and an area of 11.93 acres were sprayed with the copper fungicides.

7. *Onion*.—Leaf blight in onion (*Alternaria palandui*) occurred in an area of 217.95 acres in the districts of Cuddapah, Visakhapatnam, Kurnool, Bellary, Srikakulam and Anantapur. Either 3-3-50 Bordeaux or Perenox 1 lb. in 40 gallons was found to be effective in controlling the disease.

8. *Turmeric*.—*Leaf-spot* (*Colletotrichum capsici*).—This disease appeared in the month of August and continued up to January. The humid weather in August-September seemed to have been very favourable for its spread in those months. But this year the ryots were not enthusiastic about spraying for this crop in view of the lower prices for turmeric and only an area of 590.9 acres could be covered.

9. *Ginger* (*Colletotrichum capsici*).—*Leaf-spot* in ginger was reported this year from the East Godavari district and the remedial measures were demonstrated over 1.5 acres.

10. *Tobacco*.—(a) *Damping off* (*Pythium aphanidermatum*).—Spraying for this crop has become regular routine with the ryots in the Guntur and West Godavari districts, specially in villages where nurseries of virginia tobacco are raised. Attempts were made to popularise spraying of the tobacco nurseries in the Krishna district where there is a concentrated block of about 200 acres. A total area of 697.8 acres was sprayed in the Guntur, West Godavari, Krishna, Visakhapatnam and East Godavari districts.

(b) *Root parasite* [*Orobancha cernua* (var.) *desertorus*].—Removal and pitting of the parasite shoots before they set seed was demonstrated in over 11.5 acres in Visakhapatnam, West Godavari and Bellary districts.

(c) *Mosaic*.—Remedial measures for the control of this disease were demonstrated in the Srikakulam district over an area of 3.7 acres.

11. *Cotton*.—*Stenosis* (*Virus disease*).—It was reported from the Kurnool district and remedial measures were demonstrated over 8.0 acres.

12. *Groundnut*.—*Wilt* (*Rhizoctonia*).—This occurred widely in the groundnut crop grown in rice fallows in the West and East Godavari districts. Eradication of the infected plants and destroyal was demonstrated over 25 acres in these districts.

13. *Coriander*.—Powdery mildew occurred in this crop in the Cuddapah district and dusting of sulphur to control this disease was demonstrated over 3.0 acres.

14. *Betelvine*.—(a) *Wilt* (*Phytophthora* sp.).—This disease was reported from Visakhapatnam, Chittoor, Kurnool and Krishna districts where remedial measures such as destroyal of the infected vines and drenching the soil with Perenox 1 lb. in 40 gallons were demonstrated.

15. *Plantain*.—(a) *Wilt* (*Fusarium* sp.).—This disease occurred in the Visakhapatnam district where remedial measures were demonstrated in one acre.

16. *Coconut*.—*Stem bleeding* (*Ceratostomella paradox*).—This was reported from the Visakhapatnam and East Godavari districts. Chiselling the infected portions and application of tar was demonstrated.

Bud-rot was reported from East Godavari, Anantapur and Visakhapatnam districts and the remedial measures were demonstrated on 10 trees.

17. *Roses*.—About an acre of roses were sprayed for the control of powdery mildew and leaf spots in the East Godavari, Srikakulam and Kurnool districts.

Vegetables.

18. *Brinjal*.—(a) *Wilt* (*Fusarium* sp.).—Wilt occurred in the Guntur district and eradication of the infected plants and destroyal, and drenching the soil around the plants with Bordeaux mixture or Perenox was demonstrated in about 0.55 acre.

(b) *Little leaf* (*Virus-disease*).—Remedial measures were demonstrated over 360.3 acres in the Srikakulam, Visakhapatnam, East Godavari, Bellary, Cuddapah, Kurnool, Guntur, and Krishna districts.

19. *Tomato*.—(a) *Leaf blight* (*Alternaria* sp.).—0.5 acre of the tomato crop was sprayed with Perenox 1 lb. in 20 gallons for the control of leaf blight in the Bellary district.

(b) *Fruit-rot*.—4.5 acres in the Bellary district were sprayed with Perenox to control this disease.

(c) *Wilt* (*Fusarium* sp.).—Wilt was reported from Guntur district and the remedial measures were demonstrated over 0.5 acre.

20. *Cabbage*.—*Damping off* (*Pythium, aphanidermatum*).—Of late the cultivation of cabbage has increased in the Krishna and Guntur districts and damping off has been occurring in nurseries invariably. Remedial measures such as sowing on raised beds, burning trash before sowing and spraying fungicides were demonstrated over 3.5 acres in those two districts.

21. *Alocasia*.—*Leaf-spot* (*Phytophthora* sp.).—5.0 acres of Alocasia were sprayed with Perenox mixed with albolineum as a spreader to control this leaf-spot.

22. *Clusterbeans*.—(*Powdery mildew*).—0.6 acre in the Krishna district was sprayed with Perenox 1 lb. in 40 gallons to control this disease.

23. *Snake gourd*.—(*Powdery mildew*).—Spraying with Perenox has given good results. 0.6 acre was sprayed in the Krishna district.

24. *Damping off, Leaf-spots, etc., in other vegetables*.—16.15 acres were treated in the Kurnool and Chittoor districts for the control of damping off and other diseases occurring in the kitchen garden vegetables.

25. *Citrus*.—(a) *Foliocellosis* (*Zinc deficiency*).—This has been reported from all the districts. Zinc-Bordeaux mixture or zinc sulphate lime mixture has been advocated. A total of 1,13,539 trees were sprayed, during this year.

(b) *Iron deficiency*.—Iron deficiency was reported from the East Godavari district and Ferrous Bordeaux mixture was sprayed on 162 trees in the East Godavari district.

(c) *Other deficiencies*.—Other deficiencies of trace elements like magnesium, boron and manganese have come to the fore-front in the Cuddapah district, probably due to the extreme drought conditions that prevailed in that area. Seven hundred and thirty-one trees were given nutritional sprays containing these elements.

(d) *Gummosis*.—Removal of gum pockets by chiselling and application of Bordeaux paste was advocated. As a preventive Bordeaux paste application to the collar portions of the trees was popularized. 75,632 trees were applied with Bordeaux paste during this year.

(e) *Diplodia twig blight and die-back*.—*Diplodia* twig blight and die-back has been a common occurrence in all the citrus growing districts and the treatment of pruning the dead twigs and spraying Bordeaux mixture or Perenox is being popularized. 18,914 trees were accordingly sprayed during this year in the Srikakulam, Visakhapatnam, Bellary, Cuddapah, Nellore, Chittoor, Guntur, East Godavari and Anantapur districts.

(f) *Canker*—(*Bacterial disease*).—Four thousand nine hundred and seventy-two trees were sprayed with Perenox 1 lb. in 20 gallons in the Bellary, Nellore, Guntur, Cuddapah and Visakhapatnam districts.

(g) *Bracket Fungi* (*Ganoderma* sp.).—Remedial measures were demonstrated in two gardens in the Cuddapah district.

Plant protection work done in the northern Region during this year is given in Appendix I.

X. *Enforcement of the Pest Act for the control of the Bud-rot of palms—East Godavari district*.—The staff engaged for the enforcement of the Pest Act on Bud-rot of Palms continued to work this year also. As programmed last year, the staff were engaged in the detection of trees in the different villages allotted to them, posting registers and serving of notices on the parties during the months of July to December, and in the operation of trees in the months of January to June. The trees in the Government porambores were also detected and the concerned departments were requested to make budget provisions for undertaking the operations within their areas. It was proposed to tackle 44 villages during this year and detections were completed in all the 44 villages and a total of 301,333 trees were detected. But the amount under Advances Repayable which was raised to Rs. 8,000 for 1951-52, was not communicated till the month of March 1952 and hence the expected progress could not be shown in the operations. A total of 147,147 trees were operated during the year distributed over 28 villages. Of these 28 villages operations were completed in 13 villages, and partially completed in another 15 villages. The different villages in which work was done is given in Appendix IV. On an average a unit of one special Revenue Inspector and two maistries could cover 21,021 trees for the year. Of these 147,147 trees operated during the year, 24,000 trees were from the Government porambores for which the District Collector, East Godavari, provided Rs. 3,000 (rupees three thousand only) in his budget. The total number of detections and operations conducted during the year are given in Appendix V. The amount spent under advances repayable since 1st April 1952 was Rs. 6,222-8-0, the amount remitted was Rs. 2,983-2-0 and balance outstanding still to be collected is Rs. 3,239-6-0.

West Godavari district.—The Pest Act on bud-rot of palms is also in operation in the West Godavari district in the Bhimavaram, Tadepalligudem, Narasapur, Tanuku, Ellore, Chintalapudi, Kovvur and Polavaram taluks. The staff engaged consist of five Lower Division Clerks working as Special Revenue Inspectors, 16 maistries and 5 peons.

The control of the staff was transferred to the Agricultural Department in the last week of May 1952 and the staff have just reported to duty to this department. A conference of the Revenue Inspectors is proposed to be held in July when a programme of work would be chalked out and work would be reorganized on the lines of the work in the East Godavari district.

Krishna district.—The control of the staff enforcing the Pest Act on Bud-rot of Palms in this district has been transferred to this department in April 1952. The staff consists of one Special Revenue Inspector and a peon. The detection and operation work was attended to in 13 villages in the Bandar taluk. 2,340 detections were made by the Special Revenue Inspector during these two months of May and June and 1,727 trees were got operated by the ryots. The Special Revenue Inspector was deputed for about a week to Kakinada for undergoing training in the Bud-rot operations, maintenance of registers, serving of notices, etc., under the Special Agricultural Demonstrator, Palm Duty, Kakinada. Bud-rot occurs in the taluks of Bandar, Divi, Vijayavada, Gannavaram and Nuzvid also and the disease is rampant in the Bandar taluk. More staff is needed for keeping the disease under check in this district. Proposals for extension of staff are being examined for submission to the Director of Agriculture.

XI. *Pest Act for the control of broom rapes on tobacco*.—The incidence of broom rapes in the tobacco crop was not very pronounced during this year and propaganda was done by the staff of the Agricultural Department during their tours about the root-parasite and its effect on the tobacco crop. The ryots are aware of the consequences of the broom-rape pest and are adopting the remedial measures themselves.

XII. *Investigation—Trials with Hormone weed-killers*—(a) *On water hyacinth*.—Agroxone liquid in dilutions of 0.2 per cent, 0.4 per cent, 0.6 per cent Fernoxone 1 oz. in one gallon of water, 2 oz. in one gallon of water, 3 oz. in one gallon of water and Fernoxone 1 oz. in 5 lb. of mill dust and 2 oz. in 5 lb. were tried in tanks containing water hyacinth in the Narasapur taluk. The plants were completely killed in about a month but a few plants still remained green. The treatments were repeated after about a month and observed after two months. Fernoxone seems to be more effective than Agroxone liquid, and even the lowest dilutions seem to be controlling the weed.

(b) *On Portulaca quadrifida*.—Spraying trials with Extar Sandoz 'A' have been conducted in a plantain garden on Portulaca quadrifida, a bad weed in the citrus and plantain gardens in the West Godavari district in dilutions of 0.25 per cent, 0.5 per cent, 1 per cent and 2 per cent. Only the 2 per cent dilution sprayed twice with a month's interval at 200 gallons per acre has completely controlled the weed. But the cost of spraying comes to Rs. 100 per acre which is very prohibitive.

(c) *Trials with Planofix*.—The usefulness of Planofix on the prevention of mango fruit fall was tested this year on four varieties: Bhulokasundari, Svarnarekha, Neelam and Rajumanu. The percentage of reduction was 11 per cent, 23 per cent, 9 per cent and 21 per cent over the unsprayed control plots respectively. But the ryots were not satisfied with the reduction in fruit-fall obtained.

XIII. *Miscellaneous*—(a) *Publications*.—One article was submitted for publication in the Grow More Food Journal "Padipantalu." "Bud-rot disease on Palms in the East Godavari district. Some suggestions for eradication."

(b) Conferences—

(1) Attended the 34th College Day and Conference held at Coimbatore during August 1951 and partook in the discussions.

(2) Attended seven District Work Officers conferences held in the various districts, discussed and chalked out the programme of work in Plant Protection.

(c) Inspections.—Sri V. K. Subrahmanya Mudaliar, Headquarters Deputy Director of Agriculture, inspected my office and other equipment on 27th March 1952.

(d) Enquiries from public and specimens.—Thirteen enquiries were answered and five specimens were identified for diseases during the year.

(e) Agri-Tree-Killer.—Ten gallons of Agri-Tree-Killer solution was prepared during the year for distribution among the various districts.

XIV.—Cultivation of edible mushrooms.—With a view to popularize the cultivation of edible mushrooms the spawn of the paddy straw mushroom (*Volvaria diplasia*) prepared by the Lecturer in Mycology, Agricultural College, Bapatla has been supplied to all the districts. Ninety-six bottles were supplied in all and the cultivation was not a success this year as the produce obtained ranged from nothing to 15 lb. per bed. Due to the scarcity of fodder for cattle and due to the prevailing high cost of paddy straw many ryots have not come forward to try this cultivation.

BAPATLA,
4th August 1952.

P. GOVINDA RAO,
Crop and Plant Protection Officer, Mycology.

				Area.	Product saved.	Value.
				ACS.	TONS.	RS.
Food crops	..	..	..	479,695	7,990	16,15,245
Other crops	..	..	..	2,250	..	3,09,901
	..	..	..	406	..	..
Fruit plants	..	..	..	214,403 (No.)	..	3,97,600
						23,22,746
				Area.	Production.	Value.
				ACS.	TONS.	RS.
Food crops	M	1	N	479,695	7,990	16,15,245
	2	S	..	172,580	4,714	9,42,800
	E	3	N	27,860	3,941	7,99,110
	4	S	..	105,493	5,029	13,78,863
				785,628	21,674	47,36,018
Other crops	1	..	..	2,656	..	3,09,901
	2	..	..	2,850	..	3,39,001
	3	..	..	45,909	..	37,73,798
	4	..	..	29,360	..	19,79,548
				80,775	..	64,02,248
Fruit plants	1	..	..	214,403	..	3,97,600
	2	..	..	42,020	..	1,08,550
	3	..	..	128,547	..	1,28,215
	4	..	..	23,509	..	44,312
				408,479	..	6,78,677
Total				..	..	1,08,16,938

APPENDIX I.

Plant protection work (Mycological) done in the Northern Region of the Madras State during the fasli year 1951-52.

Serial number and crop.	Disease.	Preventive or remedial measures attended.	Area covered during 1951-52 in acres.	Saving of food or crop yield in tons.	Value of the produce saved in rupees.	Districts reporting the disease.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 Paddy	(a) Blast	Spraying bordeaux mixture 1 per cent. or perenox 1 lb. in 20 gallons.	620.37 acres.	..	15,610	Chittoor, Visakhapatnam, Anantapur, Srikakulam, Nellore and Cuddapah.
	(b) Blast	Distribution of resistant varieties.	85,803 acres.	3,178 tons	6,35,600	Nellore and Chittoor.
	(c) Foot-rot and Helminthosporiosis.	Seed treatment with agrosan G.N.	42,740.5	3,053 tons	6,10,600	Srikakulam, Visakhapatnam, West Godavari, Guntur, Chittoor, Kurnool, Krishna, Nellore, Cuddapah, East Godavari, Anantapur and Bellary.
	(d) Helminthosporiosis on leaf.	Spraying with perenox or bordeaux mixture.	65.35	..	1,635	Chittoor, Visakhapatnam, East Godavari and Srikakulam.
	(e) Algal growth.	Dusting with fernoxone	38.15	5 tons	1,000	Srikakulam.
2 Sorghum	Short-smut	Seed treatment with sulphur.	325,720	1,629 tons	3,25,800	Bellary, Anantapur, Cuddapah, Kurnool Srikakulam, West Godavari, Nellore, Visakhapatnam, Chittoor, Guntur, East Godavari and Krishna.
3 Ragi	Blast	Spraying with perenox 1 lb. in 20 gallons or bordeaux mixture 1 per cent.	11.0	1 ton	200	Chittoor, Srikakulam and Anantapur.
4 Korra	Smut	Seed treatment with sulphur 1 oz. for 15 lb. of seed.	24,700	124 tons	24,800	Bellary and Anantapur.
5 Sugarcane	(a) Smut	Eradication of the smutted shoots.	137.5	138 tons	6,900	West Godavari, Srikakulam, Bellary and Krishna.
	(b) Red-rot	Eradication of the infected canes and propaganda not to use seed material from the infected fields.	20.00	20 tons	1,000	West Godavari.

Serial number and crop.	Disease.	Preventive or remedial measures attended.	Area covered during 1951-52 in acres.	Saving of food or crop yield in tons.	Value of the produce saved in rupees.	Districts reporting the disease.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
6 Chillies	(a) Fruit-rot ..	Spraying with perenox 1 lb. in 20 gallons or bordeaux mixture 1 per cent.	266-15 acres.	12 tons ..	26,815	Chittoor, Nellore, Srika- kulam, Bellary, Guntur, Kurnool, Krishna, Anan- tapur, Cuddapah, Visakha- patnam and East Godavari.
	(b) Mildew ..	Spraying with perenox 1 lb. in 40 gallons.	126-5	5-6 tons ..	12,660	Nellore, Krishna and Guntur.
	(c) Virus ..	Eradication of infected plants.	92-00	4-1 tons ..	9,200	Krishna.
	(d) Damping off.	Spraying with perenox 1 lb. in 40 gallons.	71-93	3-2 tons ..	7,193	Kurnool, Bellary, Srika- kulam, Krishna and West Godavari.
	(e) Root-rot and wilt.	Removal of the infected plants and drenching the soil with perenox.	0-3	Negligible ..	..	Guntur.
7 Onion	.. Leaf-blight ..	Spraying with perenox 1 lb. in 40 gallons.	217-95	97-3 tons ..	52,308	Cuddapah, Visakhapatnam, Kurnool, Bellary, Srika- kulam and Anantapur.
8 Coriander	.. Mildew ..	Dusting sulphur ..	3-0	..	150	Cuddapah.
9 Groundnut	.. Wilt (Rhizoc- tonia).	Eradication of the infected plants and destroyal.	25 plants ..	Negligible ..	..	East Godavari and West Godavari.
10 Turmeric	.. Leaf-spot ..	Spraying with bordeaux mixture or perenox.	590-9	59-1 tons ..	53,190	Cuddapah, Nellore, Guntur, West Godavari, Kurnool, Srikakulam, Krishna and East Godavari.
11 Ginger	.. Leaf-spot ..	Spraying with perenox 1 lb. in 20 gallons.	1-5	0-15 tons ..	135	East Godavari.
12 Tobacco	.. (a) Damping off.	Spraying with bordeaux mixture or perenox.	697-8	..	1,39,560	Guntur, Krishna, Visakha- patnam, West Godavari and East Godavari.
	(b) Orobanche ..	Eradication of the parasite shoots.	11-5	0-5 tons of cured leaf.	840	Visakhapatnam, West Goda- vari and Bellary.
	(c) Mosaic ..	Eradication of the infected plants and destroyal.	3-7	..	..	Srikakulam.
18 Cotton	.. Stenosis ..	Eradication of infected plants	8-0	..	160	Kurnool.
14 Betelvine	.. (a) Wilt ..	Drenching the soil with pere- nox 1 lb. in 40 gallons.	2-0	Difficult to estimate.	..	Visakhapatnam and Krishna.
15 Plantain	.. (b) Blight ..	Spraying perenox ..	0-7	..	..	Chittoor and Kurnool.
	.. (c) Wilt ..	Eradication of the infected plants.	1-0	Negligible ..	..	Visakhapatnam.
16 Coconut	.. (b) Leaf-spot ..	Spraying perenox ..	200 plants ..	..	..	Anantapur.
	.. (a) Stem-bleeding.	Surgery and application of 11 trees ..	..	Negligible ..	..	Visakhapatnam and East Godavari.
	.. (b) Bud-rot ..	Removal of the infected parts and spraying perenox.	10 trees ..	Negligible ..	..	Anantapur.
	.. (c) Crown diseases	Removal of the infected parts and spraying perenox.	1 tree ..	Negligible ..	..	Visakhapatnam.
17 Citrus	.. (a) Mottle leaf ..	Spraying with zinc sulphate- lime mixture or zinc borde- aux mixture or zinc sulphate perenox mixture.	113,539 trees	1,892 tons of fruit.	..	Srikakulam, East Godavari, Bellary, Anantapur, Guntur, West Godavari, Krishna, Nellore, Chittoor, Cuddapah, Kurnool and Visakhapatnam.
	.. (b) Iron deficiency.	Spraying iron bordeaux mix- ture.	162 trees ..	3 tons ..	..	East Godavari.
	.. (c) Other defici- ency diseases.	Nutritional sprays	731 trees ..	12 tons ..	..	Cuddapah.
	.. (d) Gummosis ..	Removal of gum pockets and application of bordeaux paste.	75,692 trees.	1,262 tons of fruit.	..	Krishna, Visakhapatnam, West Godavari, Nellore, Bellary, Cuddapah, East Godavari, Chittoor, Anan- tapur and Guntur.
	.. (e) Diplodia twig blight and die-back.	Pruning of the dead branches and spraying of perenox or bordeaux mixture.	18,914 trees.	315 tons ..	..	Srikakulam, Visakhapatnam, Bellary, Cuddapah, Nellore, Chittoor, Guntur, East Godavari and Anantapur.
	.. (f) Canker ..	Spraying perenox 1 lb. in 40 gallons.	4,972 trees ..	83 tons ..	..	Bellary, Nellore, Guntur, Cuddapah and Visakha- patnam.
	.. (g) Bracket fungi (Ganoderma).	Isolation of the infected tree by digging trenches and application of sulphur.	2 trees ..	Negligible ..	..	Cuddapah.
18 Mango	.. (a) Pink disease.	Cutting away the infected shoots and spraying pere- nox mixture.	100 trees ..	4 tons ..	..	Cuddapah and Bellary.
	.. (b) Fruit-fall ..	Spraying phymone or plano- fix.	69 trees ..	..	..	Visakhapatnam and Nellore.

Serial number and crop.	Disease.	Preventive or remedial measures attended.	Area covered during 1951-52 in acres.	Saving of food or crop yield in tons.	Value of the produce saved in rupees.	Districts reporting the disease.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
19 Grapevine	(a) Powdery mildew. (b) Anthracnose.	Spraying perenox 1 lb. in 20 gallons. Pruning and spraying fungicides.	3-00 acres	..	..	Anantapur and Bellary.
Vegetables—						
20 Brinjal	(a) Wilt .. (b) Little-leaf ..	Removal of the infected plants and drenching the soil with perenox. Eradication of the infected plants.	0-55 acres 360-3 acres.	Negligible ..	..	Guntur.
21 Tomato	(a) Leaf-blight. (b) Fruit-rot .. (c) Wilt ..	Spraying with perenox .. Do .. Eradication and application of bordeaux mixture to soil round the plants as a preventive measure.	0-5 .. 4-5 .. 0-5 ..	0-5 ton .. 4-5 tons .. 0-5 ton ..	..	Srikakulam, Visakhapatnam, East Godavari, Krishna, Bellary, Chittoor, Kurnool and Guntur.
22 Cabbage	Damping off ..	Spraying with perenox 1 lb. in 40 gallons.	3-25	3 tons	..	Krishna and Guntur.
23 Alocasia	Leaf-spot ..	Spraying with perenox ..	5-0	5 tons	..	Srikakulam.
24 Cluster beans	Mildew ..	Dusting sulphur or spraying perenox.	1-5	1-5 tons	..	Anantapur.
25 Snake gourd	Mildew ..	Dusting sulphur or spraying perenox.	0-6	0-6 ton	..	Krishna.
26 Other vegetables	Damping off and other diseases.	Spraying with perenox 1 lb. in 40 gallons.	16-15	16 tons	..	Chittoor and Kurnool.
27 Rose plants	(a) Powdery mildew. (b) Leaf-spot ..	Spraying perenox. .. Spraying bordeaux mixture.	0-50 acre 0-2	..	..	East Godavari and Srikakulam.

APPENDIX II.

Statement showing the strength of staff as on 30th June 1952.

1 Madras Agricultural Service—						
Crop and Plant Protection Officer, Mycology	One.					
2 Madras Ministerial Service—						
Upper Division Clerk	One.					
Typist	One.					
3 Madras Inferior Service—						
Peons	Two.					

APPENDIX III.

Financial statement of expenditure of the Crop and Plant Protection Officer's (Mycology) Office, Bapatla, for the fasli year 1951-52.

I. Crop and plant protection—

	RS.
(1) Pay of Officer	3,925
(2) Pay of Establishment	2,156
(3) Allowances	4,287
(4) Contingencies	2,633
Total	13,001

II. Control of pests and diseases of crops—

(1) Cost of sprayers	3,746
(2) Cost of fungicides and chemicals	286
(3) Other charges	90
Total	4,122

APPENDIX IV.

Villages in the East Godavari district in which bud-rot eradication work was taken up during the year ending with 30th June 1952.

Taluk.	Villages in which detection work was completed during the year ending 30th June 1952.	Villages in which operation was completed by 30th June 1952.	Villages in which operation is expected to be completed by 31st July 1952.	Villages in which operation work is partially completed.
(1)	(2)	(3)	(4)	(5)
I. Razole	1 Sakinetipalli. 2 Antervedi-palem. 3 Gudimula. 4 Rameswaram. 5 Antervedi-gondi. 6 Kesavadau-palem.	1 Sakinetipalli. 2 Antervedi-palem	1 Gudimula. 2 Rameswaram.	..
II. Amalapur	7 Patha Injaram. 8 Pasuvullanka. 9 Kothapalli. 10 Yedurullanka. 11 Komaragiri. 12 Muramalla.	3 Patha Injaram. 4 Pasuvullanka. 5 Kothapalli.	3 Yedurullanka.	1 Muramalla. 2 Komaragiri.
III. Rajahmundry	13 Duppalapudy. 14 Mukkinada. 15 Thokada. 16 Tungapadu.	6 Duppalapudy.	4 Mukkinada	3 Thokada.

Taluk.	Villages in which detection work was completed during the year ending 30th June 1952.	Villages in which operation was completed by 30th June 1952.	Villages in which operation is expected to be completed by 31st July 1952.	Villages in which operation work is partially completed.
(1)	(2)	(3)	(4)	(5)
IV. Ramachandra- pur:	17 Kesavaram. 18 Medapadu. 19 Dwarapudi. 20 Vemulapalli. 21 Anaparti.	7 Kesavaram. 8 Medapadu. 9 Dwarapudi.	5 Vemulapalli.	4 Anaparti.
V. Kakinda ..	22 Uppumilli. 23 Duguduru. 24 Kolanka. 25 Pillanka. 26 Pallipalem. 27 Injaram. 28 Kapulapalem.	10 Uppumilli.	6 Duguduru.	5 Kolanka.
VI. Peddapur ..	29 Veerampalem. 30 G. Dontha- mur. 31 Kapavaram.	..	7 Veerampalem.	6 G. Dontha- mur.
VII. Pittapur ..	32 Uppada. 33 Subbampeta. 34 Aminabada. 35 Kothapalli. 36 Komaragiri. 37 Ponnada. 38 Mallavaram. 39 Moolapeta. 40 Yendlapalli. 41 Ghorsa. 42 Amaravilli. 43 Nagulapalli. 44 Kondevaram.	11 Uppada. 12 Subbampeta. 13 Aminabada.	8 Kothapalli.	7 Komaragiri.

APPENDIX V.

Total detections, operations and balance by the end of the year 30th June 1952.

Taluk.	Total number of detections during the year.	Total number of operations during the year.	Balance remaining by the end of 30th June 1952.
(1)	(2)	(3)	(4)
1 Razole	43,109	21,754	21,355
2 Amalapur	39,499	16,363	23,136
3 Rajahmundry ..	39,769	20,658	19,111
4 Ramachandrapur ..	53,481	25,282	28,199
5 Kakinada	38,160	20,739	17,421
6 Peddapur	45,820	27,341	18,479
7 Pittapur	41,495	15,010	26,485
Total ..	301,333	147,147	154,186

ANNUAL ADMINISTRATION REPORT OF THE CROP SAMPLING
SECTION FOR FASLI YEAR 1951-52.

I. SCOPE OF THE WORK.

1-1. This is the Second Report of the Crop Sampling Section after its reconstitution in 1950, under the co-ordinated Scheme of Crop Cutting Experiments on Food Crops. This Scheme which has been planned to work for five years was sanctioned in the first instance for one year from August 1950. The sanction was renewed for the second year in G.O. Ms. No. 2116, Public (Political-B), dated 13th August 1951. The scheme continued to work in the co-ordinated manner as in the previous year, with the Director of Agriculture in administrative control of the Agricultural Officers in the Scheme and the Economic Adviser to Government controlling the Statistical Staff and the technical aspects of the work. The Administrative control by the Director of Agriculture was, in effect, limited to orders regarding leave, transfers, postings, etc., of the Agricultural Staff and account matters in respect of funds provided for the Scheme under "40 (d). Agriculture". For all practical purposes the Economic Adviser, as being in charge of the execution of the Scheme, had complete control over the staff, both Agricultural and Statistical.

1-2. The Crop Sampling Surveys were continued this year, as in the previous one, on the principal Food Crops, viz., Paddy, Chulam, Ragi and Cumbu and on the benefits of the principal Grow More Food Aids, viz., Improved Paddy Seed, Green Manure on Paddy and Fertiliser on Paddy. The Survey in respect of Oil Seeds sanctioned towards the end of the cultivation season for a year in 1950-51 in G.O. Ms. No. 187, Public (Political-B), dated 24th January 1951, could not be taken up then and so was taken up during the year under report. Towards the end of the year Government ordered in G.O. Ms. No. 477, Food and Agriculture, dated 24th March 1952, a Pilot Survey of the Cost of Production of Crops. Work on this last item could not, however, be proceeded within the year under report.

II. STAFF AND ADMINISTRATIVE SET-UP.

2-1. The staff sanctioned for the scheme continued as in 1950-51, except that the post of Lower Division Clerks under the Special District Agricultural Officers was converted to one of Upper Division Clerks with effect from December 1951, based on representations made to Government. The clerical staff provided for working the scheme as originally formulated, was found to be inadequate as the field work—(attended to by subordinates in the Agricultural Department and Revenue Departments—as extra departmental work)—was always in default and often defective and had to be tackled both by frequent inspections and constant issue of reminders and instructions. The situation became even more difficult with the addition of the survey on Oil Seeds. This was explained to Government and additional staff and facilities were proposed. They did not, however, accept this proposal. The work during the year was therefore attended to under a handicap and under extreme of strain.

2-2. I continued as the Special Deputy Director of Agriculture in direct charge of the executive side of the scheme throughout the year while the

technical aspects were in the direct charge of an Assistant Statistical Officer. The two officers were independent and directly responsible for their work to the Economic Adviser.

2-3. The year was marked by some changes among the Special District Agricultural Officers in charge of the regions as below :—

(i) *Kakinada Region*.—(a) In additional charge of the District Agricultural Officer, Kakinada, from the commencement of the year to 25th August 1951, consequent on the promotion and transfer of Sri M. Satyanarayana.

(b) Sri V. Rama Rao from 27th August 1952 to 4th May 1952.

(c) The District Agricultural Officer, Kakinada in additional charge from 5th May to 8th June 1952.

(d) Sri M. Somayya from 9th June 1952 to the end of the year.

(ii) *Vijayawada Region*.—(a) Sri M. Somayya from the commencement of the year to 1st June 1952.

(b) Sri D. Hanumantha Rao from 2nd June to 12th June 1952.

(c) The District Agricultural Officer in additional charge from 13th June 1952 to the end of the year.

(iii) *Madras Region*.—(a) Sri K. Santhanam, from the commencement of the year to 20th May 1952.

(b) Sri J. H. S. Ponnayya from 21st May 1952 to the end of the year.

(iv) *Tanjore Region*.—(a) Sri P. S. Venkatasubramaniam from the commencement of the year to 28th August 1951.

(b) Sri K. Srinivachachari from 29th August to 23rd November 1951.

(c) The additional District Agricultural Officer (Manures), Tanjore in additional charge from 23rd November to 4th December 1951.

(d) Sri P. S. Venkatasubramaniam from 5th December 1951 to the end of the year.

(v) *Coimbatore region*.—(a) Sri K. Raman Menon from the commencement of the year to 31st December 1951.

(b) Sri S. V. Ramachandran from 1st January to 31st March 1952.

(c) Sri K. Raman Menon from 1st April 1952 to the end of the year.

In the other regions, viz., Bellary, Madurai and Kozhikode, there was no change of the Special District Agricultural Officers, Messrs. Mirza Anser Baig, K. V. Natesan and P. P. Syed Mohammed respectively continuing at their respective posts and throughout the year.

2-4. The Office of the Special District Agricultural Officer, Madras, together with his staff of one Lower Division Clerk and two peons formed part of the unit in the headquarters staff and so formed a part of the Economic Adviser's office till the middle of December 1951. With the conversion of the post of the Lower Division Clerk for the Special District Agricultural Officer to one in the Upper Division cadre, his office was separated as an independent unit. As this change was introduced I ceased to be a drawing officer.

2-5. The change of the Special District Agricultural Officers in the five centres resulted in a set-back in the work. It was very pronounced in Kakinada, Vijayavada and Tanjore regions due to the following reasons :—

(i) The region being in the additional charge of another officer who, in his main post, was too over-worked to be able to devote any attention to the specialized work on Crop Sampling that the work suffered severely. (The period of additional charge was nearly three months in Kakinada and 17 days in the year under report in Vijayavada.

(ii) The new incumbents at the post being severely handicapped in the early stages because of the lack of the specialization needed for the work. (This handicap was specially the case in Tanjore region, while the substitute in Coimbatore had previous knowledge of the work and the one at Madras had the advantage of the guidance from the headquarters.)

III. SEASON.

3-1. The year under report proved to be yet another period of disappointment, taken for the state as a whole. The south-west monsoon was weak and the north-east monsoon was highly precarious. The summer following was also very trying and promoted famine conditions in the Central and Ceded districts. But for a spell of heavy down pour in May 1952, the situation might have been aggravated. This being the overall depressive picture, a few parts of the State however experienced very favourable agricultural conditions marked by bumper yields. The monthly rainfall conditions are summarized below :—

1951.

July.—Rainfall was moderate to heavy in the West Coast districts and in Krishna, Anantapur, North Arcot and Tanjore. It was fair to light in the Circars, portions of Ceded districts, Central districts and Southern districts.

August.—Rainfall became lighter in the West Coast, heavier in the Circars and light to moderate in other areas.

September.—The Central districts experienced heavy rainfall, while it was moderate in portions of the Circars, lower Central districts and the Southern regions.

October.—Good rainfall was recorded in the Circars and Southern districts along the East Coast, while it was heavy on the West Coast. Rainfall was poor in Rayalaseema and very light in the other districts.

November.—In Rayalaseema the rainfall continued to be poor this month also, while it was moderate in the Central districts. Heavier rainfall was experienced in the West Coast and Central Tamil Nad, being particularly heavy in Chingleput and South Arcot.

December and January 1952.—The months were practically rainless except for light showers in parts of the Central districts along the East Coast.

1952.

February.—Moderate rainfall was again received in parts of the Southern districts, while Southern Andhradesa and a few Central districts had very light showers in a scattered manner. Other parts of the State were rainless.

March and April.—Rainfall during these months was negligible.

May.—Good rains were received generally all over the State and were particularly heavy in Rayalaseema and northern Coromandel regions.

June.—Rainfall was good only on the West Coast and fair to moderate in portions of Rayalaseema and Central districts. Other areas had such light scattered showers as to be of little practical use.

3-2. This being the distribution of the rainfall, irrigation sources—particularly in the Central districts including Rayalaseema, did not have adequate supplies of water and many wells dried up. As a result the pattern of normal cropping underwent significant changes with a tendency towards an increase of area under millets and a reduction in paddy in the irrigable areas. The increase of area under irrigated millets got balanced by a reduction under rainfed millets and current fallows were on the whole higher than normal. The exact pattern of the altered land utilisation can be studied only after the area figures are completely tabulated. Yields of crops—particularly irrigated ones—were in general good in the Circars and Southern Coastal district.

IV. DETAILS OF WORK DONE.

4-1. The work attempted during the year included the following:—

(a) Crop cutting experiments on paddy, cholam, cumbu and ragi under the Five-Year Co-ordinated Scheme of crop cutting experiments on food crops—Controlled completely by the State Government.

(b) Assessment of the additional production due to the principal Grow More Food Aids on paddy—confined only to the single effects of improved seed, green manure and ammonium sulphate—Planned and controlled by the Indian Council of Agricultural Research but carried out by the State Government.

(c) A state-wide survey of the yield and output of groundnut, financed jointly by the State Government and Central Oil Seeds Committee and technically controlled by the Indian Council of Agricultural Research.

(d) Pilot surveys for the estimation of yield and output of groundnut, gingelly and castor in one district, each, which also were controlled and financed as in the case of the State-wide survey on groundnuts.

4-2. The plan of work and procedural details in respect of the above were formulated jointly by the Deputy Director of Agriculture (Crop Sampling) and the Assistant Statistical Officer (Crop Sampling) under the guidance of the Economic Adviser and in consultation with the Indian Council of Agricultural Research. In doing so, the pattern, as in the previous year, was maintained; but some changes were made so as to suit the local conditions and practical aspects of the work. One important change made was to plan the survey in paddy for three crop periods, separately instead of for two periods as in the previous years. The instructions and the pro formas were also amplified and re-edited so as to minimize the doubts and reporting errors of the field staff.

4-3. The field work was entrusted to the Agricultural Demonstrators and Revenue Inspectors as in the previous year, the former attending to the surveys on Millets and the latter to those on the other categories. This work was also treated as extra-departmental as in the previous year and so the provision for separate remuneration, based on the number of experiments, continued. The Special District Agricultural Officers were given a refresher course at the commencement of the season at a Conference held at Coimbatore during the College Day at the Agricultural College. They, in

turn, trained the field staff afresh in their regions by assembling them in batches at convenient centres. In the course of the year it was found necessary to train the field staff again and again a number of times as there were numerous transfers. These were very frequent among the Revenue Inspectors. In the case of the Agricultural Demonstrators the transfers were mostly to other taluks (also as Agricultural Demonstrators) and so the training given in one centre was not lost. But in the case of Revenue Inspectors the transfers were mostly to and from the ministerial ranks of the offices in the Revenue Department. So the training once given was often lost in the event of a transfer. As in practice it was found impracticable to keep track of these transfers and train the new incumbents soon after they assumed charge in their posts, it was arranged that all Revenue Inspectors be trained in the crop cutting experiments also during their survey training. In this way four hundred and forty-six Revenue Inspectors were trained in sixteen centres. This will it is hoped, facilitate the progress of future surveys.

4-4. The Special District Agricultural Officers in the eight regions devoted all their efforts to getting the field work attended to at the different stages, besides undertaking a check of the accuracy of the field work representatively. In addition, they took up also other *ad hoc* items of work entrusted to them. The work of the Special District Agricultural Officers was supervised by the Deputy Director of Agriculture (Crop Sampling) and the Assistant Statistical Officer (Crop Sampling) intensively and by the Economic Adviser in selected centres. An abstract of the work done by the special staff in this manner is presented in the tabular statement below:—

Region.	Number of days toured.	Number of villages visited.	Number of experiments checked at the different stages including those laid personally.
(1)	(2)	(3)	(4)
Kakinada	174	108	76
Vijayavada	219	118	99
Bellary	213	174	542
Madras	209	178	297
Tanjore	218	190	263
Coimbatore	206	130	193
Madurai	236	208	181
Kozhikode (later Shoranur)	223	130	160
Total ..	1,692	1,236	1,811
Average ..	211½		

As can be seen the Special District Agricultural Officers toured on the average for 211½ days, visiting in all 1,236 villages and checking 1,811 experiments. In addition I toured for 139 days and visited 139 villages in 20 districts and Assistant Statistical Officer toured for 58 days and visited 38 villages in 12 districts.

4-5. The statement below gives, in abstract form, the number of experiments planned and the number completed, by each category :—

Category of experiments.	Number of experiments.		
	Planned.	Completed.	Percentage Completed/Planned.
(1)	(2)	(3)	(4)
1 Cholan—Irrigated	314	116	37
Rainfed	1,622	603	40
2 Cumbu—Irrigated	200	93	47
Rainfed	1,340	549	41
3 Ragi—Irrigated	668	392	59
Rainfed	392	133	34
Total millets (allotted to Revenue Inspectors) ..	4,536	1,946	43
4 Paddy—I period	376	348	87
5 Paddy—II period	1,964	1,823	93
6 Paddy—III period	200	190	95
Total Paddy ..	2,540	2,361	93
7 Groundnut irrigated (pilot survey in South Arcot district).	84	84	100
8 Groundnut irrigated (State wide)	1,430	1,274	89
9 Gingelly (pilot survey in east Godavari district).	162	154	95
10 Castor (pilot survey in Anantapur district).	186	180	97
Total Oil Seeds ..	1,862	1,692	90
Grow More Food aids.			
11 Improved seed	436	365	84
12 Green manure	344	296	86
13 Ammonium sulphate (Pre-manuring) ..	352	275	78
14 Ammonium sulphate (Post-manuring)	352	283	80
Total, Grow More Food aids ..	1,484	1,219	82
Total items 4-14 (allotted to Agricultural Demonstrators).	5,886	5,272	89
Grand total of all experiments.	*10,422	7,218	69

* Excludes 18 experiments on gingelly for which random numbers were not communicated.

4-6. From the above abstract it will be seen that out of 10,440 experiments planned only 7,218 (69 per cent) got completed. The defaults were larger in the experiments on millets (attended to by the Revenue Inspectors)—than in others. This poorer performance by the Revenue Inspectors, as compared to the Agricultural Demonstrators, is in a measure due to their being distracted on work connected with elections and famine relief in some areas, for more than two months at a stretch which coincided with harvest periods. Both of these reasons could, in this way, have affected only the crops which got harvested during December and January 1952. The failures are however quite as common in respect of the crops which got harvested earlier than November 1951, or after February 1952. This feature points therefore irresistibly to a general disinclination on the part of the Revenue Inspectors to attend to this work and to the lenient view taken by the higher Revenue authorities of the resulting neglect. Though several attempts were made to arouse a realization of the seriousness of the defaults, the outcome

by way of results was disappointing and lest there should be any personal unpleasantness the attempts aforesaid could be proceeded with only up to a limit.

Compared to the Revenue Inspectors, the Agricultural demonstrators have done much better work. But for the election work, in which the Agricultural demonstrators also were engaged during January 1952, the results accounted for by them might have been even more satisfactory. The active support given by the controlling officers in the Agricultural department when the tendency on the part of the demonstrators to default was brought to their notice, went a long way in all this.

It will be out of place in this report to go into further details of the multitudinous causes which had contributed to the defaults. One thing however needs mention. With the provision of a fast conveyance enlarged staff and better office equipment, the defaulting proclivities could have been more successfully resisted by timely appeals and more frequent personal approaches to the field staff.

4-7. The progress of experiments in all categories together, by regions, is brought out in the statement below, to serve as an index of the relative merit of work of the concerned Special District Agricultural Officers :—

Region.	Number of experiments		
	Planned.	Completed.	Percentage Completed.
(1)	(2)	(3)	(4)
Kakinada	1,378	899	65
Vijayavada	1,422	1,003	71
Bellary	1,988	1,180	59
Madras	1,218	874	72
Tanjore	1,636	1,222	80
Madurai	1,172	950	81
Coimbatore	1,440	917	64
Kozhikode (later Shoranur)	346	338	98
Total ..	10,440	7,383	71

(NOTE.—The figures in column 3 of the above statement are slightly higher than those in the corresponding column of the statement under paragraph 4-5 above as earlier statement excludes experiments which were defective or those for which the final reports were not received at the headquarters.)

4-8. The highest percentage of experiment completed, with reference to the number allotted, is found in Malabar region as the experiments there were exclusively attended to by the Agricultural Demonstrators and the total for the region was also small compared to other regions. The poorest performance is in Bellary region where the experiments on millets were predominant and the greater predilection for failures of the experiments entrusted to the Revenue Inspectors has already been remarked in paragraph 4-6 above. In Coimbatore also the millets account for a larger number of experiments. This factor, combined with a change of Special District Agricultural Officer for a short period, has caused a set-back in the work. The change of Special District Agricultural Officer has had a more marked effect on the progress in Kakinada region. Having regard to all these factors and other limitations of various kinds, special credit for good performance can be given to Tanjore and Madurai regions.

4-9. The enumeration of the area benefited by the Grow More Food Aids formed a separate sub-survey by itself within the General Survey for the Assessment of the Additional Production due to the Grow More Food Aids, the other part being the crop cutting experiments included under paragraph 4-5 above. This work was planned to be attended to in the villages sampled for the Grow More Food experiments by the Agricultural Demonstrators themselves and in another 376 villages by the Special District Agricultural Officers. The data in respect of each village got recorded in separate schedules (Form III) prescribed. The Agricultural Demonstrators completed 524 out of 764 schedules due while the Special District Agricultural Officers completed 255 out of 376 allotted to them.

4-10. The survey of the cost of production of crops, assigned to the Special District Agricultural Officers in April 1952, had not been taken up as some delay was experienced in the supply of forms and detailed instructions to them.

4-11. *Sample check of Grow More Food wells.*—Towards the close of the fasli year a sample check of the wells constructed under the various subsidy schemes up to the end of the fasli year 1950-51 was undertaken on behalf of the Indian Council of Agricultural Research. For this purpose three Statistical Supervisors from the Indian Council of Agricultural Research and eight Economic Investigators for Industrial Statistics were pressed into service. They went round the taluks, randomly selected by the Indian Council of Agricultural Research, and in each such taluk ten Grow More Food wells were selected randomly. The wells and the area commanded by them ever since construction, were checked and enumerated in a detailed form prescribed by the Indian Council of Agricultural Research. The work was super checked, to the extent possible, by the Economic Adviser and the officers in the Crop Sampling Section. Commencing from March 1952 the three Statistical Supervisors of the Indian Council of Agricultural Research, who worked whole time on the job, completed the wells allotted to them by June 1952. The eight Economic Investigators of this State were on this work in addition to their normal duties. They were therefore able to complete the checking of only 121 wells, out of 240 allotted to them, till the end of June 1952.

V. RESULTS OF THE SURVEYS.

5-1. The compilation and final analysis of the data gathered through the several proformas are yet incomplete. The chief handicap has been the delay in the finalization of area under the crops as per district G. returns and the season and crop report for the State (attended to in other sections of the Economic Adviser's office). These may become available only by the end of December 1952. In the meantime a rough and tentative compilation and analysis has been attempted by the Assistant Statistical Officer (Crop Sampling). These results are not included in this report as, in pursuance of the orders of the Economic Adviser last year, they are to be furnished by him separately.

VI. Copies of the Annual Reports submitted by the Special District Agricultural Officers are appended.

V. SATAGOPAN,

Special Deputy Director of Agriculture (Crop Sampling).

OFFICE OF THE ECONOMIC ADVISER

TO GOVERNMENT,

Madras, 18th September 1952.

ADMINISTRATION REPORT OF THE SEED DEVELOPMENT OFFICER (PADDY), KAKINADA, FOR THE YEAR 1951-52.

I. INTRODUCTION.

The most important of the achievements of the Agricultural Department is the evolution of high yielding improved strains in the various crops and of them the paddy strains occupy a pre-eminent position. They have spread to such a large proportion of the cultivated area under paddy, both by departmental propaganda and by natural spread that the demand for the seed has been very great. The policy of the department till some years ago was to supply the seeds produced on the Agricultural Research Stations to the demonstration staff for multiplication on ryots' lands under seed farm conditions and for further distribution. In the earlier years when the demand was small, this system worked well, but with the need for grow more food and the intensified activity of the department in various aspects of the propaganda, particularly the extension of the area under improved strains, the propaganda staff could not devote that much of attention to this all important aspect of seed multiplication, such that the quality of the seeds produced on the seed farms fell far short of the required standards of purity and viability and complaints about the poor quality of the seed supplied from the agricultural depots were on the increase. The purity of the crops actually cultivated also has fallen low and in a majority of the cases though improved strains were actually cultivated, the crops looked like only mixtures of different varieties due to the continued use of seed containing a lot of impurities. Added to this, the need for augmenting the food resources of the country called forth greater spread of pure seed of improved strains and the consequent demand for larger and still larger quantities of good seeds could not be met by the normal seed farms run by the department. Hence in September 1949 Special Seed Development Staff was sanctioned. This special staff consisted of three Seed Development Officers for paddy with 25 Assistants situated in the different paddy growing centres and two Seed Development Officers with 13 Assistants for work on millets. After gaining some experience, the jurisdiction of the officers was revised in March 1951 and the present sphere of work of the Seed Development Officer (Paddy), Kakinada, is in the six districts of Srikakulam, Visakhapatnam, East Godavari, West Godavari, Krishna and Guntur. The headquarters of the nine Assistants working under him are at Srikakulam for that district; Anaka-East Godavari district; Tanuku and Bhimavaram for the West Godavari district; Vijayavada and Masulipatnam for the Krishna district; and Guntur for the Guntur district.

II. OBJECTS OF THE SEED DEVELOPMENT SCHEME.

2. With the limited areas on the Agricultural Research Stations, the quantity of nucleus seed available for organizing the large areas under seed farms is not sufficient and hence the Seed Development Staff is entrusted with the task of multiplying the nucleus seed produced on the Research Stations on the following basis:—

(i) The seed farms organized by the department are classified as primary and secondary and the Seed Development Staff will be responsible for running the primary seed farms raised from the nucleus seed produced in the Agricultural Research Stations.

(ii) The nucleus seed of the Research stations is handed over to the Seed Development Officer, who distributes it to the various taluks in all the districts under his jurisdiction for arranging the primary seed farms. Only such of the strains as are popular in each district and which are approved for spread in the annual programmes of work for the various districts are multiplied in the primary seed farms of the concerned districts.

(iii) Influential and big landlords in suitable villages, preferably in concentrated areas, are selected in consultation with the district staff as primary seed farm ryots and the nucleus seed is sold to them.

(iv) The sowing of the nurseries with the nucleus seed, the transplanting of the primary seed farms, their thorough roguing, harvesting and careful thrashing of the crop avoiding all chances of admixtures of seeds in the thrashing floors, and the complete drying of the seed to preserve the full vitality of the seed are the responsibilities of the Seed Development Staff.

(v) The seed thus produced in the primary seed farms is made available to the district staff for organizing the secondary seed farms only with that seed.

(vi) The special staff are also responsible for testing the purity and the viability of the seed produced in the secondary seed farms by the district staff.

III. REVIEW OF PREVIOUS WORK OF SCHEME.

3. During 1949-50, a total area of 2,111.74 acres of primary seed farms were organized utilizing the 37½ tons of nucleus seed and from this area a total quantity of 435½ tons of primary seed farm seed was procured. Of this quantity, 92 per cent of the seed had a purity of 98 per cent and over. The seed produced from the secondary seed farms of 1949-50 (for which only the previous seed farm seed was used) was tested and it was found that only 40 per cent of it had the desirable purity of 98 per cent and more. The germination capacity of the seeds from both the primary and secondary seed farms was also good.

4. During 1950-51, 41 tons of nucleus seed was distributed and from the large areas planted, only 1,242.4 acres were taken up for primary seed farms and from this area a total quantity of 9,368 bags of primary seed farm seed was procured and made available to the district staff for organizing secondary seed farms. The seed procured exceeded the target fixed by 7,084 bags and the excess quantity was utilized for general distribution also. It is of significance to find that 67 per cent of this seed had a purity of cent per cent while the remainder was of 99 or 98 per cent pure. The purity of the secondary seed farm seed which was multiplied from the previous year's primary seed farm seed showed remarkable improvement in its quality. Sixty-one per cent of the total quantity procured had a purity range of 98 to 100 per cent. Thirty-six per cent had a purity range between 95 and 97 per cent, while seed having a purity of 94 per cent and less was only three per cent during 1950-51. The corresponding ranges of 1949-50 were 40, 45 and 15 per cent respectively. The viability of the seeds from both the kinds of the seed farms also has been maintained and was always more than 90 per cent.

IV. PROGRESS OF THE SCHEME DURING 1951-52.

5. *Charge.*—The Seed Development Scheme was in my charge throughout the year. There were only three changes in the personnel of the Assistants; two at Srikakulam and one at Anakapalle. All the other Assistants continued to be in charge of the several posts throughout the year without change.

6. *Tours.*—The Seed Development Officer (Paddy), Kakinada; toured in all the six districts during the year for 240 days visiting 250 places working out to an average of 20 days of tour and 21 places of visit per month. The tours of the Assistants were as detailed below and they were for an average number of 20 days of tour and 15 places of visit per month.

Details of tours of the Assistants.

Paddy assistants at	Total number of		Average number per month of	
	Days toured.	Places visited.	Days toured.	Places visited.
(1)	(2)	(3)	(4)	(5)
Srikakulam	223	199	17	16
Anakapalle	215	191	18	16
Kakinada	241	170	20	14
Amalapuram	270	207	22	17
Tanuku	253	188	21	16
Bhimavaram	217	112	18	9
Vijayavada	256	218	22	18
Masulipatnam	265	196	22	16
Guntur	231	147	19	12
Total	2,171	1,628	20	15

7. *Primary seed farms—Targets aimed at.*—The Seed Development Officer and the concerned Assistants have taken part in the conferences convened by the Deputy Director of Agriculture in all the six districts, for chalking out the programme of work for the year 1951-52, more particularly in the matter of fixing the various strains that are cultivated in the different tracts and for which seed farms have to be organized. According to the final programme of work and in consultation with the concerned District Agricultural Officers the targets fixed for the district for organizing paddy seed farms were split up among the various taluks and the taluk target between the areas to be devoted to the various strains to be multiplied both under primary and secondary seed farms. This strainwar and talukwar distribution of the seed farm target was communicated to all the Seed Development and district staff for organizing the seed farms accordingly. The targets of primary seed farms thus fixed for the various districts were as follows:—

Details of targets for primary seed farms of 1951-52.

District.	Paddy assistants at	Targets of primary seed farms.	
		Area in acres.	Number of bags of seed to be procured.
(1)	(2)	(3)	(4)
Srikakulam	Srikakulam	100	400
Visakhapatnam	Anakapalle	80	320
East Godavari	Kakinada	100	600
	Amalapuram	100	600
West Godavari	Tanuku	120	720
	Bhimavaram	120	720
Krishna	Vijayavada	120	720
	Masulipatnam	130	780
Guntur	Guntur	100	800
Total		970	5,660

8. *Nucleus seed distribution.*—Six hundred and forty-one bags equivalent to 52 tons 1,448 pounds of the nucleus seed produced on the Agricultural Research Stations at Anakapalle, Samalkota and Maruteru was distributed by the Seed Development Officer among the various taluks, strictly in accordance with the programme of work. Details of the quantities of nucleus seeds distributed in the areas of the several Paddy Assistants during

1950-51 and in 1951-52, for organizing the primary seed farms of 1951-52 in both the main and second crops, respectively are given in the following table:—

Details of nucleus seed distributed for primary seed farms of 1951-52.

District.	Paddy assistant at	Quantity of nucleus seed supplied in bags.		
		In 1950-51 for first crop, 1951-52.	In 1951-52 for second crop, 1951-52.	Total. TONS. LB.
Srikakulam ..	Srikakulam ..	107	..	7 1,453
Visakhapatnam ..	Anakapalle ..	135	..	9 412
East Godavari ..	Kakinada ..	68	9	5 1,716
	Amalapuram ..	79	20	6 1,953
Total for East Godavari district ..		147	29	12 1,429
West Godavari ..	Tanuku ..	106	24	8 1,757
	Bhimavaram ..	92	3	7 080
Total for West Godavari district ..		198	27	15 1,837
Krishna ..	Vijayavada ..	26	..	1 2,080
	Masulipatnam ..	39	2	3 557
Total for Krishna district ..		65	2	5 397
Guntur ..	Guntur ..	31	..	2 440
Grand total ..		683	58	52 1,488

9. *Primary seed farms organized.*—The nucleus seed available at the Agricultural Research Stations was far in excess of the requirements of the primary seed farms targetted and hence in actual working of the scheme, areas much larger than the targets were organized to primary seed farms and even for secondary seed farms. The actual areas of primary seed farms organized during the main crop and second crop seasons of 1951-52 after attending to the sowing of the nurseries and the transplantation of the crop in the various districts were shown below, aggregating to a total area of 1,901·84 acres which is 931·84 acres in excess of the target.

Areas of primary seed farms organized in 1951-52.

Main and Second crop seasons.

District.	Paddy assistant at	Target in acres.	Area of primary seed farms organized in acres.			Excess over target in acres.
			Main crop.	Second crop.	Total.	
Srikakulam ..	Srikakulam ..	100	197·80	..	197·80	97·80
Visakhapatnam ..	Anakapalle ..	80	173·90	3·00	176·90	96·90
East Godavari ..	Kakinada ..	100	258·50	16·35	274·85	174·85
	Amalapuram ..	100	382·43	21·10	403·53	303·53
Total for East Godavari district ..		200	640·93	37·45	678·38	478·38
West Godavari ..	Tanuku ..	120	171·51	28·49	200·00	80·00
	Bhimavaram ..	120	195·00	12·00	207·00	87·00
Total for West Godavari district ..		240	366·51	40·49	407·00	167·00
Krishna ..	Vijayavada ..	120	146·76	..	146·76	26·76
	Masulipatnam ..	130	154·00	5·00	159·00	29·00
Total for Krishna district ..		250	300·76	5·00	305·76	55·76
Guntur ..	Guntur ..	100	136·00	..	136·00	36·00
Grand total ..		970	1,815·90	85·94	1,901·84	931·84

10. The season was favourable in all the districts during the main crop season and bumper yields were had in all these districts. However, the second crop in the Godavari Delta suffered due to low water level in the river and very low yields were obtained. Roguing in all the primary seed farms was personally attended to by all the Paddy Assistants in time. Harvesting and thrashing of the produce was also supervised by them and all the necessary precautions were taken to avoid inadvertent mixtures on the thrashing floors. Great attention was also paid to the proper and complete drying of the sheaves on the field and also of the grain after thrashing.

11. *Procurement of primary seed farm seed.*—By the end of the year 1951-52, the following quantities of primary seed farm seed were procured by the several Paddy Assistants and the total quantity thus procured amounted to 966 tons 2,197 lb. (12,807 bags) which has exceeded the target by 7,447 bags.

District.	Paddy assistant at	Target in bags.	Primary seed farm seed of both main and second crops procured in 1951-52.			
			Equivalent in bags.		Excess over target in bags.	
			TONS.	LB.		
Srikakulam ..	Srikakulam ..	400	59	1,008	812	412
Visakhapatnam ..	Anakapalle ..	320	29	1,370	402	82
East Godavari ..	Kakinada ..	600	93	1,919	1,266	666
	Amalapuram ..	600	212	2,132	2,874	2,274
Total for East Godavari district ..		1,200	630	1,811	4,140	2,940
West Godavari ..	Tanuku ..	720	116	2,108	1,578	858
	Bhimavaram ..	720	141	1,386	1,911	1,191
Total for West Godavari district ..		1,440	258	1,254	3,489	2,049
Krishna ..	Vijayavada ..	720	102	1,264	1,384	664
	Masulipatnam ..	780	118	450	1,595	815
Total for Krishna district ..		1,500	220	1,714	2,979	1,479
Guntur ..	Guntur ..	800	91	1,760	1,285	485
Grand total ..		5,660	966	2,197	12,807	7,447

12. *Testing of seed for purity.*—Most of the seeds procured from primary and secondary seed farms in 1951-52 were tested by the Seed Development Staff for both purity and viability. An abstract of the results of purity tests of the seed is given below.

Abstract of results of purity tests, 1951-52.

Primary seed farm seed.

Centre of work.	Particulars.	Number of bags of seed having a percentage purity of						Total.
		100	99	98	97	96		
Srikakulam ..	Number of bags of seed having the percentage purity—A. 5	83	529	127	47	26		812
	Percentage of number of bags in each group of A to the total—B.	10	65	16	6	3		100
Anakapalle ..	A.	159	152	71	..	..		382
	B.	42	40	18	..	..		100
Kakinada ..	A.	488	477	117	35	..		1,117
	B.	44	43	10	3	..		100
Amalapuram ..	A.	1,524	1,152	198	..	..		2,874
	B.	53	40	7	..	..		100
Tanuku ..	A.	1,554	..	..	24	..		1,578
	B.	99	..	..	1	..		100
Bhimavaram ..	A.	1,831	66	14	..	..		1,911
	B.	96	3	1	..	..		100
Vijayavada ..	A.	937	331	116	..	..		1,384
	B.	68	24	8	..	..		100
Masulipatnam ..	A.	608	987	..	..	..		1,595
	B.	38	62	..	..	..		100
Guntur ..	A.	461	565	259	..	..		1,285
	B.	36	44	20	..	..		100
Grand total ..	Number of bags of seed having the percentage purity—A.	7,645	4,259	902	106	26		12,938
	Percentage of each group of A to the total—B.	59	33	7	0.8	0.2		100.00

Abstract of results of purity tests 1951-52.

Secondary seed farm seed.

Centre of work.	Particulars.	Number of bags of seed having a percentage purity of								Total.
		100	99	98	97	96	95	94 to 90	85 to 80	
Srikakulam.	Number of bags having the percentage purity—A.	15	24	513	235	68	119	109	..	1,303
	Percentage of number of bags in each group of A to the total—B.	1	19	40	18	5	9	8	..	100
Anakapalle.	A.	9	833	1,139	188	..	61	12	..	2,242
	B.	1	37	51	8	..	3	..	..	100
Kakinada ..	A.	570	216	424	924	..	..	..	..	2,134
	B.	27	10	20	43	..	..	..	..	100
Amalapuram.	A.	130	1,716	1,393	1,68	50	10	..	..	4,983
	B.	3	34	28	3	1	..	..	..	100
Tanuku ..	A.	3,280	2,497	1,14	1,074	..	..	..	..	8,006
	B.	41	31	14	13	..	..	..	..	100
Bhimavaram.	A.	1,952	1,682	2,770	516	271	38	..	..	7,229
	B.	27	23	39	7	3	1	..	..	100
Vijayavada.	A.	622	2,109	2,015	1,299	70	..	..	..	6,115
	B.	10	35	33	21	1	..	..	..	100
Masulipatnam.	A.	96	4,031	2,511	..	..	..	..	..	6,641
	B.	1	60	39	..	..	..	..	..	100
Guntur ..	A.	1,524	4,050	3,43	2,509	850	..	25	..	13,301
	B.	12	30	33	19	6	..	..	..	100
Grand total.	A.	8,198	17,381	16,242	8,429	1,309	228	146	21	51,954
	B.	16	33.3	31	16.3	2.5	0.5	0.35	0.05	100

It is seen from the above table that a total quantity 12,938 bags of primary seed farm seed and 51,954 bags of secondary seed farm seed was tested.

13. The combined purity range of the primary seed farm seeds for all the districts during 1951-52, compared to that of the previous two years is given below.

Purity percentage.	Primary seed farm seed.					
	1949-50.		1950-51.		1951-52.	
	Number of bags having purity percentage stated in column (1).	Per cent of the number of bags of purity percentage shown in column (1) to the total procured.	Number of bags having purity percentage shown in column (1).	Percentage of column (4) to the total.	Number of bags having purity percentage shown in column (1).	Percentage of column (6) to the total.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
PER CENT.						
100	1,471	31.02	6,083	67.2	7,645	59.0
99	1,732	36.53	2,347	25.9	4,259	33.0
98	1,165	24.57	367	4.0	902	7.0
97	195	4.11	159	1.8	106	0.8
96 & less	179	3.77	101	1.1	26	0.2
Total ..	4,742	100.00	9,057	100.0	12,938	100.0

This data shows that (1) there is a progressive increase in the quantities of primary seed farm seed procured from year to year, (2) that seeds having a purity of cent per cent are fifty-nine per cent of the total and that another thirty-three per cent of the seeds had a purity of 99 per cent. Considering the large areas of primary seed farms handled and huge quantities of seed procured, the ultimate purity attained is really good.

14. The combined purity ranges of the secondary seed farm seed for all the districts during 1951-52 compared to similar data of the two previous years is given in the following table:—

Group number.	Purity percentage.	Secondary seed farm seed.					
		1949-50.		1950-51.		1951-52.	
		Number of bags having purity percentage shown in column (2).	Percentage of the number of bags shown in column (3) to the total number of bags procured.	Number of bags having the purity percentage shown in column (2).	Percentage of the number of bags shown in column (5) to the total number of bags procured.	Number of bags having the purity percentage shown in column (2).	Percentage of the number of bags shown in column (7) to the total number of bags procured.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
I	100	626	4.17	4,712	10.2	8,198	16.00
II	99	5,220	35.86	10,442	22.7	17,381	33.30
	98			12,981	28.2	16,242	31.00
Total of II		5,220	35.86	23,423	50.9	33,623	64.30
III	97			10,336	22.4	8,429	16.30
	96	6,775	45.20	4,430	9.7	1,309	2.50
	95			1,777	3.9	228	0.50
Total of III		6,775	45.20	16,573	36.0	9,966	19.30
IV.	94.9 to 90	2,020	13.46	1,270	2.7	146	0.35
V.	89.9 to 85.0	145	0.96	89	0.2	21	0.05
VI.	84.9 and less	53	0.35	Nil	Nil	Nil	Nil
Grand total ..		14,839	100.00	46,067	100.00	51,954	100.00

Here again it is seen that (1) there is a progressive increase in the quality of secondary seed farm seed procured from year to year and (2) sixteen per cent and 64 per cent of the total production of secondary seed farm seed of 1951-52 had a purity of cent per cent (Group I) and 99 or 98 per cent (Group II), respectively, as against the corresponding figures in 1949-50 and 1950-51 of 4 and 10 per cent of Group I and 36 and 51 of Group II. From this it is gratifying to note that the proportion of seeds having greater purity is increasing year by year, consequent on the progressive efforts of the Seed Development Scheme showing thereby that there is need for continuing the efforts of the special Seed Development Staff to further increase the standard of purity of the seed distributed by the Department and to maintain the standard it has already achieved without once again allowing that standard to deteriorate.

15. *Testing of seed for viability.*—All the seed tested for purity has also been tested for its germination capacity and an abstract of the results of viability is presented in the following table.

Abstract of results of viability tests.

Primary seed farm seed						
Number of bags of paddy seed with germination range of						
Centre of work.	Particulars.	100 per cent to 95 per cent.	94 per cent to 90 per cent.	89 per cent to 85 per cent.	84 per cent to 80 per cent.	Total.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Srikakulam ..	{ A. .. B. ..	..	..	..	..	..
Anakapalle ..	{ A. .. B. ..	192	92	20	54	358
Kakinada ..	{ A. .. B. ..	758	149	40	170	1,117
Amalapuram ..	{ A. .. B. ..	1,831	853	190	..	2,874
Tanuku ..	{ A. .. B. ..	945	611	..	22	1,578
Bhimavaram ..	{ A. .. B. ..	1,834	15	50	12	1,911
Vijayavada ..	{ A. .. B. ..	954	365	65	..	1,384
Masulipatnam ..	{ A. .. B. ..	1,595	..	..	..	1,595
Guntur ..	{ A. .. B. ..	1,285	..	..	..	1,285
Grand total ..	{ A .. B ..	9,394	2,085	365	258	12,102
		77.7	17.3	3	2	100

NOTE.—A = Number of bags having the viability range shown in columns (3) to (6).
B = Percentage of the number of bags shown in columns (3) to (6) to the total procured [column (7)].

Abstract of results of viability tests—cont.

Secondary seed farm seed 1951-52						
Number of bags of seed with germination range of						
Centre of work.	Particulars.	100 per cent to 95 per cent.	94 per cent to 90 per cent.	89 per cent to 85 per cent.	84 per cent to 80 per cent.	Total.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Srikakulam ..	{ A. .. B. ..	..	..	..	..	..
Anakapalle ..	{ A. .. B. ..	1,099	978	92	..	2,169
Kakinada ..	{ A. .. B. ..	1,107	629	198	200	2,134
Amalapuram ..	{ A. .. B. ..	2,152	2,414	257	160	4,983
Tanuku ..	{ A. .. B. ..	3,956	2,712	650	688	8,006
Bhimavaram ..	{ A. .. B. ..	3,524	1,687	1,628	390	7,229
Vijayavada ..	{ A. .. B. ..	4,543	1,468	104	..	6,115
Masulipatam ..	{ A. .. B. ..	6,641	..	..	..	6,641
Guntur ..	{ A. .. B. ..	13,301	..	..	..	13,301
Grand total ..	{ A .. B ..	36,323	9,888	2,929	1,438	50,578
		72	19	6	3	100

NOTE.—A=Number of bags having the viability range shown in columns (3) to (6).
B=Percentage of the number of bags shown in columns (3) to (6) to the total procured (column 7).

From the above two tables it is seen that 95 and 91 per cent of the total production of primary and secondary seed farms respectively are having a germination capacity of 90 per cent and more which also is a good achievement and must not be allowed to go down once again.

16. The comparative viability data of the primary and secondary seed farm seed during the three-year period of the currency of the Seed Development Scheme is presented below.

The comparative viability data.

Season.	Percentage of number of bags of seed having a viability percentage range of						Total.
	100 to 95.	94 to 90.	89 to 85.	84 to 80.	79 and less.		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	
Primary seed farm seed.							
1949-50 ..	38.5	42.9	15.2	2.7	0.7	100.0	
1950-51 ..	71.5	24.9	3.6	..	..	100.0	
1951-52 ..	77.7	17.3	3.0	2.0	..	100.0	
Secondary seed farm seed.							
1949-50 ..	45.4	41.4	10.2	1.9	1.1	100.0	
1950-51 ..	54.7	34.6	8.8	1.9	..	100.0	
1951-52 ..	72.0	19.0	6.0	3.0	..	100.0	

From this it is seen that the proportion of quantities of seed having the greater viability ranges of 90 per cent and over is on the increase from year to year. There have been absolutely no complaints of either bad quality or bad germination from any quarter during the year under report.

V. PROCUREMENT OF SEED FOR SUPPLY TO DEFICIT DISTRICTS.

17. During the year 1951-52, the monsoons were a failure in most of the Southern, Central and Ceded districts and failure of crops over vast regions was experienced. Even seed for the next crop in those areas has to be obtained from outside and to meet that contingency, larger areas of seed farms were organized in some of the cosmopolitan strains like MTU. 3, MTU. 9, MTU. 15, GEB. 24 and also in other more common strains of MTU. 1, MTU. 19, SLO. 16 and SR. 26 B., and the following quantities of seed were procured and despatched to the deficit districts by the combined efforts of the Seed Development and District Staff:—

District from which seed is despatched.	Strain number.	Quantity in bags.
Srikakulam	BAM. 3	173
Visakhapatnam ..	SR. 26B	52
East Godavari	GEB. 24, MTU. 3, MTU. 9, MTU. 15, SLO. 16 and M.T.U. 1	333
West Godavari	GEB. 24, MTU. 3, 15, 17 and 19	2,378
Krishna	GEB. 24, MTU. 19 and SR 26 B	4,641
Guntur	MTU. 19	4,500
	Total	12,077 or 862 tons.

All the above seed was tested prior to purchase for purity and germination by the Seed Development Assistants.

VI. WORK FOR 1952-53 SEASON.

18. With a view to cover at least a quarter of the total area cultivated with paddy under assured water-supply with improved seed as per the suggestion of the Government of India, the Director of Agriculture, in his Memo. No. E. E. 2-347/52, dated 12th April 1952, initiated the ten-year programme of multiplication of improved paddy strains in special primary seed farms in ten districts. Further instructions were also given that these special primary seed farms are in addition to the usual area of secondary seed farms and targets were fixed for secondary seed farms under the five-year plan and for the special primary seed farms under the ten-year programme that are to be organized in 1952-53. The targets fixed for the areas of secondary and special primary seed farms and the quantities of the seed to be procured therefrom are shown below:—

Targets of seed farms for 1952-53 season.

District.	Target for 1952-53 under the five-year plan.			Additional area of special primary seed farms to be raised in 1952-53.	
	Area of secondary seed farms to be raised.	Quantity of primary seed farm seed required in bags.	Quantity of secondary seed farm seed to be purchased in 1952-53 for distribution in 1953-54.	Area of special primary seed farms on an enlarged scale to be raised with nucleus seed.	Quantity of seed to be purchased from special primary seed farms in 1952-53 for secondary seed farms of 1953-54.
	(1) ACS.	(2) BAGS.	(3) BAGS.	(4) ACS.	(5) BAGS.
Srikakulam	1,050	263	4,200	..	..
Visakhapatnam ..	840	210	3,260	..	..
East Godavari	2,330	583	14,000	1,000	5,000
West Godavari	2,330	583	14,000	1,100	5,500
Krishna	2,100	525	12,600	1,000	5,000
Guntur	2,015	504	16,120	600	3,000
Total	10,665	2,669	64,180	3,700	18,500

It will be seen from paragraph 11, that quantities of primary seed farm seed, far in excess of the seed requirements for the secondary seed farms (column 3) have been procured during 1951-52, and made available to the district staff.

19. In regard to the organization of the special primary seed farms in the four districts of East and West Godavari, Krishna and Guntur and the normal primary seed farms under the five-year scheme in the districts of Srikakulam and Visakhapatnam, nucleus seeds available at the research stations, Anakapalle, Samalkot and Maruteru were distributed during 1951-52 and the quantities of seed distributed is shown below. This distribution is based on the programmes of work in the various districts and the strains distributed are strictly confined to those that are approved in them:—

Nucleus seed distributed in 1951-52 for ordinary and special primary seed farms of 1952-53.

Centre of work of the Seed Development Assistant.	Quantity of nucleus seed supplied.			Approximate area that can be planted under primary seed farms (acres).	Remarks.
	(1)	(2)	(3)		
	TONS.	LB.	BAGS.	ACS.	
Srikakulam	6	1,071	90	270	For primary seed farms of Five-Year Plan.
Visakhapatnam ..	10	1,861	151	453	
East Godavari—					For special primary seed farms of ten-year programme.
Kakinada	8	630	116	567	
Amalapuram	3	1,806	53	266	
Total	12	196	169	833	
West Godavari—					For special primary seed farms of ten-year programme.
Tanuku	4	944	60	311	
Bhimavaram	4	1,490	63	328	
Total	9	194	123	639	
Krishna—					For special primary seed farms of ten-year programme.
Vijayavada	3	552	44	280	
Masulipantam	3	1,411	49	270	
Total	6	1,963	93	560	
Guntur	6	748	88	684	For special primary seed farms of ten-year programme.
					For ordinary and special primary seed farms.
[Grand total ..	51	1,553	714	3,439	

Seed beds with the above seeds were sown in May and June 1952 and transplantation of the 1952-53 crop is in progress. From column 3 of the table above it will be seen that in the three districts of East and West Godavari and Krishna, the area of seed farms that can be organized, utilising the seed most economically falls short of the target fixed for the special primary seed farms but, by procuring the seed, later on, from these special Primary Seed Farms at quantities slightly in excess of the targetted quantity of 5 bags per acre, which is easily possible, the targetted quantity of primary seed farm seed can be procured for organizing the secondary seed farms of 1953-54 without any shortage of seed.

20. *Propaganda—Green manure work.*—All the Paddy Assistants helped the District staff in doing propaganda about the planting of green manure crops on field bunds particularly Sesbania and Glyricidia. They have also planted in most of the primary seed farms Sesbania and Glyricidia during 1951-52 and have sown seed beds of Sesbania for planting along field bunds of 1952-53 primary seed farms.

VII. PROGRAMME OF WORK FOR 1952-53 SEASON.

21. The programme of work for the next season is detailed below :—

- (i) Further distribution of nucleus seed from the Research Stations.
- (ii) Sowing late nurseries of main crop with nucleus seed.
- (iii) Attending to the transplanting of the ordinary and special primary seed farms.
- (iv) Carrying out the roguing operations in the primary seed farms.
- (v) Attending to the harvesting of crop and proper drying of the sheaves before thrashing.
- (vi) Attending to the proper thrashing of the harvested crop, drying of the seed and procurement of primary seed farm seed.
- (vii) Distribution of primary seed farm seed to the district staff for organizing the secondary seed farms of 1953-54.
- (viii) Generally helping the district staff in the matter of roguing of secondary seed farms.
- (ix) Testing of primary and secondary seed farm seed for purity.
- (x) Testing of primary and secondary seed farm seed for viability.
- (xi) Doing propaganda in the matter of extension of green manure campaign and planting Sesbania and Glyricidia on the primary seed farm areas.
- (xii) Adopting all the improvements advocated by the department in the primary seed farm areas.

A short summary of the report is appended.

KAKINADA,
10th August 1952.

K. B. VISWANADHAM,
Seed Development Officer.

APPENDIX.

Summary of the Administration Report of the Seed Development Officer (Paddy), Kakinada, for 1951-52.

Special staff for Seed Development work was sanctioned in September 1949 and is continued during 1951-52 and during 1952-53. The Seed Development Officer, Kakinada, has distributed during 1950-51 for main crop of 1951-52 and in 1951-52, for its second crop a total quantity of 52 tons 1,488 lb. of nucleus seed. Sowing of the necessary seed beds, and the transplantation of the crops, their complete roguing, careful harvesting, drying of the sheaves and careful stacking and thrashing, avoiding all chances of admixtures of seed and proper drying of seeds to preserve the full vitality of seeds were attended to personally by the special staff in most of the cases. With the nucleus seed supplied, primary seed farms over an area of 1,815.9 acres in the main crop season and 85.94 acres in the second crop

season were organised. From these seed farms a total quantity of 966 tons 2,197 lb. equivalent to 12,807 bags of seed were procured and made available to the district staff for the secondary seed farms of 1952-53. This quantity exceeded the target fixed by 7,447 bags. The seed procured from the primary and secondary seed farms was tested for its purity and viability. The data of seed testing has shown that, among primary seed farm seed, seeds having a purity of cent per cent are 59 per cent of the total and that 33 per cent of the seeds had a purity of 99 per cent. In the matter of the secondary seed farm seed, 16 per cent and 64 per cent of the total production of 1951-52 had a purity of cent per cent and 99 or 98 per cent respectively as against the corresponding figures of 4 and 10 per cent of the cent per cent group and 36 and 51 per cent of the next group in the years 1949-50 and 1950-51 respectively. It is gratifying to note that as a result of the Seed Development Scheme the proportion of the seeds having greater purity is increasing year after year showing thereby that there is need for continuing the efforts of the special staff to further increase the standard of purity and to maintain the standards already achieved without once again allowing them to deteriorate. The viability of both the primary and secondary seed farm seeds was tested and 95 and 91 per cent of the total production of primary and secondary seed farm seed respectively are having a germination capacity of 90 per cent and more, which also is a good achievement, and must not be allowed to go down once again. A total quantity of 862 tons of seed (12,077 bags) was sent from surplus districts to meet the shortage of seed in the drought-affected districts elsewhere in the State. The special primary seed farm scheme of the ten-year programme is organised and nucleus seed to the extent of 52 tons is distributed in 1951-52 for organising about 3,439 acres of primary seed farms in 1952-53. The special staff have also taken an active part in the propagation of the planting of Sesbania and Glyricidia on the primary seed farms and other paddy areas also.

ANNUAL ADMINISTRATION REPORT OF SEED DEVELOPMENT OFFICER (PADDY), VELLORE, FOR THE YEAR 1951-52.

I submit my Annual Administration Report for the fasli year 1951-52.

2. *The Scheme and its Object.*—The Paddy Seed Development Scheme was first sanctioned for one year in September 1949. It was then extended till 31st March 1951. The continuance of the scheme for one more year for 1951-52 was sanctioned in G.O. No. 87, Food and Agriculture (Food Production), dated 5th March 1951. This is the third year of its working.

The object of the scheme is to develop and produce quality seeds of good purity and viability of the various paddy strains, and distribute them to ryots on a large scale in order to increase the over-all output of paddy of which Madras State is found to be in deficit. This forms, therefore, one of the major items of the Five-Year Plan of the Grow More Food Campaign, contributing to an increased production of about 43,710 tons of rice.

The scheme in Vellore division was run by a special staff consisting of one Seed Development Officer with headquarters at Vellore and five Seed Development Assistants, one in charge of each of the five districts, Salem, North Arcot, South Arcot, Chingleput and Nellore. The Assistants were each given a messenger to help them. The duties of the special staff centred round getting nucleus paddy seeds from Research Stations, raising Primary Seed Farms, roguing and maintaining the purity of the crop, testing the seeds, procuring them and handing them over to the district staff for raising Secondary Seed Farms. They were also made responsible for examining and testing the seeds procured by the district staff from Secondary Seed Farms.

3. *Charge.*—I continued to be in charge of the scheme throughout the year.

4. *Staff.*—There were very few changes in the personnel of the staff. Messrs. Balasubramaniam and Pandurangan were in charge of North Arcot and South Arcot districts, respectively, throughout the year. Sri K. Ambikacharan went on long leave from 5th December 1951 to the end of the period and his place was taken by Sri V. Lakshmanan, Seed Development Assistant, Salem, who in turn was succeeded by Sri N. Ramachandran. Sri Ramalingam, Seed Development Assistant, Nellore, was transferred and Sri K. Rangasamy was posted in his place from 8th September 1951. Appendices A and A-1 give the sanctioned strength of the staff and the periods during which several Seed Development Assistants were on duty.

5. *Season and its effects on crops.*—The distribution of rainfall is given in Appendix B. The year was very bad in all the five districts and was worse than last year in Nellore and Salem. The rainfall was far below the average and were received late in the year. The tanks were all empty, and the wells went dry, and there was dearthness everywhere even for drinking purposes. Even in the deltaic tract of Nellore, most of the tanks had received only partial supply and large areas had either to be abandoned or grazed to cattle. The north-east monsoon was a failure throughout except in South Arcot and the absence of rains from November to April in all districts except Salem reduced the acreage in the Navarai season. There was however a slight relief when good showers were received in May, and most of the tanks in Chingleput and Nellore districts got filled up. Salem, North Arcot and South Arcot also had their share of these rains, but only to a slight extent. These rains would however be useful to the Swarnavari and Samba crop of the next season only.

Fortunately there were no major pests or diseases except jassid attack in Salem which was immediately controlled by dusting with 5 per cent DDT and an area of about 410 acres was saved thereby. The other minor pests were stem-borer scotinophora bugs, and case-worm. There was no disease practically and blast was markedly absent. Precautionary measures were taken against foot-rot by treating all paddy seeds with agrosan before issue.

Failure of the season in continued succession for the last four years especially in North Arcot, South Arcot, Salem and Chingleput had a very depressing effect on paddy cultivation, and all efforts to step up production were thwarted. The area was reduced and the yield was cut down by 25 to 30 per cent in Nellore and South Arcot districts, and from 30 to 40 per cent in Salem, North Arcot and Chingleput districts.

6. *Agricultural Research.*—No research was conducted under the scheme.

7. *Agricultural propaganda.*—I toured for 266 days in the year with an average of 22.2 days per month, and visited 43 taluks and 311 villages in all. The five Seed Development Assistants toured for 1,083 days with an average of 18 days per head per month, visited 43 taluks and 1,000 villages and contacted 2,263 ryots. In addition to the paddy seed development work, they did propaganda on improved paddy varieties and their cultivation, improved nursery, roguing optimum dose of manuring with special reference to green manures, and the planting of Sesbania and Gliricidia, on a large scale. Special stress was also laid on the proper selection and preservation of their own seeds to make each holding self-sufficient.

8. *The Paddy Seed Development Work—Primary Seed Farms.*—Targets for Paddy Seed Farms for each district were fixed by the Director of Agriculture in his E-2-914/50, dated 11th January 1951. These were divided into Primary Seed Farm and Secondary Seed Farm in an approximate proportion of 1 : 20, on the presumption, that seeds procured in one acre of Primary Seed Farm will be sufficient to cover twenty acres of Secondary Seed Farm. Both were split talukwise and strainwise according to the popularity and spread of each strain, and targets were fixed for each taluk and for each strain in a taluk. The details are given in Appendix C.

(i) *Area.*—The total targets fixed for Primary Seed Farm, the area raised and the quantity of seeds procured are given in Statement I below. Strainwise figures are given in Appendix C.

STATEMENT I—Primary Seed Farm Paddy—1951-52—Progress of work.
Vellore Division.

Serial number. (1)	District. (2)	Quantity of nucleus seeds obtained from agricul- tural Research Stations and Crop Specialist. (3)	Area of Primary Seed Farm (4)		Quantity of seeds produced and handed over to Agricultural Demonstrators. (5)		Area of Primary Seed Farm rogued. (6)
			TONS. LB.	TARGET. ACS.	ATTAINED. ACS.	TARGET. TONS. LB.		ATTAINED. TONS. LB.
1	Salem ..	3 780	100	111.75	42 1,920	9 260	98.00
2	North Arcot ..	22 537	150	236.04	64 640	30 1,757	161.39
3	South Arcot ..	6 2,225	120	176.22	51 960	56 994	176.22
4	Chingleput ..	3 2,091	120	132.34	42 1,920	20 357	132.34
5	Nellore ..	3 1,456	140	171.22	60 0,000	132 640	164.72
Total ..		40 360	630	830.57	261 960	248 1768	752.67
In bags of 160 lb. ..		..	..	..	3,660	3,483	..

40 tons 369 lb. of pure nucleus paddy seeds of various strains were received from the several research stations for raising the Primary Seed Farm area.

Against a total target of 630 acres, 830.57 acres were raised, thereby over-reaching the target by 31.8 per cent.

The area raised in each district was more than the target but, strain-war targets could not be achieved (vide Appendix C) as nucleus seeds under certain strains could not be obtained in sufficient quantity. In some cases, due to complete drought, some of the strains failed.

(ii) *Procurement*.—Procurement was however low in all the districts except South Arcot and Nellore. It was far below the target in Salem, fair in Chingleput, better in North Arcot and best in South Arcot and Nellore districts. The two being self-sufficient and surplus districts, they easily exceeded the target by nearly 97 and 120 per cent respectively. The total attainment for the division was 248 tons 1,768 lb. or 3,483 bags of 160 lb. against 2,308.5 bags procured last year. This works out to 95.2 per cent of the target and the quantity will be sufficient to cover 13,932 acres of Secondary Seed Farm next season.

Continuous failure of the season for the last four years, and prevalence of high black-market rate were the main causes that contributed to the low procurement in the deficit districts of North Arcot, Chingleput and Salem. Procurement by exchange was resorted to but only with partial success. Considering the conditions that prevailed, procurement of 841 bags of good Primary Seed Farm seeds from these three districts should be considered as a great achievement.

(iii) *Roguing*.—In order to maintain the purity of the crop and the seed, the seed farm areas were rogued both at the time of flowering and before thrashing. To help this process, roguing lines were formed wherever possible in about 290 acres. These roguing lines of 9 inches broad divided the field into strips of 9 feet to 10 feet broad and greatly facilitated not only roguing but also operations like planting, weeding, spraying and manuring, with the least disturbance to the crop. They promoted better aeration and even reported to reduce rat damage.

(iv) *Quality of seeds*.—The paddy seeds produced in both Primary Seed Farm and Secondary Seed Farm were tested for germination and purity before and after procurement. Seeds of less than 97 per cent germination and 98 per cent purity for Primary Seed Farm seeds and less than 95 per cent germination and 97 per cent purity for Secondary Seed Farm seeds were rejected. Those with more than three per cent chaff and immature grains were recommended for drying and further cleaning before issue. The godowns of all the Agricultural Demonstrators in the division were inspected by both the Seed Development Officer and Seed Development Assistants periodically and necessary instructions were issued for proper labelling of the bags and preserving the seeds from insect attack. Periodical sampling of seeds once in two months was also done for some of the samples to see whether there was any deterioration in quality.

Statement II below furnishes the number of paddy samples and quantity of seeds analysed by the staff during the year.

STATEMENT II.—Analysis of paddy samples for viability and purity.

District.	Number of samples analysed.		Number of bags of seeds of (160 lb.) examined.
	For viability.	For purity.	
Salem	295	306	1,662
North Arcot	453	412	7,317
South Arcot	598	635	4,389
Chingleput	179	158	7,998
Nellore	716	697	40,814
Total	2,241	2,207	62,180

It will be seen from the above that 2,241 paddy samples representing 62,180 bags of seeds were tested for viability and 2,208 samples for purity against 803 samples representing 24,629 bags for viability and 999 samples for purity tested last year, thereby showing an increase in the volume of work by 179 per cent.

(a) *Purity*.—The range of purity of the Primary Seed Farm and Secondary Seed Farm seeds procured during the year was as follows:—

STATEMENT II-A.—Range of Purity.

Purity percentage.	Number of samples			Number of bags. (160 lb.)		
	Primary seed farm.	Secondary seed farm.	Non-seed farm.	Primary seed farm.	Secondary seed farm.	Non-seed farm.
PER CENT.						
100	76	25	7	203	265	10
99	146	360	166	2,745	5,741	1,093
98	48	295	230	242	5,880	18,670
97	38	152	147	318	18,877	18,687
96	1	63	69	4	415	1,085
95	1	176	64	2	1,557	1,649
94 to 90	..	35	59	..	139	155
Below 90	..	20	30	..	1,140	398
Total ..	310	1,126	772	3,514	34,014	24,652

STATEMENT II-B.—Purity.

Percentage of number of samples of different purity to total.

Purity percentage.	Percentage of number of samples to total.			Percentage of number of bags to total.		
	Primary seed farm.	Secondary seed farm.	Non-seed farm.	Primary seed farm.	Secondary seed farm.	Non-seed farm.
100	24.5	2.2	0.9	5.8	0.8	0.0
99	47.1	21.8	21.5	78.1	16.9	4.5
98	15.5	26.2	29.8	6.9	17.3	75.8
97	12.3	13.5	19.0	9.0	55.5	6.4
96	0.3	5.7	8.9	0.1	1.2	4.4
95	0.3	15.6	8.3	0.1	4.6	6.7
94 to 90	..	3.2	7.7	..	0.4	0.6
Below 90	..	1.8	4.9	..	3.3	1.6

It will be seen from Statement II-B that more than 87 per cent of Primary Seed Farm seed samples have a percentage of purity of 98 per cent and above as compared with Secondary Seed Farm seeds of which only 60.2 per cent are above this range. The non-seed farm seeds have a still lower number. The percentage number of samples of 96 per cent and less is less than one per cent in Primary Seed Farm, while it is 26.3 per cent in Secondary Seed Farm seeds and 29.8 in non-seed farm seeds. Even when the number of bags representing the above samples are compared, it is seen that, in Primary Seed Farm seed, 90.8 per cent is above 98 per cent purity. It is clear from the above that maximum purity can be attained only by multiplying nucleus seeds in Primary Seed Farms and that there is gradual deterioration as it passes on to the Secondary Seed Farm and thence to non-seed farm stage.

(b) *Viability*.—The range of viability and the percentage of samples of different viability to total are given in Statements II-C and II-D below :—

STATEMENT II-C.—Range of viability.

Germination percentage.	Percentage number of samples.			Percentage number of bags of 160 lb.		
	Primary seed farm.	Secondary seed farm.	Non-seed farm.	Primary seed farm.	Secondary seed farm.	Non-seed farm.
100	38	13	..	317	129	..
99	155	278	130	2,513	3,459	1,105
98	77	215	148	406	8,044	18,449
97	40	143	278	281	6,219	1,715
96	10	70	116	74	5,339	1,115
95	5	55	50	14	8,230	957
94 to 90	..	61	81	..	627	183
Below 90	8	218	52	6	2,149	849
Total	333	1,053	855	3,611	34,196	24,372

STATEMENT II-D.—Percentage of samples of different viability to total.

Germination percentage.	Percentage of number of samples to total.			Percentage number of bags to total.		
	Primary seed farm.	Secondary seed farm.	Non-seed farm.	Primary seed farm.	Secondary seed farm.	Non-seed farm.
100	11.4	1.2	..	8.7	0.4	..
99	46.5	26.4	15.2	69.6	10.1	4.5
98	23.1	20.4	17.3	11.3	23.2	75.7
97	12.0	13.6	32.5	7.7	18.2	7.0
96	13.0	6.7	13.6	2.1	15.5	4.6
95	1.6	5.2	5.8	0.4	24.6	3.9
94 to 90	..	5.8	9.5	..	1.8	0.8
Below 90	2.4	21.7	6.1	0.2	6.2	3.5

It will be seen from Statement II-D that 93 per cent of the samples were above 96 per cent germination in Primary Seed Farm while it was 61.6 per cent in Secondary Seed Farm and 65 per cent in non-seed farm. The number of samples of 96 per cent and below were 7 per cent in Primary Seed Farm, 39.4 per cent in Secondary Seed Farm, 35 per cent in non-seed farm. The same trend is seen even when the number of bags of different viability are compared. It is clear that Primary Seed Farm seeds produced out of nucleus seeds have more viability than Secondary Seed Farm or non-seed farm seeds.

Out of 2,208 samples representing 62,180 bags of seeds, 556 samples representing 7,262 bags were rejected for low purity. Again, out of 2,241 samples, representing 62,173 bags, 435 samples representing 3,802 bags were rejected for low viability. It was gratifying to note that after the introduction of the scheme, the quality of paddy seeds had greatly improved and there was a general appreciation from the public.

9. *Procurement and transfer to other districts*.—The total targets fixed for procurement of paddy seeds for Vellore division under Secondary Seed Farm was 60,810 bags. Due to failure of season, large areas failed to produce anything; and due to prevalence of a higher price outside, very many seed farm ryots avoided supply of seeds to the department. Consequently procurement was far below the target in all the districts except Nellore, and recourse had to be taken to procure seeds from non-seed farm areas also. These areas were visited and rogued by Seed Development Assistants, and after roguing, necessary certificate was issued by them to the Agricultural Demonstrators

regarding their purity. The seeds were also tested for viability and purity before procurement. Arrangements were also made to get seeds from the surplus districts to make up the deficit.

The quantities of paddy seeds thus obtained are given below :—

STATEMENT III.—Quantities of Paddy seeds obtained from non-seed farm and outside districts.
(Bags of 160 lb.)

District.	From non-seed farm.	From outside districts.
Salem	43	3,652
North Arcot	544	3,476
South Arcot	82	3,623
Chingleput	3	5,598
Nellore	26,661	1,675
Total	27,333	24,024

Nellore district procured the maximum quantity of seeds from non-seed farm areas which were mostly BCP.1 and BCP.2 varieties and supplied them to the districts of Chittoor, Cuddapah, Anantapur and Guntur. It also arranged to procure and supply GEB. 24 seeds to the above districts in addition to Chingleput and Bellary. The total quantity supplied by Nellore to other districts was 13,192 bags.

10. *Green manure work*.—The following paddy seed-farm areas were planted by Seed Development Assistants with Sesbania and Gliricidia.

STATEMENT IV.—Green manure work—1951-52.

District.	Area planted with Sesbania.	Area planted with Gliricidia.	Area planted with Sesbania and Gliricidia.	Quantity of Sesbania seeds collected.
	(ACS.)	(ACS.)	(ACRES.)	LB.
Salem	6.50	1.25	1.50	8
North Arcot	40.00	16.00	6.00	..
South Arcot	60.90	35.50	35.75	29
Chingleput	54.75	20.00	4.00	6
Nellore	123.50	20.00	..	..
Total	285.65	92.75	47.25	42

11. *Difficulties met with in running the scheme and suggestions for improvements*.—(i) The seed farms are at present run in ryots fields. Due to failure of season, and water-supply, large areas failed. Hence procurement of seeds was low.

(ii) Due to high market rate outside, the targetted quantity could not be procured in spite of paying a premium of 25 per cent over control rate.

(iii) The seed farm indenture is only a gentleman's agreement and the ryots could not be enforced by law to surrender the quantity agreed to.

(iv) For want of pucca godowns and drying floors, great difficulty was felt in giving the seeds periodical drying and storing them from rat and insect damage.

(v) The Seed Development Assistants have no adequate staff to help them in their work which is distributed throughout the district. Close supervision and inspection was not therefore possible and quality, and quantity of work were therefore a bit affected.

The remedies suggested are.—(i) State seed-farms may be run by the Government in lands taken on long lease from big land holders, temples and mutts.

(ii) The Agricultural Demonstrator's depot may be provided with rat-proof godowns and concrete drying floors.

(iii) Maistries may be appointed at one for every 75 to 100 acres of primary seed-farm to work under Seed Development Assistants.

(iv) The whole paddy seed multiplication scheme, viz., both primary seed-farm and secondary seed-farm may be run by the special staff instead of partly by the Seed Development Assistants and partly by the Agricultural Demonstrators as is being done at present.

(v) Better transport facilities may be provided to each Agricultural Demonstrator not only to procure seeds from several villages but also to distribute the improved varieties to remote corners, so that the whole district including the interior villages may be covered. Provision of a jeep (with trailer attachment) to each Agricultural Demonstrator will greatly facilitate the work.

(vi) A higher rate of premium, say 5 per cent more, may be offered to primary seed-farm seeds than to secondary seed-farm, as a higher level of purity and viability is expected to be maintained in the former.

12. Outstanding achievements of the scheme.—The Paddy Seed Development Scheme is being worked from September 1949 and this is the third year of its working. The Vellore division consists of five districts, viz., Salem, North Arcot, South Arcot, Chingleput and Nellore and each district is under the charge of a Seed Development Assistant. The whole work is being supervised by a Seed Development Officer with headquarters at Vellore.

The special staff toured for 1,349 days, visited 43 taluks and 1,311 villages, distributed over five districts. They arranged for raising primary seed-farm, rogue the area, and procure paddy seeds of high quality. They tested the secondary seed-farm and non-seed farm seeds also procured by the Agricultural Demonstrators, and reported about their viability and purity. They inspected non-seed farm areas and certified for their purity before procurement. They thus maintained the quality of paddy seeds distributed to ryots at a very high level. In addition, they did propaganda on all improvements connected with paddy including green-manuring.

The progress of work during 1951-52 is as follows:—

	Target.	Attained.
1 Primary seed-farm area raised (acres)	630	830.57
2 Area rogued	..	752.67
3 Quantity of seeds procured from primary seed-farm (bags of 160 lb.).	3,660	3,483.00
4 Secondary seed-farm area expected to be covered by item 2 above.	..	13,932.00
5 Quantity of seeds arranged for supply to outside districts.	..	13,192
6 Number of samples analysed for—		
(a) Germination	..	2,241
(b) Purity	..	2,208
7 Number of bags of seed examined for germination and purity.	..	62,180
8 Area planted with Sesbania and Gliricidia ..	..	345.65
9 Number of improved nurseries raised	..	185

13. Programme of work for the year 1952-53.—Running of primary seed-farm in an area of 1,150 acres.

(2) Roguing and maintaining the purity of crop in the above area.

(3) Testing of seeds procured from both primary and secondary seed-farms.

(4) Inspection of taluk depots and advising on proper preservation of seeds.

(5) Planting Sesbania and Gliricidia in all primary seed-farms.

(6) Trial of the new Seed Development Scheme in a few villages in order to make each holding or village self-sufficient in seed requirements. This consists of (i) distribution of primary seed-farm seeds to all ryots in a village at about 1 lb. per acre, in quantities sufficient for raising their full requirements of seeds during the next season.

(ii) Supply of sufficient nucleus seeds to a few ryots of a Village Agricultural Association or Advisory Committee for multiplication and distribution in their village and cover the whole paddy area in the village.

(7) General propaganda on improved nursery, improved seeds, judicious manuring, green manuring and planting of Sesbania and Gliricidia, control of pests and diseases and pretreatment and preservation of seeds.

VELLORE,
23rd August 1952.

N. C. THIRUMALACHARY,
Seed Development Officer (Paddy).

APPENDIX A.

Sanctioned Posts for the Seed Development Scheme (Paddy), Vellore division, as on 30th June 1952.

					Permanent.	Temporary.
1.	Seed Development Officer (Paddy)	..	..	..	..	1
2.	Upper Subordinates	..	..	..	..	5
3.	Ministerial Service—					
	Lower division clerk	..	..	..	..	1
	Typist	..	..	..	..	1
4.	Inferior Service—					
	Peons	..	..	..	..	2
5.	Menials paid from contingencies—					
	Messengers	..	..	..	..	5

STAFF DETAILS—A-1.

No.	District.	Headquarters.	Name of Seed Development Assistants.	Period.	
				From	To
1	Salem.	Salem	Sri V. Lakshmanan	1st July 1951.	5th December 1951.
			Sri N. Ramachandran	6th December 1951.	30th June 1952.
2	North Arcot.	Vellore	Sri H. Balasubramanian.	1st July 1951.	30th June 1952.
3	South Arcot.	Cuddalore	Sri S. V. Pandurangan	1st July 1951.	30th June 1952.
4	Chingleput.	Guindy	Sri K. Ambikacharan	1st July 1951.	5th December 1951.
			Sri V. Lakshmanan	6th December 1951.	30th June 1952.
		Nellore.	Sri M. Ramalingam	1st July 1951.	7th September 1951.
			Sri K. Rangasamy	8th September 1951.	30th June 1952.

District.	Name of the strain.	Primary seed farm.		Procurement (bags of 160 lb.).				TONS. LB.
		Targets.	Attained.	Targets.	Attained.			
					BAGS.	LB.		
South Arcot.	ADT 3	..	10	22.48	60	67	- 00	
	ADT 20	..	15	21.51	90	65	-100	
	SW 7	..	5	5.00	30	7	-105	
	CO 13	..	30	26.47	180	103	-104	
	ADT 8	..	5	17.79	30	63	- 45	
	CO 25	..	30	47.97	180	340	-100	
	GEB 24	..	10	23.00	60	85	- 25	
	ASD 5	..	10	6.00	60	33	- 95	
	BAM 3	..	5	6.00	30	23	- 70	
	Total	..	120	176.22	720	790	- 34	58-994
Chingleput ..	ADT 13	..	5	..	25	..		
	CO 13	..	10	5.00	50	..		
	ADT 20	..	5	4.00	25	..		
	CO 18	..	10	12.00	50	19	-117	
	ASD 5	..	10	22.50	50	10	-100	
	CO 5	..	15	19.65	75	164	- 10	
	CO 25	..	20	17.00	100	10		
	CO 19	..	10	20.00	50	20		
	GEB 24	..	15	24.00	75	9	- 60	
	BAM 3	..	10	4.19	50	39	- 10	
	ADT 22	..	10	4.00	50	9	- 60	
	Total	..	120	132.34	600	282	- 37	20-357
Nellore ..	BCP 1	..	80	121.72	480	1,387		
	BCP 2	..	20	10.00	120	397		
	GEB 24	..	20	14.00	120	58		
	ADT 22	..	10	8.00	60	10		
	MTU 15	..	5	8.00	30	..	} Not yet harvested.	
	ADT 3	..	5	12.50	30	..		
	Total	..	140	174.22	840	1,852		164-72

ADMINISTRATION REPORT OF SEED DEVELOPMENT OFFICER, TANJORE, FOR THE YEAR 1951-52.

I submit hereunder the Administration Report for the fasli year 1361.

II. Charge.—I continued to be the Seed Development Officer (Paddy), Tanjore, throughout the year assisted by an executive staff of seven Seed Development Assistants and ministerial staff of a Lower division clerk and a typist as sanctioned in G.O. Ms. No. 87, Food and Agriculture, dated 5th March 1951, for the year 1951-52 and G.O. Ms. No. 110, Food and Agriculture (Food Production), dated 17th March 1952, for the year 1952-53 with the same jurisdiction as came into being on 8th February 1951—vide Director of Agriculture's endorsement No. E. 2-23/51, dated 12th March 1951, and endorsement D. Dis. E. 99/52, dated 24th March 1952. The names of the upper subordinates who were working as Seed Development Assistants in this circle since 1st July 1951, are furnished in Appendix I chronologically and districtwar.

III. Season—(1) *Tanjore revenue district (which includes Pattukkottai Agricultural District).*—The rainfall during the year was considerably below normal. The paucity of the North-East monsoon rains caused the worst sufferings. Untimely rains in January-February especially the latter, interfered with *samba* and *thaladi* harvests and spoilt the germinating pulse and green manure crops. The practical absence of summer showers in many parts thwarted the development and performance of the crops that escaped destruction by the February rains. The South-West monsoon rains of 1951 were late by about a fortnight at the water-shed of the Cauvery which delayed the opening of the Stanley Reservoir. However water was received much earlier than in 1950 season. *Kuruvai* crops generally fared well and yielded normally if not better in spite of the prevalence of sclerotial disease and jassid pest. The failure of the North-East monsoon rains during December-January affected *samba* crops to some extent and *thaladi* season crops badly. In the non-delta tracts the paddy crops did not fare well wherever they survived the rigours of December-January drought.

(2) *Tiruchirappalli.*—The rainfall during the year amounted to 31.78 inches which was lower than the average of 34.20 inches for several years. The deficiency was marked both in the South-West and North-East monsoon seasons, though the hot weather rains were slightly in excess of the average. The South-West monsoon was late by about a fortnight. Owing to the low level of water in the Mettur lake, water was let into the Cauvery channels after a delay of about a fortnight. *Kuruvai* crops generally came up well. Though jassid and sclerotial attacks were evident, they did not affect the crops as badly as they did during the previous year. Owing to the paucity of the North-East monsoon rains and the inadequate flow and storage in the reservoir at Mettur, *samba* and *thaladi* crops could not get their normal supplies of water and yields also went down. A peculiar feature noted in the season was the inability of many varieties of *samba* paddy to ear properly, owing probably to the lack of adequate percentage of humidity in the air. This fate was shared by Co. 25 too. *Navarai* crops of paddy grown generally in Kulittalai and Musiri taluks did not fare also normally owing to the ill-distributed and untimely rains and lack of sufficient water-supply. Paddy

under rainfed tanks failed generally on account of drought. Therefore, the Grow More Food schemes just prevented the situation from getting out of control instead of making marked contributions to production.

(3) *Madurai.*—The rainfall during the year amounted to 26.77 inches against the several years' average of 32.60 inches. The South-West monsoon started early in June and was active both in June and July. It became weak in August but strengthened in September and raised the total rainfall for the season above the normal. The North-East monsoon was late by about a fortnight, was strong in November and failed later. The hot weather rains also were below normal. Periyar channels received water at the normal time and supplies were adequate enough generally. Normal yields of *kar* crops were obtained though the North-East monsoon rains interfered to some extent with harvests. The *samba* crops also came up well and yielded almost normally in spite of severe handicaps caused by season as inflow and storage in the Periyar lake were adequate. The summer rains of February have benefited late paddy crops in rainfed tracts and enabled millets also to be grown successfully.

(4) *Ramanathapuram.*—The rainfall amounted to 27.17 inches during the year as against 33.63 inches during the previous year. The North-East monsoon rains of September-November helped paddy cultivation considerably though the inadequate rains of December-January stood in the way of the realisation of the full hopes raised in the hearts of the growers by the earlier rains.

(5) *Tirunelveli.*—There was a total rainfall of 27.35 inches as against 28.58 inches during 1950-51 and against the average of 30.4 inches. The South-West monsoon made a good start but stopped abruptly in the latter part of June and continued to be so during a major part of July. Later the monsoon was active off and on. The North-East monsoon started late in September, was weak in October, improved in November and was poor subsequently. The river maintained adequate supplies and enabled both *kar* and *pishanam* crops to be grown successfully and yield normally though the February rains affected the *pishanam* crops to some extent and varieties like *anaikomban* and *sendhi* were affected by blast and registered low yields. Except in portions of Sankarankoil and Koilpatti rainfed paddy also fared pretty well.

(IV) *Summary of work done.*—(1) I toured all the districts in my jurisdiction during the 251 days I spent on tour in the fasli year. I inspected 182 primary and 142 secondary seed-farm crops and visited 291 places during the tours—vide Appendix II for details.

(2) The primary seed farms were run by the Seed Development Assistants with the assistance of the Agricultural Demonstrators and their staff. Necessary assistance to the Agricultural Demonstrators in running secondary seed farms were afforded by the Seed Development Assistants to the extent possible. The details of primary and secondary seed farms run in each district and the quantity of seed secured from each of these categories are furnished in Appendix III. Samples of seed farm produce (both primary and secondary) were tested by the Seed Development Assistants for both purity and viability and only such of those which conformed to standards were recommended to the Agricultural Demonstrators for purchase. The number of purity and viability tests conducted by the Seed Development Assistants during the year are furnished in Appendix IV. Such of those Seed Development Assistants who had small quantities of Tetrozolium chloride left with

them out of the material kindly supplied by the Principal, Agricultural College, Bapatla, last year, used the chemical to the extent possible for testing viability. The number of such tests made are noted in the remarks column of Appendix IV. As the Director of Agriculture decided that the reliability of the viability percentages obtained by the use of the chemical should be thoroughly investigated no other viability test with the chemical was conducted by the Seed Development Assistants. The number of bags of paddy seeds purchased having different percentages of purity and viability in each district is furnished in Appendices V-A, V-B and V-C.

(3) Owing to the continued adverse seasonal conditions over wide and different regions in the State, the paddy crops of those regions failed to thrive. This brought about the necessity of supplying seeds of cosmopolitan strains to the maximum extent possible from the areas of assured water-supply. Owing to the tight money conditions that prevailed during the harvesting season and as the result of the operation of various economic factors, paddy prices in the free market along with the prices of many commodities came tumbling down which generally enabled the Department to purchase everywhere seeds at the village site price plus the premium of 25 per cent offered. The decontrol policy ushered in by the Government later brought about a welcome but a revolutionary change in the situation which in course of time forced up the prices of paddy practically everywhere especially in surplus districts at the close of the year under report. The quantities moved out to other districts are furnished in Appendix VI.

(4) Targets for running primary seed farms were fixed up in consultation with the District Agricultural Officers. Necessary seed material for raising primary seed farm crops were arranged to be supplied from the Agricultural Research Stations by the Paddy Specialist, Coimbatore. The seeds received for sowings in 1951-52 and 1952-53 are furnished in Appendices VII and VIII respectively.

(5) Propaganda was also made for reduction of seed rate, sowing in cent nurseries, economic planting, raising green manure crops, growing green leaf manure producing plants and shrubs on bunds and vacant places and applications of concentrated manures of both nitrogenous and phosphatic types in doses suited for each case, as well as in other forms of departmental activity prevalent in each tract. Some mirasdars were initiated into the mysteries of the technique of mass selection of seeds for improving yields. The adoption of the system of leaving roguing space in seed farms is being spread to the extent possible. The process of maintenance of nucleus, primary, secondary and non-seed farm stocks of each strain in separate lots with distinct distinguishable marks and labels is kept up. Most of the Agricultural Demonstrators are finding it increasingly difficult to store and preserve properly the large quantities of seeds purchased as per targets and for supplying to other districts in need of them. This problem will assume a very acute form when the ten-year plan is in full swing unless solved in advance.

(6) Spread of grains is continued to be surveyed in each district and the areas where they have not reached are localized and steps taken to replace local varieties and discarded strains with the latest improved ones.

TANJORE,
27th August 1952.

R. GOVINDARAMIAH,
Seed Development Officer.

APPENDIX I.

Statement showing the Seed Development Assistants working under the control of the Seed Development Officer (Paddy), Tanjore, during 1951-52 in each district.

Serial number and division.	Name of the Seed Development Assistant.	Dates.	
		From	To.
1 Tanjore	Sri N. S. Rajaraman.	1st July 1951	13th May 1952.
	Sri K. Venugopal ..	14th May 1951	5th June 1952.
	Sri S. Venkataraman.	6th June 1952 and onwards.	Throughout the year.
2 Mayuram	Sri K. Venugopal ..	1st July 1951	24th October 1951.
3 Pattukottai ..	Sri K. R. Narayana-swami.	25th October 1951.	4th December 1951.
	Sri K. Venugopal ..	5th December 1951 and onwards.	Throughout the year.
4 Tiruchirappalli ..	Sri V. Krishnamurthi.		
	Sri M. K. Swamina-than.		
5 Madurai	Sri N. Annaswami Iyer.		Do.
6 Ramanathapuram at Sattur.	Sri J. S. C. Antony ..		Do.
7 Tirunelveli	Sri K. K. Subramania Iyer.		Do.

APPENDIX II.

Statement showing the number of places visited and number of seed farms inspected by the Seed Development Officer (Paddy), Tanjore, in each district during 1951-52.

Serial number and division.	Number of places visited.	Number of primary seed farms inspected.	Number of secondary seed farms inspected.	Total number of seed farms inspected.
(1)	(2)	(3)	(4)	(5)
1 Tanjore	112	89	44	133
2 Pattukottai ..	62	40	32	72
3 Tiruchirappalli ..	30	16	22	38
4 Madurai	29	14	25	39
5 Ramanathapuram ..	15	7	7	14
6 Tirunelveli	41	16	12	28
7 Outside the region	2	..	..	..
Total	291	182	142	324

APPENDIX III.

Statement showing the area of seed farms arranged and the quantity of seeds procured from each category in each district during 1951-52.

Serial number and district.	Primary.			Secondary.			Total.		
	Area of seed farms arranged.	Quantity of seeds procured.		Area of seed farms arranged.	Quantity of seeds procured.		Area of seed farms arranged.	Quantity of seeds procured.	
		ACS.	TONS. LB.		ACS.	TONS. LB.		ACS.	TONS. LB.
1 Tanjore	1,035-20	631	1,773	1,644-34	978	667	2,679-54	1,610	200
2 Pattukottai ..	428-49	245	272	1,881-08	1,126	1,408	2,309-55	1,371	1,680
3 Tiruchirappalli ..	155-95	51	984	1,563-67	380	596	1,719-62	431	1,580
4 Madurai	191-03	90	1,640	2,486-11	983	240	2,677-14	1,079	1,880
5 Ramanathapuram.	145-50	21	2,054	755-24	23	1,663	900-74	45	1,477
6 Tirunelveli ..	110-19	53	1,038	1,198-05	357	660	1,308-24	410	1,698
Total	2,066-36	1,100	1,041	9,528-47	3,849	754	11,594-83	4,949	1,795

APPENDIX IV-A.

Statement showing the number of samples of seeds under each category analysed for purity in each district during 1951-52.

Serial number and district.	Primary.	Secondary.	Non-seed farm.	Total.
1 Tanjore	354	411	102	867
2 Pattukottai	47	160	23	230
3 Tiruchirappalli	41	118	19	178
4 Madurai	42	273	54	369
5 Ramanathapuram	26	107	2	135
6 Tirunelveli	33	250	218	501
Total	543	1,319	418	2,280

APPENDIX IV-B.

Statement showing the number of samples of seeds under each category analysed for viability in each district during 1951-52 by ordinary methods.

Serial number and district.	Primary.	Secondary.	Non-seed farm.	Total.	Remarks.
1 Tanjore	332	362	58	752	..
2 Pattukottai	84	229	21	334	..
3 Tiruchirappalli	34	68	12	114	Thirty-seven primary, 82 secondary and 16 non-seed farm samples. Total (135) were tested with chemical for viability.
4 Madurai	17	90	24	131	Besides these 4 primary samples and 1 secondary were tested for viability with chemical.
5 Ramanathapuram	58	203	38	299	
6 Tirunelveli	16	118	10	144	
Total	541	1,070	163	1,774	

APPENDIX V-A.

Statement showing the percentage of purity and viability of bags of primary seeds farm seed purchased in each district during 1951-52.

Serial number and district.	Number of bags purchased having the purity of						Number of bags purchased having the viability of					
	100 per cent.	99 per cent.	98 per cent.	97 per cent.	96 per cent and less.	Total.	100 per cent.	99 per cent.	98 per cent.	97 per cent.	96 per cent and less.	Total.
1 Tanjore	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
2 Pattukottai	1,225	5,335	4,763	661	109	11,432	5,269	3,493	5,806	357	..	..
3 Tiruchirappalli	1,086	2,681	280	..	33	4,428	3,516	318	774	161	..	..
4 Madurai	1,252	102	..	49	..	1,354	61	173	211	..	..	..
5 Ramanathapuram	33	161	..	..	..	274	655	..	173	40	..	..
6 Tirunelveli	355	394	..	..	..	749	462	10,312	..	..	..	..
Total	4,125	8,913	5,753	173	..	18,964	462	10,312	7,142	558	..	18,474

* Remarks.—The S.D.A. did not analyse 490 bags for viability.

APPENDIX V-B.

Statement showing the percentage of purity and viability of bags of secondary seed farm seeds purchased in each district during 1951-52.

Serial number and district.	Number of bags purchased having the purity of						Number of bags purchased having the viability of					
	100 per cent.	99 per cent.	98 per cent.	97 per cent.	96 per cent and less.	Total.	100 per cent.	99 per cent.	98 per cent.	97 per cent.	96 per cent and less.	Total.
1 Tanjore	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
2 Pattukottai	1,466	6,152	8,414	629	..	16,661	6,804	9,337	9,525	332	..	..
3 Tiruchirappalli	2,500	7,426	8,524	434	..	18,884	2,179	3,242	8,355	1,142	..	..
4 Madurai	6,965	2,744	2,638	39	..	5,421	2,650	1,482	3,242	201	..	..
5 Ramanathapuram	62	52	30	185	..	329	4	114	201	10	..	..
6 Tirunelveli	1,146	2,793	796	287	..	5,002	977	4,025	..	..	..	..
Total	12,139	23,180	22,022	2,319	401	60,061	1,031	25,109	22,805	1,685	..	50,630

* Remarks.—The S.D.A. did not take 9,431 bags for viability.

APPENDIX V-C.

Statement showing the percentage of purity and viability of bags of non-seed farm seeds purchased in each district during 1951-52.

Serial number and district.	Number of bags purchased having the purity of						Number of bags purchased having the viability of					
	100 per cent. (2)	99 per cent. (3)	98 per cent. (4)	97 per cent. (5)	96 per cent and less. (6)	Total. (7)	100 per cent. (8)	99-98 per cent. (9)	97-96 per cent. (10)	95-94 per cent. (11)	94 per cent and less. (12)	Total. (13)
1 Tanjore ..	..	775	3,530	1,567	..	5,872	..	2,876	2,996	..	..	5,872
2 Pattukottai ..	..	287	208	185	..	680	..	455	176	..	..	680
3 Tiruchirappalli ..	..	..	86	42	..	138	..	19	119	..	..	138
4 Madurai ..	..	235	106	140	57	618	..	19	297	..	..	328 *
5 Ramanathapuram ..	..	..	373	..	..	373	..	..	317	..	..	373
6 Tirunelveli ..	..	1,380	1,975	1,763	..	5,118	..	..	..	..	..	..
Viability tests were not conducted as the bags were despatched to destinations soon after purchases were made and before the resting period of the seeds was over.												
Total ..	522	2,928	5,872	3,420	57	12,799	..	3,369	3,905	117	..	7,391

* Tests for 290 bags were not conducted.

APPENDIX VI.

Statement showing the quantity of seeds transferred to other districts from

Serial number and district.	Quantity transferred.	
	TONS.	LB.
1 Tanjore ..	589	65
2 Pattukottai ..	539	1,144
3 Tiruchirappalli ..	Nil.	Nil.
4 Madurai ..	125	800
5 Ramanathapuram ..	..	2,120
6 Tirunelveli ..	403	585
Total ..	1,656	234

APPENDIX VII.

Statement showing the quantity of seeds received from Agricultural Research Stations for 1951-52 crops.

Serial number and district.	Quantity received.	
	TONS.	LB.
1 Tanjore ..	12	900
2 Pattukottai ..	1	795
3 Tiruchirappalli ..	5	336
4 Madurai ..	1	1,490
5 Ramanathapuram ..	2	1,087
6 Tirunelveli ..	18	826
Total ..	41	954

APPENDIX VIII.

Statement showing the quantity of seeds from Agricultural Research Stations for 1952-53 crops.

Serial number and district.	Quantity received.	
	TONS.	LB.
1 Tanjore ..	33	735
2 Pattukottai ..	7	1,355
3 Tiruchirappalli ..	9	1,334
4 Madurai ..	11	790
5 Ramanathapuram ..	1	270
6 Tirunelveli ..	12	1,779
Total ..	75	1,783

ANNUAL ADMINISTRATION REPORT OF THE SEED DEVELOPMENT OFFICER (MILLETS) BELLARY, FOR THE YEAR 1951-52.

I submit the following Annual Administration report of the seed Development work done by me and my Assistants in my jurisdiction during the year 1951-52 or the fasli year of 1360.

(I) *Charge*—I joined duty on 26th September 1951 relieving Janab Syed Ibrahim, B. Sc. Ag. who was in charge of the post of Seed Development Officer (Millets), Bellary from 1st July to 25th September 1951, and ever since, I continued to hold charge of the post.

(II) *Jurisdiction and staff*.—During the period under review, there is no change in my jurisdiction and continued to have jurisdiction over four districts, namely, Bellary, Anantapur, Kurnool and Guntur, with six Seed Development Assistants working under me with their headquarters at (1) Anantapur, (2) Bellary, (3) Adoni, (4) Kurnool, (5) Nandyal, (6) Guntur, and there is no change in the personnel of the Seed Development Assistants. The names of Assistants working at each centre with their jurisdictions and periods of stay are given below:—

Name of Assistant.	Head-Quarters.	Jurisdiction.	Period of stay.	Remarks.
Sri N. V. Raja Rao ..	Anantapur ..	Anantapur district.	1st July 1951 to 30th June 1952.	Went on leave from 20th April to 31st May 1952.
Janab Abdul Muham-mad Rahman Baig.	Bellary ..	Bellary, Rayadrug and western taluk.	Do.	Went on leave from 24th October to 31st October 1951.
Sri B. Bhanji Rao ..	Adoni ..	Adoni, Alur and Siriguppa taluks.	Do.	
Sri C. Venkatapathi Rao.	Kurnool ..	Northern taluks of Kurnool district.	Do.	
Sri I. L. Narasimha Rao	Nandyal ..	Southern taluks of Kurnool district.	Do.	
Janab Syed Ahmedulla	Guntur ..	Guntur district.	Do.	

There was a slight change in the ministerial staff and the following staff worked under me during the periods noted against each.

1. K. Shantappa .. Clerk .. 1st July 1951 to 30th June 1952.
2. Manickem .. Typist .. 1st July to 18th August 1951, a.n.
3. Jaffer Sheriff .. Do. .. 28th August 1951 to 30th June 1952.

(III) *General*.—The immediate effect of the adverse seasonal conditions and the resultant failure of crops was seen in the marked rise in market prices of millets. As the ryots were getting exorbitant prices, they were not at all willing to part with their seed. So in the beginning great difficulty was felt in convincing ryots to part with their seed to the Department. On representation from District Agricultural Officers the premium to be paid to the ryots was increased up to 75% over the local price fixed by the Collector. Then there was a steep fall in prices of all commodities in conformity with the general trend of world events. Then the market price and the departmental rate of millets have become almost the same. So some of the ryots

came forward to sell their seed to the department. The Demonstrators have availed the opportunity to stock their depots with reasonable quantity of stocks but were afraid of purchasing all the stocks that were offered because if under the market fluctuations the prices of the millets were to go down further, they will find it very difficult to dispose of the stocks held by them. The Agricultural Demonstrators have proceeded with caution in purchasing the seeds offered. So this formed another strong reason for not reaching the targets of procurement fixed.

IV. *Seasons and weather*.—This year was a very bad year marked by very low and ill-distributed rainfall. Due to the adverse seasonal conditions that prevailed during this period all the crops have suffered a lot and gave very poor to no yields in most of the districts. Actual famine conditions prevailed in parts of Anantapur, Kurnool and Guntur districts and relief to the extent possible was afforded by the Government.

Though the total rainfall in some of the districts was not far below the average, due to its ill-distribution, the crops have come to suffer most. For example, Kurnool district had in fact received 7 inches rainfall over and above the normal rainfall of 24.36 inches. But the crops were none the better, for the high rainfall received since most of it (i.e.), 12.54 inches, was received in the month of May when it was least wanted. Instead of doing any good it did havoc by killing sheep and cattle and making poor people suffer with its heavy downpour. Thus due to the low and illdistributed rainfall as can be seen from the following table all the crops in general in all the four districts have given yields far below the normal.

Months.	Anantapur. Normal, 1951-52.		Bellary. Normal, 1951-52.		Kurnool. Normal, 1951-52.		Guntur. Normal, 1951-52.	
1951—								
July ..	2.20	3.12	5.90	3.65	4.57	5.18	..	6.84
August ..	3.30	3.42	5.70	1.85	4.88	2.99	..	3.20
September ..	5.30	3.57	8.33	5.99	5.01	3.27	..	1.79
October ..	4.00	4.46	3.40	2.44	3.00	2.99	..	3.38
November ..	1.90	1.21	0.70	0.19	1.72	0.35	..	0.29
December ..	0.30	..	..	..	0.33	0.02	..	..
1952—								
January ..	0.10	..	..	..	0.22	..	..	..
February ..	0.20	..	0.10	0.08	..	..	..	..
March ..	0.20	1.11	..	..	..	0.02	..	..
April ..	0.80	0.87	1.73	0.91	0.10	1.14	..	0.29
May ..	2.00	3.09	5.40	5.23	1.28	12.54	..	3.41
June ..	2.10	2.66	2.00	0.66	3.25	2.64	..	0.30
Total ..	22.40	21.56	33.26	20.99	24.36	31.14	30.36	19.50

Thus the adverse seasonal conditions coupled with the attendant incidence of pests and diseases resulted in very poor yields of all rainfed crops which in turn had a telling effect on the quantity of seed procured.

V. *Pests and diseases*.—Some pests like the cholam shoot borer surul puchi on groundnut have appeared in a serious form taking advantage of the bad seasonal conditions and inflicted no less a damage on the crops which were rendered least resistant due to lack of rains.

VI. *Tours made*.—The Seeds Development Officer toured for 193 days during the year. During these days on tour he toured in Guntur district for 34 days, Anantapur district for 46 days, Bellary district for 50 days and Kurnool district for 63 days.

Correspondingly the number of days toured by each assistant is given below:—

	Target fixed.	Number of days toured.
Seed Development Assistant, Anantapur	240	151
Do. Bellary	240	113
Do. Adoni	240	137
Do. Kurnool	240	156
Do. Nandyal	240	167
Do. Guntur	240	266

VII. Work done.—During the period under review I attended to the following main items of work:—

(1) During my visits to the districts I verified the exact quantity of nucleus seed supplied by the research stations to the various taluks and whether the quantity supplied has been properly distributed to the primary seed farm ryots or not.

(2) Inspected the areas of primary seed farms of millets arranged by each of the assistants to study the growth of the crop from time to time and gave necessary practical instructions on the field to the Seed Development Assistants and Agricultural Demonstrator concerned, about the nature of rogues that generally occur in the different millets, how to identify them, and the best time to rogue them out.

As per my instructions, the extent of primary seed farms of different millets rogued by the Seed Development Assistants is given below:—

	Area of seed farms rogued.		
	Jonna.	Korra.	Ragi.
Anantapur	10	106	3
Bellary	..	68	..
Adoni	81	64	..
Kurnool	281	50	..
Nandyal	238	36	..
Guntur	50	30	..
Total	587	354	3

Thus a total of 587 acres of primary seed farms of jonna, 354 acres of korra and 3 acres of ragi have been rogued in all the districts put together.

(3) Gave necessary instructions to the Seed Development Assistants about the general items of agricultural improvement work they have to carry out in the villages they visit, namely, (1) improved mhothe ramps, (2) improved cattle and stock yards, (3) raising of perennial vegetable plants, (4) popularizing prosopis as a live hedge and (5) planting of green manure plants like Glycercidia and Sesbania on a large scale. During my visits I saw that the Seed Development Assistants take proper interest in these items of general agricultural improvement and carry them out to the maximum extent possible.

(4) The other important item of work attended to is to drive the Seed Development Assistants to procure the maximum quantity of seeds of millets from the primary seed farm ryots, to reach the targets fixed. The actual quantity of nucleus seed, the area of primary seed farms arranged and the quantity of millet seed procured by each of the Seed Development Assistants are given in Appendix I and Appendix II.

(5) During my tours I inspected the quality and quantity of primary seeds of millets procured by each of the Seed Development Assistants and saw that they conducted the germination tests and purity tests of as large a number of bags as possible. The exact number of germination tests and the number of bags that were examined for purity are as follows:—

	Number of germination tests.	Number of bags examined for purity.
Anantapur	35	100
Bellary	41	35
Adoni	22	324
Kurnool	42	45
Nandyal	60	69
Guntur	147	118
Total	347	691

Thus a total of 347 germination tests were conducted and 691 bags of millets were examined for purity of seed on the whole.

(6) I visited the Agricultural Research Stations, Hagari, Siruguppa, Nandyal and Guntur partly to acquaint myself with the work, that is being carried on in these stations and partly to consult the Superintendents of these stations and to arrange supply of nucleus seed to the various districts according to the demand and supply.

VIII. Summary.—Due to the prolonged drought conditions that prevailed during the growing period of the millet crops, most of the crops have failed miserably and hence I submit that procurement of millet seed could not be done up to the targets fixed.

G. RAMABHADHAN,
Seed Development Officer (Millets).
BELLARY,
1st August 1952.

APPENDIX I.

District.	Nucleus seed supplied in lb.			Area sown under primary seed farms.			Number of bags (procured) (160 lb. each).		
	Jonna.	Korra.	Ragi.	Jonna.	Korra.	Ragi.	Jonna.	Korra.	Ragi.
Anantapur	..	700	520	..	165	59	..	109	16
Bellary	8,500	975	210	1158	187	25	286	131	17
Kurnool	10,886	340	..	751	95	..	805	305	..
Guntur	3,900	240	..	268	30	..	82	3	..

APPENDIX II.

District.	Area sown both under primary and secondary.			Number of bags procured both under primary and secondary (160 lb. each).		
	Jonna.	Korra.	Ragi.	Jonna.	Korra.	Ragi.
Anantapur	..	451	59	..	142	16
		(375)	(25)		(563)	(50)
Bellary	3,079	414	25	726	681	17
	(3,000)	(425)	(25)	(3,750)	(531)	(50)
Kurnool	2,306	1,041	..	1,581	877	..
	(2,500)	(350)	..	(5,000)	(700)	..
Guntur	493	182	..	110	14	..
	(450)	(200)	..	(450)	(200)	..

N.B.—Figures in parentheses give the target fixed by the Director of Agriculture.

ANNUAL ADMINISTRATION REPORT OF SEED DEVELOPMENT OFFICER, COIMBATORE, FOR 1951-52.

I submit the Annual Administration Report of the work done by the Seed Development staff of Millets in the southern district of the Madras State for the year 1951-52. This is the third annual report under the Seed Multiplication Scheme in Millets.

2. *Introduction.*—Millets are important food crops of the Madras State comprising an area of about 13 million acres. They are cultivated in almost all kinds of soils and under varying climatic conditions. As a result of research work, a number of high yielding strains of millets are available at the various research stations of the State. The quantity of millet seeds produced at the research stations are comparatively small owing to the limited space available for the multiplication of these strains, with the result that seed of improved millet strains are not available for the common cultivator of the State. The Government became aware of this difficulty of the agriculturist and sanctioned a scheme for the production and distribution of improved seeds of millets in G.O. Ms. No. 906, Food and Agriculture, dated 7th September 1949. Two Seed Development Officers (Millets) were appointed, one in charge of districts north of Madras and the other in charge of the southern districts; and the scheme commenced working on 21st September 1949. In the course of work, certain difficulties were experienced and the Government revised the scheme in G.O. Ms. No. 142, Food and Agriculture, dated 16th September 1950 and the sanction extended up to 31st March 1951. The jurisdiction of the Seed Development Officer (Millets) was reduced to the most important five districts in each of these areas. The scheme was extended by one more year from 1st April 1951 to 31st March 1952 in G.O. Ms. No. 87, Food and Agriculture (Food Production), dated 5th March 1951. The Government have further extended the scheme in G.O. Ms. No. 110, Food and Agriculture (Food Production), dated 17th March 1952 up to 31st March 1953, with the following staff:—

Headquarters of the seed development staff.	Jurisdiction.
Seed Development Assistant, Coimbatore ..	Coimbatore district.
Do. Gobichettipalayam.	Do.
Do. Musiri	Tiruchirappalli district.
Do. Athur	Salem district.
Do. Koilpatti	Tirunelveli district.
Do. Nilakottai	Madurai district.

The headquarters of the Seed Development Officer is at Lawley Road, Coimbatore, with jurisdiction over the abovementioned five districts. The duties of the Seed Development staff are: making arrangements for growing of primary seed farms, roguing the seed farms, helping the district staff in procurement of seeds and periodical inspection and testing of stored seeds.

3. *Staff and charge.*—Sri B. L. Narasimhamurthy was in charge of the seed development work in millets till 20th July 1951, when he was relieved

by Sri U. Achyutha Wariar who continued to be in charge of the work till the end of the period under report. The following Table I gives the staff employed during the year:—

TABLE I.
Staff employed in the seed development work (millets).

Staff employed.	Period of service.	
	From	To
Seed Development Officers—		
1. Sri B. L. Narasimhamurthy	1st July 1951	20th July 1951.
2. Sri U. Achyutha Wariar	21st July 1951	30th June 1952.
Seed Development Assistants—		
1. Coimbatore—		
Sri G. Venkataramana	1st July 1951	Do.
2. Gobichettipalayam—		
Sri G. Selvarangaraju	Do.	6th September 1951.
Vacant	7th September 1951..	27th September 1951.
Sri G. Selvarangaraju	28th September 1951.	2nd October 1951.
Vacant	3rd October 1951 ..	12th November 1951.
Sri G. Venkataramana (additional charge).	13th November 1951..	11th December 1951.
Sri G. Rajagopalan	12th December 1951..	30th June 1952.
3. Musiri—		
Sri A. N. Ramalingam	1st July 1951	3rd June 1952.
Sri D. R. Parthasarathy (additional charge).	4th June 1952	18th June 1952.
Sri A. N. Ramalingam	19th June 1952	30th June 1952.
4. Athur—		
Sri D. R. Parthasarathy	1st July 1951	Do.
5. Koilpatti—		
Sri S. Sivasankaran	Do.	Do.
6. Nilakottai—		
Sri S. Subramanian	Do.	11th August 1951.
Sri S. Sivasankaran (additional charge).	12th August 1951	19th August 1951.
Sri K. N. Doraiswamy	20th August 1951	30th June 1952.

4. *Season and rainfall.*—The amount of rainfall received during the year and the deviation of the same from normal is presented in monthwar details in the following Table II:—

TABLE II.
Annual rainfall (1951-52) with departure from normal.

Months.	Districts.									
	Salem.		Coimbatore.		Tiruchirappalli.		Madurai.		Tirunelveli.	
	Rainfall.	Departure from normal.	Rainfall.	Departure from normal.	Rainfall.	Departure from normal.	Rainfall.	Departure from normal.	Rainfall.	Departure from normal.
1951—										
July	3.4	— 0.4	2.0	+ 0.3	4.0	+ 2.9	5.9	+ 3.9	0.7	+ 0.2
August	3.5	— 3.1	0.2	— 1.1	2.3	— 1.8	5.5	+ 1.4	1.0	— 0.1
September	6.6	+ 0.5	2.2	+ 0.7	2.2	— 1.8	8.7	+ 4.0	3.3	+ 1.8
October	2.3	— 4.1	3.7	— 2.6	4.7	— 1.6	5.2	— 2.2	1.8	— 5.0
November	3.9	+ 0.1	3.0	+ 1.3	7.2	+ 0.2	4.3	— 1.4	10.1	+ 2.1
December	..	— 1.0	0.2	— 1.2	..	— 2.6	..	— 2.0	0.5	— 3.8
1952—										
January	..	— 0.3	0.1	— 0.7	0.8	— 0.2	0.9	+ 0.1	2.0	+ 0.2
February	0.6	+ 0.3	0.7	+ 0.3	1.0	+ 0.7	4.0	+ 3.5	1.6	+ 0.1
March	0.1	— 0.4	0.3	+ 0.1	..	— 0.4	0.1	— 0.6	0.4	— 0.9
April	0.5	— 1.4	0.6	— 1.8	0.5	— 1.9	0.1	— 2.1	3.1	..
May	2.5	— 2.1	0.1	— 1.7	0.4	— 2.2	1.0	— 1.7	0.8	— 1.4
June	2.8	— 0.3	0.2	— 0.7	..	— 1.8	1.4	— 0.2	0.1	— 0.6
Total	26.2	— 12.2	13.3	— 7.1	23.1	— 10.5	37.1	+ 2.7	25.4	— 7.4

A perusal of the table presented above will show that the rainfall was highly defective in almost all the districts, the deficit amounting to as much as 12 inches in the case of Salem district. Considering this deficit on the back ground of the poor rainfall received during the past five years, the situation had become very serious. During the south-west monsoon period, when vast area of dry land millets are sown, the rainfall was not enough to sow a crop and even in places where the crop was sown with the available moisture, the crop dried up subsequently due to want of rains. Owing to the continuous drought prevailing for the last five years, the underground water has gone lower and lower in the wells with the result that lifting of water for irrigation had become increasingly difficult. This affected the area under irrigated millets. Where vast stretches of irrigated millets could be expected, only isolated patches were seen during the year. Thus, the season as a whole was a complete failure and the crop that affected most was the millets in this area.

5. *Progress of seed development work.*—The main duties of the seed development staff are the arrangement of the seed farms, roguing of seed farms and assisting the district staff in the procurement of seeds. In this connexion, the Seed Development Officer was on tour for 205 days visiting 193 villages. He contacted cultivators and made arrangements to grow 254 acres of millet seed farms. He inspected 509 acres of seed farms and made arrangements to procure 135 bags of seeds. He also attended four conferences of the District Officers in connexion with the seed farm work. The work of the staff is presented in a tabular statement in the following Table III:—

TABLE III.

Details of seed development work.

	Number of tour days.	Number of villages visited.	Area of seed farm arranged to grow.	Area of seed farm inspected.	Quantity of seed arranged to procure.
			ACS.	ACS.	BAGS.
Seed Development Officer—					
Coimbatore	205	193	254	509	138
Seed Development Assistant—					
Coimbatore	251	203	127	235	118
Gobichettipalayam ..	112	130	239	157	55
Salem	228	255	106	260	38
Tiruchirappalli	239	267	245	343	111
Madurai	218	216	305	151	138
Tirunelveli	237	264	381	625	142

The assistants had maintained close touch with the seed farm cultivators, especially those who had grown primary seed farms. In spite of the adverse seasonal effects, they were able to induce the cultivators to grow the Departmental strains and sell a portion of their produce to the State.

6. *Area of seed farm achieved.*—The important item of seed farm work is the timely distribution of the sufficient nucleus seeds to the seed farm cultivator. The required quantity of seeds were distributed as per the target fixed for the year. In many cases, seeds sufficient to exceed the target

were also issued. The target of seed farm under millets and the area arranged, with the quantity of seeds distributed are given in the following Table IV:—

TABLE IV.

The target of seed farms and the area achieved during 1951-52.

	Target for 1951-52.		Achievements.					
	Area to be covered.	Seed required.	Seeds distributed.			Area covered.		
			Primary.	Secondary.	Total.	Primary.	Secondary.	Total.
	ACS.	LB.	LB.	LB.	LB.	ACS.	ACS.	ACS.
<i>Cholam.</i>								
Coimbatore. ..	1,500	22,400	7,732	8,828	16,560	310	73	383
Salem. ..	1,000	15,520	2,758	14,029	16,787	65	296	361
Tiruchirappalli ..	200	3,040	1,140	26,279	27,419	49	113	162
Madurai ..	450	6,720	750	14,297	15,047	64	252	316
Tirunelveli ..	200	2,880	796	2,335	3,131	47	140	187
<i>Cumbu.</i>								
Coimbatore ..	500	4,960	4,944	4,303	9,247	255	120	375
Salem ..	225	2,400	3,265	6,433	9,628	56	213	269
Tiruchirappalli ..	..	..	..	..	..	..	..	..
Madurai ..	300	3,200	400	2,240	2,640	37	112	149
Tirunelveli ..	340	3,520	3,200	160	3,360	480	15	495
<i>Ragi.</i>								
Coimbatore ..	440	2,080	1,665	3,528	5,193	260	169	429
Salem ..	310	1,440	705	18,941	19,646	40	161	201
Tiruchirappalli ..	250	1,280	575	705	1,280	43	166	209
Madurai ..	250	1,280	216	7,444	7,660	25	114	139
Tirunelveli ..	250	1,280	775	..	775	145	..	145
<i>Tenai.</i>								
Coimbatore ..	125	480	245	525	770	18	12	30
Salem ..	25	160	155	354	509	4	10	14

The target of the area of all millets in Coimbatore district was 2,565 acres of which 1,217 acres were covered during the year. It will be seen that seeds sufficient to cover the area were distributed, but the area actually grown was only 48 per cent of the target. It was noticed that the seeds were actually sown but owing to either lack of moisture in soil or lack of irrigation water in the well the crop did not come to maturity. In many cases even half-grown crops had to be abandoned for want of water in the wells. In this connection, it will be worth mentioning that the total rainfall for the year was only 13 inches in the Coimbatore district. In Salem district, seeds sufficient to cover the target and even to exceed it, were supplied to the seed farm ryots. In fact, a total quantity of over 45,000 lb. of seeds were supplied which would have covered in a normal season, an area of over 6,000 acres. The actual achievement of seed farm area was only 54 per cent of the target. This was due to low rainfall and acute water scarcity throughout the district. A target of 450 acres of cholam and ragi was fixed for the Tiruchirappalli district. Seeds sufficient to cover an area of 2,000 acres were distributed. The total area of seed farm was only 371 acres or 82 per cent of the target, the chief reason for the reduction being adverse seasonal conditions. The target for the seed farm in Madurai district was 1,000 acres of which 60 per cent in acreage was achieved. Though seeds sufficient to cover an area of over 2,000 acres were distributed, the actual area of seed farm was only 604 acres. Though the district has recorded a rainfall above normal, a quantity of 8.7 inches was received in February, which was not useful to the millet crop. But of the target of 790 acres under millets in Tirunelveli district, 827 acres have been achieved even

under an adverse seasonal condition. Taking the southern districts as a whole, out of a targetted area of 6,363 acres, 3,864 acres or 60 per cent of the area has been achieved during the year 1951-52.

7. *Distribution of nucleus seeds from research stations.*—The seeds for sowing primary seed farms in the districts have to be obtained from research stations. The chief millets producing stations in the southern districts are the Millet Breeding Station, Coimbatore, and Agricultural Research Station, Kollpatti. Arrangements were made to distribute the nucleus seeds from the above research stations to places where seed farms are to be raised, well in advance of sowing time. The quantity of seeds distributed from these research stations is presented in Table V below :—

TABLE V.

Distribution of nucleus seeds from research stations.

District.	Cholam. LB.	Cumbu. LB.	Ragi. LB.	Tenai. LB.
Millet Breeding Station, Coimbatore—				
Coimbatore	9,771	16,935	1,580	337
Salem	3,438	5,820	60	110
Tiruchirappalli	1,575		220	..
Madurai	1,521	1,265	200	..
Agricultural Research Station, Kollpatti—				
Madurai	20	50	..	..
Tirunelveli	777	1,800	758	..
Agricultural Research Station, Siruguppa—				
Coimbatore	6,400	..	..	..

Seeds sufficient to raise the primary seed farms were distributed from the research stations. In some cases, quantities supplied from these stations were also available for general distribution.

8. *Maintenance of purity of seeds.*—The percentage of natural crossing in some of the millets is high and unless the off-types are removed at the time of flowering, the purity of strains will be vitiated. The removal of off-types and natural crosses is an important item in seed development work. The area rogued by the staff engaged in seed development work is tabulated and presented in Table VI under the different millets.

TABLE VI.

Area of seed farms rogued.

District.	Primary. ACS.	Secondary. ACS.	Total. ACS.
<i>Cholam.</i>			
Coimbatore	40	2	42
Salem	43	36	79
Tiruchirappalli	32	40	72
Madurai	35	..	35
Tirunelveli	22	10	32
<i>Cumbu.</i>			
Coimbatore	87	..	87
Salem	17	13	30
Tiruchirappalli	..	..	..
Madurai	..	..	..
Tirunelveli	37	..	37
<i>Ragi.</i>			
Coimbatore	26	..	26
Salem	21	10	31
Tiruchirappalli	14	34	48
Madurai	..	..	..
Tirunelveli	68	..	68
<i>Tenai.</i>			
Coimbatore	4	..	4
Salem	2	..	2

As a rule, all primary seed farms were rogued by the Seed Development Assistants. When time permitted, a good portion of secondary seed farms were also rogued.

9. *Seed-testing.*—This is another important item of work. The seeds are to be tested for purity and also for viability. Millets such as cholam andumbu have to be tested more often, because of their rapid deterioration during storage. Ragi and tenai are comparatively free from this defect. The number of samples tested during the period under report is given in Table VII presented below :—

TABLE VII.

Number of samples of seeds tested.

District.	Cholam. NOS.	Cumbu. NOS.	Ragi. NOS.	Tenai. NOS.	Total. NOS.
Coimbatore	4	77	41	8	130
Salem	28	14	21	5	68
Tiruchirappalli	46	..	44	..	90
Madurai	58	26	29	..	113
Tirunelveli	51	60	54	..	165

10. *Procurement of seeds.*—The statement of target and the quantity of seed that was procured during the year together with the quantity that is likely to be procured from the standing crop at the end of the year is given in Table VIII shown below :—

TABLE VIII.

Statement of millet seeds procured during 1951-52.

District.	Target in bags = 160 lb.	Quantity pro- cured in bags = 160 lb.	Quantity expected to be procured in bags = 160 lb.	Total in bags = 160 lb.
<i>Cholam.</i>				
Coimbatore	2,000	40	62	102
Salem	2,000	27	25	52
Tiruchirappalli	400	85	60	145
Madurai	900	108	..	108
Tirunelveli	400	87	200	287
<i>Cumbu.</i>				
Coimbatore	1,000	77	165	242
Salem	450	21	40	61
Tiruchirappalli	..	..	..	..
Madurai	600	16	..	16
Tirunelveli	680	149	..	149
<i>Ragi.</i>				
Coimbatore	880	33	342	375
Salem	620	9	..	9
Tiruchirappalli	500	4	..	4
Madurai	500	45	..	45
Tirunelveli	500	15	..	15
<i>Tenai.</i>				
Coimbatore	250	2	4	6
Salem	50	2	..	2

Millets are usually cultivated by poor cultivators for their own food and by rich cultivators for giving as wages for their farm labourers. Throughout the year under report, rice was a controlled commodity. The natural repurchase was that the cultivator could not be induced to part with the produce. Moreover, the price offered by the department was such that it

was not possible for the cultivator to get his requirement of millets or rice without being put to great financial difficulty. Naturally the procurement could be done only in small quantities, but enough seeds were procured to grow the allotted area for the coming year, in addition to a limited quantity of seeds being made available for distribution.

11. *Miscellaneous items of work.*—The Seed Development staff was visiting villages in their jurisdiction very frequently for the purpose of seed farm work. The opportunity was utilized to do propaganda on the other improved methods advocated by the department. Table IX presented below gives a summary of items of work attended to by the staff in addition to their duties:—

TABLE IX.

Details of miscellaneous items of work.

Item of work.	Coimbatore.	Salem.	Tiruchirap. palli.	Madurai.	Tirunelveli.	Total.
Number of seed bags examined.	142	47	343	128	157	837
Area covered by levelling ..	24	..	..	30	..	54
Area covered by contour cultivation.	5	..	..	..	..	5
Area covered by green manure.	40	10	49	89	56	244
Fencing with prosopis ..	56	6	9	30	53	154
Improved cattle manure pit.	51	21	22	15	31	139
Improved mhoie ramp ..	14	5	1	12	13	45
Improved cattle yard ..	16	..	3	8	12	39
Perennial vegetable ..	246	..	44	30	80	420

12. *Summary of work and achievement.*—The season 1951-52 was a complete failure. The rainfall was defective in almost all the districts, which reflected on the area of millets grown. In many cases, even though the seeds were sown, the crop could not come to a successful maturity. Out of the 6,363 acres of millets targetted for the Southern districts, 3,864 acres or 60 per cent were grown. The procurement was low. A quantity of 720 bags or 6 per cent of the target was achieved. The chances are that an equal quantity can be obtained from the standing crop. However, sufficient seeds are available to cover the area of the seed farm in the coming season and also a limited quantity of seed for distribution. The staff also did propaganda for the several items of improvement advocated by the department and a substantial achievement was made.

The financial statement for the fasli year 1951-52 is appended.

COIMBATORE,
25th August 1952.

U. ACHYUTHA WARIAR,
Seed Development Officer (Millet).

APPENDIX.

Financial statement for the fasli year 1951-52 of Seed Development Officer (Millets), Coimbatore.

Receipts—Nil.

Expenditure.

	RS.
Pay of Officer	3,078
Pay of Establishment	9,794
Dearness allowance	3,637
Travelling allowance and other compensatory allowance.	7,393
Demonstration charges	1,712
Dearness allowance to manials	1,140
Other Miscellaneous charges	994
Total ..	27,748

ANNUAL REPORT OF THE AGRICULTURAL ENGINEERING BRANCH, SOIL CONSERVATION, BELLARY, FOR THE FASLI YEAR 1361 (I.E., FROM 1ST JULY 1951 TO 30TH JUNE 1952).

1. *Soil Conservation Scheme in Ceded districts.*—A scheme for soil conservation in Rayalaseema was sanctioned by the State Government in their G.O. Ms. No. 304, Development, dated 24th January 1949, with a view to prevent soil and water losses in the dry lands of this tract and also to improve the economic condition of the ryots of the tract. The scheme came into operation on 8th August 1949 when the Assistant Agricultural Engineer, who was to be in charge of the scheme, joined duty.

After the preliminary topographic survey, the plans and estimates for tackling about 4,800 acres in the three centres, namely, Hagari and Alur in Bellary district and Guntakal in Anantapur district were submitted to Government and with the sanction of the Government in their G.O. Ms. No. 2172, Development, dated 14th May 1951, the actual execution of bunding work was taken up. Execution of bunding work was in full swing during the year and very good progress was made in all the three centres. The area sanctioned in the original estimates was completely covered in Alur and Guntakal centres and in Hagari centre also, the area will be completed shortly (in Hagari centre). The bunding work could not be further pushed through in the centres (though plenty of labour was available) due to the fact that revised proposals for extension of the area to 11,560 acres in all the three centres, so as to complete a catchment has not been sanctioned so far. In addition to the contour-bunding work, other conservation practices, such as contour-trenching and afforestation of steep and uncultivated slopes, construction of waste weirs and turfing of bunds and waste weirs were also done during the year.

Two hillocks in Joladarasi village of the Hagari centre were contour-trenched and afforested. In one of the hillocks (Buruzu Tippa) comprising an area of 21 acres, the trenched area was seeded to trees of economic importance, such as *prosopis juliflora*, *delonix regia*, *albezia lebbek*, *azaridacta indica* (neem), etc. The seeds which were sown during August 1951 had germinated well and in all about 60 per cent of the seedlings survived the severe drought period (i.e., summer of 1952) and all these seedlings are sure to establish well after the rains have set in.

The other hillock "Pedda Thippa" comprising an area of 57 acres which was trenched during the year under report was also seeded to species of trees of economic importance (such as *prosopis*, *delonix*, *albezia*, *neem*, *babul*, *tamarind*, etc.) after the onset of early rains during the end of May 1952. Some of the seeds have already germinated and, with the further rains expected during the north-east monsoon, the seeds are expected to germinate better. Advantage of early rains received during May 1952 was also taken in sowing grass seeds on bunds and near waste weirs.

2. During the year under report, contour-bunding work was vigorously taken up in addition to the several other works done by the staff, such as contour trenching, survey for the alignment of bund positions, actual alignment (or lock-spitting), the position of bunds on fields, supervision over bunding and

waste weir construction works, giving technical assistance to ryots on soil conservation measures to be adopted, tree-planting, turfing of bunds (with grasses), etc. The area covered during the year under various items are given below:—

Name of the district.	Name of the centre.	Area surveyed up to the previous fasli.	Area surveyed during the fasli.	Total up to 30th June 1952.	Area bunding up to the previous fasli.
(1)	(2)	(3)	(4)	(5)	(6)
		ACS.		ACS.	ACS.
Bellary	Hagari	6,049	Nil.	6,049	24
Bellary	Alur	6,310	Nil.	6,310	650
Anantapur	Guntakal	6,845*	Nil.	6,845*	200

Area bunding during the fasli.	Total area bunding up to 30th June 1952.	Area trenched up to the previous fasli.	Area trenched during the fasli.	Total trenched up to 30th June 1952.
(7)	(8)	(9)	(10)	(11)
ACS.	ACS.	ACS.	ACS.	ACS.
891	915	21	57	78
390	2,040	..	..	..
1,215	1,415	..	..	..

* Comprises of 5,320 acres surveyed in Bellary district and 1,525 acres surveyed in Anantapur district.

Execution of bunding work is in progress in Hagari centre only, as the sanctioned area of the original estimate is yet to be covered. The sanctioned areas in Alur and Guntakal centres have been completely covered and at present no bunding work is being done in these two centres.

3. *State Soil Conservation Board.*—In the capacity of the Secretary to the State Soil Conservation Board, two meetings were convened, one on 15th October 1951 at Bellary and another on 19th May 1952 at Ootacamund. Several schemes on soil conservation to be taken up in the province and the work so far done were discussed in the meetings. The Board accepted in general all the schemes that were put before the Board and also resolved to recommend to Government for early sanction and implementation of the schemes.

4. *Exhibitions.*—Took part in the Park Fair Exhibition, Madras and the Industries and Arts Exhibition, Bellary. In both the exhibitions, models of several conservation practices, as contrasted with the ryots' methods, were displayed. The layout was very much appreciated by the public.

5. *Special items of works done.*—(i) Attended the Food and Agricultural Organization (of the United Nations Organization) meeting on "Land Utilization in Tropical Countries" held from 17th to 29th September 1951 at Nuwara Eliya (Ceylon) as one of the Five-men Indian Delegation, led by Sri M. S. Sivaraman, I.C.S., Director of Agriculture, Madras. The conference adopted several recommendation resolutions on Land Utilization and the same communicated to the member Governments for adoption.

(ii) Investigated the problem of silting up of paddy lands in Uppuvelur village in South Arcot district and suggested suitable remedial measures.

(iii) Visited certain reaches of the Kurnool-Cuddapah canal area along with the District Agricultural Officer and District Forest Officer, Kurnool, with a view to submit proposals for a scheme of turf-bunding and afforestation of the Kurnool-Cuddapah canal area and proposals are being drawn up in consultation with appropriate officers.

(iv) Proposals for taking up soil conservation measures with contour-bunding as its main feature as famine relief measure in the season-affected areas of Chittoor, Coimbatore and Madurai districts were submitted, after a thorough investigation of the areas. The scheme submitted for Chittoor district has been sanctioned and is now in operation.

(v) Attended the meeting convened at Coimbatore for finalizing the scheme for research on soil conservation in the Nilgiris and has been sent to Government as a five-year scheme for submission to the Indian Council of Agricultural Research.

(vi) The question of taking adequate steps to prevent soil erosion in the Araku Valley was investigated with the Special District Agricultural Officer and the proposals have been submitted to the Board of Revenue to bring up the issue before the State Soil Conservation Board.

(vii) Gave technical assistance to the Doddaghatta Co-operative Colonization Scheme on the suitable soil conservation measures to be adopted in the region. An area of about 60 acres was aligned with bund positions, the execution work having been taken up by the co-operative society.

6. *Miscellaneous*.—(i) Statement of expenditure and receipts and (ii) statement of sanctioned staff are enclosed.

BELLARY,
26th July 1952.

N. SANKARANARAYANA REDDI,
Assistant Agricultural Engineer.

ENCLOSURE.

1. Statement of expenditure during fasli year 1951-52.

Head—40. F. Agricultural Engineering—B. Contour-bunding.

I. Pay and Allowances—

	RS.	A.	P.
Pay of Officers	3,300	0	0
Pay of Establishment	22,227	5	0
Fixed travelling allowance	3,744	8	0
Travelling allowance—Ordinary	3,966	10	0
Dearness allowance	7,882	9	0
House-rent allowance	1,568	5	0
	42,689	5	0

II. Contingencies—

Working expenses	16,228	2	0
Cost of bunding	1,64,293	0	0
Cost of machinery	1,075	0	0
Office contingencies	1,944	9	3
Dearness allowance to menials	4,976	7	0
	1,88,517	2	3

Grand total, Items I and II, amounts to .. 2,31,206 7 3

Statement of receipts (fasli year 1951-52).

XXIX. Agriculture—Agricultural receipts—

	RS.	A.	P.
Recoveries of overpayments	300	0	0

Statement showing details of sanctioned staff (fasli year 1951-52).

Names.	G.O. No. 3781, Development, dated 22nd September 1950 (1st July to 7th August 1951).	G.O. No. 1267, Development, (P. & D.), dated 22nd March 1951 (1st July to 7th August 1951).	G.O. Ms. No. 4440, Development (P. & D.), dated 5th Octo- ber 1951.	G.O. No. 1849, Development (P. & D.), dated 23rd April 1951 (1st July to 7th August 1951).	
(1)	(2)	(3)	(4-a) 8th August to 17th September 1951.	(4-b) 8th August 1951 to 30th June 1952.	(5)
1 Assistant Agricultural Engi- neer.	1	..	..	1	..
2 Soil Conservation Assistants ..	6	3	3	6	..
3 Agricultural Engineering Supervisors.	..	3	..	3	..
4 Draughtsman	..	1	..	1	..
5 Junior Superintendent	..	1	..	1	..
6 Upper division clerks	..	2	1	1	..
7 Lower division clerks	1	1	..	2	..
8 Store keepers	..	1	..	1	..
9 Typists	..	1	..	1	..
10 Revenue Inspectors	..	3	..	3	..
11 Jeep drivers	..	..	..	3	..
12 Peons	2	2	2	4	..

ADMINISTRATION REPORT OF THE ASSISTANT AGRICULTURAL ENGINEER, SOIL CONSERVATION SCHEME, OOTACAMUND, FOR THE YEAR 1951-52 (FASLI 1361).

I submit below the administration report for the year 1951-52 (fasli 1361).

I. Charge.—I assumed charge of the post of the Assistant Agricultural Engineer, Soil Conservation (Nilgiris), Ootacamund, on 17th July 1951 forenoon and continued to be in charge of the scheme throughout the period under report.

As per orders contained in Director of Agriculture's Memorandum No. K. 1-516/52, dated 16th June 1952, and G.O. Ms. No. 1035, Food and Agriculture, dated 27th June 1952. I was in full additional charge of the post of Assistant Agricultural Engineer for contour-bunding in Chittoor district sanctioned in G.O. Ms. No. 13, Revenue (Famine Relief), dated 7th May 1952, from 28th May 1952 forenoon and continued to be so till 30th June 1952.

II. Executive staff—Soil Conservation in the Nilgiris.—The two Agricultural Engineering Supervisors, assisted by one Revenue Inspector, are placed in direct charge of the scheme and one stationed at headquarters. One draughtsman sanctioned for the scheme is stationed at the office and is engaged in preparation of drawings and blue-prints connected with the scheme.

Sri S. Ramaiah, Agricultural Engineering Supervisor, was surrendered back to the Public Works Department and was relieved by Sri T. R. Narasimhulu, Agricultural Engineering Supervisor, on 8th January 1952.

Sri V. R. Jayaraman, Agricultural Engineering Supervisor, was on earned leave without substitute from 2nd to 13th November 1951, and 23rd to 28th June 1952 during the period under report; and Sri T. R. Narasimhulu, the other Agricultural Engineering Supervisor, was on earned leave with substitute from 23rd May to 30th June 1952.

Soil Conservation in Chittoor district.—Out of the six Soil Conservation Assistants and two Agricultural Engineering Supervisors, sanctioned for the scheme, only five Soil Conservation Assistants have joined duty during the period ending 30th June 1952. Three had joined duty during the first week of June, whereas the other two joined duty during the last week of June 1952. Two Soil Conservation Assistants have been posted to be in direct charge of Contour-bunding work in Vayalpad taluk and other two have been posted to be in direct charge of the work in Chittoor taluk.

The postings of two Agricultural Engineering Supervisors, one draughtsman, one tracer and two Revenue Inspectors sanctioned in the scheme are yet to be made.

III. Contour-Bunding Scheme—(a) Nilgiris District Scheme.—The rolling nature of the terrain, the steep slopes aided by the exploitative agricultural practices being followed by the ryot of the district and the large area demanded of the forest and other vegetational cover, for cultivation of potato, a clean-tilled row crop, have become an easy target of the heavy

rainfall received in the tract, resulting in recurring loss of tons of precious and productive top soil in the Nilgiris. The erosion menaces in this district have attained such a dangerous proportion that they require the immediate attention of the State. In the notification, G.O. Ms. No. 3516, Development, dated 6th September 1950, Government have therefore, notified that the Madras Land Improvement Schemes (Contour Bunding and Contour Trenching) Act, 1949, should be made applicable to the Nilgiris district and adjoining hill slopes and directed the Board of Revenue to prepare and submit plans and estimates for a scheme for soil conservation in the specified areas. The Board of Revenue in turn directed the Director of Agriculture, Madras, for the purpose. A special staff consisting of one Assistant Agricultural Engineer, two Agricultural Engineering Supervisors, one Draughtsman and other ministerial and menial staff was sanctioned for a period of three months in the first instance and the staff started functioning from 17th July 1951 forenoon, the date on which the Assistant Agricultural Engineer joined duty. As the period of sanction was too small to prepare a scheme even for a selected area, further extension was sought for and the sanction for a further period ending with 31st July 1952 was accorded in G.O. Ms. No. 6017, Development (Planning and Development), dated 5th December 1951.

Initial and speedy reconnoitering of the badly eroded places in all the taluks of the Nilgiris district was taken up and it was decided to start intensive and detailed soil conservation survey in Ketti Valley in Coonoor taluk for the preparation of soil conservation scheme at the outset, since a large extent of lands on steep slopes are under cultivation and the erosion hazards are the maximum at this place.

Several streams running in the several sub-valleys of this valley drain ultimately into the Katteri stream which is harnessed for water-supply for the Katteri Hydro-Electric Power Station generating power for the Cordite Factory. Any conservation practices introduced in this valley basin will therefore be conducive to the efficiency of this Hydro-Electric Power Station as well.

To start with, a self defined sub-watershed of about 300 acres was selected in consultation with the Collector of the Nilgiris and the Assistant Conservator of Forests in charge of Soil Conservation, Ootacamund; and detailed contour and topographical survey was undertaken. Contour and topographical surveying of 291.00 acres which form the free catchment of the selected sub-valley was completed during the period under report.

As per resolution passed by the State Soil Conservation Board, during its meeting on 15th October 1951 at Bellary, a Pilot Soil Conservation Scheme for a comprehensive block of 88.65 acres situated on the higher contour of the selected sub-watershed was prepared and submitted with plans and estimates for sanction. The financial implications of the Pilot Scheme are furnished in Appendix A (enclosed).

Due to the special feature of the terrain of the proposed area and the special nature of the soil conservation measures suitable for this area, the cost of the various proposed soil conservation measures works out to nearly Rs. 300 on an average per acre. Hence, it was proposed that only 50 per cent of the total expenditure on the land improvement works will

be recovered from the ryots in twenty easy instalments, the first instalment commencing from after two years from the date of completion of the land improvement works proposed.

The Soil Conservation Scheme for the remaining 203.35 acres together with plans and detailed estimates was prepared and submitted to the Nilgiris Soil Conservation Board for discussion and approval and the same was under the consideration of the said Board.

In view of the fact that sowing season for the first crop was fast approaching and any bunding work taken up on catchment basis will have to be completed expeditiously in the interest of safeguarding the lands lying on the lower contours, soil conservation on the 500 acre catchment near the 6th mile on Chittoor-Cuddapah road in Chittoor taluk and the catchment near the first mile on Vayalpad-Tharigonda road in Vayalpad have been taken up during the first week of June 1952 when the executive subordinates posted for the scheme joined duty. The actual execution of the contour bunding work was started on 10th June and 13th June 1952 in Chittoor and Vayalpad taluks, respectively and 118 acres in Chittoor taluk and 52 acres in Vayalpad taluk have been contour bunded during the period ending 30th June 1952. On receipt of rains during the month in Vayalpad taluk agricultural operations involving sowing of groundnut and cumbu in and around this sub-catchment was taken up and hence, the contour bunding work in the sub-catchment where work was originally started, had to be suspended and fresh sub-catchment where the sowing and other agricultural operations were not taken up yet, has been selected nearly 2 miles from the original sub-catchment; and the work is in progress there. The following particulars for the period ending 30th June 1952 concerning the soil conservation work as a famine relief measure in Chittoor district, are furnished :—

Particulars.	Chittoor taluk.	Vayalpad taluk
Number of works taken up	One (4,300 acre block).	One (3,500 acre block).
Estimated value of works taken up.	Rs. 2,60,000	Rs. 2,00,000
Expenditure so far incurred on works completed.	Rs. 5,900-1-0	Rs. 1,862-1-0
Number of persons employed up to 30th June 1952—		
Men	3,111	806
Women	1,630	1,076
Children	147	112

Soil Conservation Scheme in Chittoor district.—In G.O. Ms. No. 13, Revenue (Famine Relief), dated 7th May 1952, the Government were pleased to sanction the scheme for soil conservation in Chittoor district and directed that the work should be taken up immediately as a famine relief measure. Three self-defined catchments comprising of 4,300 acres in Chittoor taluk and an area of about 4,000 acres on either sides of Vayalpad-Tharigonda road and Vayalpad-Guntur road, in Vayalpad taluk were the sites approved for implementing the contour bunding scheme in Chittoor district. The scheme came into effect from 28th May 1952, i.e., the date on which the Assistant Agricultural Engineer, Soil Conservation Scheme, Ootacamund, took additional charge of the post of Assistant Agricultural Engineer, Soil Conservation Scheme, Chittoor.

APPENDIX A.

Pilot Scheme—Financial Implications.

	RS.	A.	P.
Staff—			
I. Pay of establishment—			
(i) Two Agricultural Engineering Supervisors or Soil Conservation Assistants on pay of Rs. 100—230 for 3 months— $3 \times 2 \times 100$..	600	0	0
One Accountant on Rs. 80 per mensem in the scale of Rs. 80—3—95— 5—110— 3×80	240	0	0
Two Engineering Maistries on Rs. 40 per mensem each— $2 \times 3 \times 40$..	240	0	0
Two peons at Rs. 18 each per month— $2 \times 3 \times 18$	108	0	0
Total ..	1,188	0	0
(ii) Dearness allowance—			
Two Supervisors and 1 Accountant at Rs. 24 per month— $3 \times 3 \times 24$..	216	0	0
Two Engineering Maistries at Rs. 21 per mensem— $2 \times 3 \times 21$..	126	0	0
Two peons at Rs. 18 per mensem— $2 \times 3 \times 18$	108	0	0
Total ..	450	0	0
(iii) Other compensatory allowance (Special Pay)—			
Three persons at Rs. 13-8-0 per mensem— $3 \times 3 \times 13-8-0$	121	8	0
Two persons at Rs. 9 per mensem $2 \times 3 \times 9$	54	0	0
Two persons at Rs. 4-8-0 per mensem $2 \times 3 \times 4-8-0$	27	0	0
Total ..	202	8	0
	or		
	203	0	0
(iv) House rent allowance—			
Seven persons at Rs. 3 per mensem— $7 \times 3 \times 3$	63	0	0
Total of pay and allowances ..	1,904	0	0
II. Travelling allowances—			
Two Supervisors at Rs. 50 per mensem	300	0	0
Two peons at Rs. 20 each per mensem	120	0	0
Other unforeseen items like transfer Travelling allowances, etc. ..	180	0	0
Total ..	600	0	0
III. Cost of land improvement works	25,000	0	0

ABSTRACT.

	RS.	A.	P.
I. Pay and allowances of establishment	1,904	0	0
II. Travelling allowances	600	0	0
III. Cost of land improvement works	25,000	0	0
	27,504	0	0

APPENDIX B.

Statement of expenditure and Receipts (1st July to 30th June 1952).

Nilgiris Soil Conservation Scheme.

	RS.	A.	P.
Expenditure—			
Pay—			
(a) Pay of Officers	2,725	13	0
(b) Pay of establishment	4,353	0	0
Allowances—			
(a) Dearness allowance	2,399	9	0
(b) House-rent allowance	258	15	0
(c) Other compensatory allowances	853	6	0
(d) Travelling allowances	2,133	14	0
Contingencies—			
Office and other items of contingencies including liabilities to be adjusted	14,509	2	3
Receipts	Nil.		

Chittoor Soil Conservation Scheme.

Expenditure—			
Contingencies	1,632	10	0
Receipts—			
Receipts	Nil.		

NOTE.—Soil Conservation Scheme in Chittoor district was started from 28th May 1952.

APPENDIX C.

Statement of sanctioned Officers and Posts.

Name of service and posts.	Number of sanctioned posts.	
	Permanent.	Temporary.
NILGIRIS SOIL CONSERVATION SCHEME.		
1. Madras Agricultural Service.		
Assistant Agricultural Engineer	1	
2. Madras Agricultural Subordinate Service.		
Agricultural Engineering Supervisors	2	
Draughtsmen	1	
3. Madras Ministerial Service.		
Lower division clerk	1	
Typist	1	
4. Madras Inferior Service.		
Peons	4	
CHITTOOR SOIL CONSERVATION SCHEME.		
1. Madras Agricultural Service.		
Assistant Agricultural Engineer	1	
2. Madras Agricultural Subordinate Service.		
Draughtsman	1	
Soil Conservation Assistants	6	
Agricultural Engineering Supervisors	2	
Tracer	1	
3. Madras Ministerial Service.		
Upper division clerks	2	
Lower division clerks	2	
Store-keeper	1	
Typist	1	
4. Madras Revenue Subordinate Service.		
1 Revenue Inspectors	2	
5. Madras Inferior Service.		
Peons	6	
Jeep drivers	2	

ANNUAL ADMINISTRATION REPORT OF THE TRACTOR WORKSHOP, BAPATLA, FOR THE YEAR ENDING WITH 30TH JUNE 1952.

I submit below the third Administration Report of the Tractor Workshop, Bapatla, for the year 1951-52.

Charge.—I continued to be in-charge of the Tractor Workshop, Bapatla, through out this year except from 11th August to 18th September 1951 for which period the Lecturer in Mechanical Engineering, Agricultural College, Bapatla, was in additional charge of this post as I was deputed for training at the Indian Agricultural Research Institute, New Delhi, during that period.

With the posting of two Assistant Agricultural Engineers (Inspection) at Vijayavada and Vizianagaram my jurisdiction was limited to the Tractor Workshop and Regional Stores at Bapatla and the inspection work at Nellore district.

Postings, leave and transfers.—The Second Assistant Tractor Foreman's post was filled up from August 1951 and the sixth fitter's post from March 1952. One upper division clerk and one typist were working under the Principal, Agricultural College, Bapatla, throughout the year in the Engineering Section of Guntur district. The Office Superintendent went on leave for about 2-1/2 months (total) twice during this year. One upper division clerk went on leave for two months and subsequently transferred from workshops. Three persons have changed hands in one of the lower division clerk's post. The services of one Tractor Foreman were terminated on various counts of charges. The post of the Second Agricultural Engineering Supervisor and a Miller sanctioned for the workshop remain unfilled during this year.

Addition of tools and plant.—The following additional equipment was purchased for the workshop during the year :—

One B.E.N. air compressor sand blasting apparatus oxygen and acetylene regulators and other accessories for the metal spraying apparatus, one plug cleaner and one Wolf's Valve reseating machines were added.

Manufacture.—The basis of manufacturing work in the workshop remains the same as it was during the previous years, namely, that they are manufactured only incidental to repairs and not for stocking purposes on a planned basis against any future contingency, though always some more parts of the kind that are already under preparation are produced where some convenience in setting up and operation are found feasible to cut down the cost of production. Proposals have been submitted to develop the manufacturing work of spares of regular wearing nature which are always in constant demand on a planned basis and make it a regular feature of the Tractor Workshop, Bapatla, and it is hoped it would receive due consideration for adoption during the next year to which this report relates.

670

ADMINISTRATION REPORTS OF SUBORDINATE OFFICERS OF

About 209 work orders for manufacturing spares numbering 655 were carried out during the year as detailed below :—

Manufacture of spares for.	Number of work orders.	Total number of spares.
Tractors	83	256
Implements	24	116
Pumpsets	28	64
Other items	74	219

Repairs.—The method of reclaiming the worn out plow shares and the centre and end cutting edges was gradually developed in the workshop to such a stage where it can be said with confidence that these methods certainly result in economising expenditure over these items. Plow shares and cutting edges reclaimed by welding spring steel flats and sharpening have been put to use at Guntur and Srikakulam and found to have given excellent results. It now only remains to take up this work and translate it into volume. Proposals to take up this work regularly in the workshop were submitted and it is hoped that it would receive due consideration.

About 372 work orders for repairing and servicing of 861 parts were executed during the year as detailed below :—

Repair of parts of	Number of work orders.	Numbers operated upon.
Tractors	123	313
Implements	52	76
Pumpsets	57	109
Other items	140	363

Servicing.—Major and minor overhauls and servicing for over 50 units of tractors, implements, pumpsets, lorries, jeeps, dusters, sprayers and other agricultural machinery were undertaken and completed in the workshop. Special mention may be made of the commissioning of the D-4 caterpillar tractor No. 1 of Guntur and D-4 tractor received from Anakapalle into work both of which were in a sick list for more than one and half years. These units were procured from the Army surplus and put to maximum use and many parts were worn out which were not readily available. A number of them were manufactured in the workshop and the units were set right. Also mention may be made of the servicing and commissioning of the 10-ton automobile van received from Saidapet and the servicing and repairing of the Waukesha oil engine from a state of condemnation.

Training.—A training course was held from 13th August to 15th September 1951 in mechanised agriculture at the Indian Agricultural Research Institute, New Delhi, by Mr. Earle K. Rambo, the Agricultural Engineering Adviser to the Government of India, under Point 4 Programme, for which 32 candidates were deputed by the various State Governments of our country. This was conducted in a unique way both to impart knowledge as well as to serve as a model training class for similar classes to be run by these trainees in their respective States. I am one of those who were deputed from this department and benefited by this training. Detailed proposals to conduct two similar classes in this State for the benefit of all the Assistant Agricultural Engineers and Agricultural Engineering Supervisors of this department were submitted and it is likely we may be having these classes during the next fasli year.

One Assistant Tractor Foreman was deputed to Calcutta for a period of three weeks for getting trained in the use of the metallizing equipment in the re-building of worn out crank-shafts, etc., at the Indian Oxygen and Acetylene Company, Limited, during the month of May 1952.

Practical training was given at the workshop in the use of fitters tools, track servicing, etc., for all the batches of trainees from the tractor Driver Training Scheme at Bapatla.

Regional stores.—Spares worth Rs. 4,73,674 approximately were received during this fasli year from Saidapet stores and various dealers of tractors and implements and spares worth Rs. 85,045 were despatched to various districts for immediate requirements in and outside the jurisdiction of the region as shown below :—

	RS.
Anakapalle	4,295
Anantapur	8,221
Araku Valley	129
Bellary	7,241
Cuddapah	1,405
Eluru	3,660
Kakinada	861
Kurnool	14,700
Nellore	2,620
Srikakulam	9,725
Vijayavada	27,890
Guntur	2,171
Other districts	

Tours.—I was on tour for 65 days during the year excluding the training and in the districts of Nellore, West Godavari and Krishna and inspected tractors, 12 implements, 38 oil engines, nine lorries and jeeps.

The Agricultural Engineering Supervisor of workshop was deputed for a period of about one and half months during December and January for managing and attending to the Park Fair Exhibition at Madras.

The Stores Superintendent was on tour to Madras for about 20 days in April and May for taking delivery of stores ordered for transfer to Bapatla and the Saidapet stores.

Actual expenditure incurred during the fasli year under each budget head.

	RS.	A.	P.
1 Pay of officers	2,868	1	0
2 Pay of establishment	17,240	6	0
3 Dearness allowance to officers and establishment.	6,889	0	0
4 Travelling allowance to officers and establishment.	1,851	8	0
5 House rent allowance	783	15	0
6 Contingencies including wages to menials.	20,495	12	3
7 Dearness allowance to menials	957	0	1

General.—The utilization factors of the various machines in the workshop for over a period of one-and-half years were collected which were found to be very poor. Our country, though in dire need of more and more production machinery, is not able to invest the required capital on it, necessitating to think in terms of making the maximum use of the existing machinery in shifts. Under the circumstances it is essential for us to see that the total number of hours each machine was put to use in a given period is immediately increased to as nearly as possible the total number of hours to which it can be put to use during that period, i.e., in other words to raise the utilization factor.

As long as the work in the Workshop is of the jobbing nature the output will be necessarily low, as the same person has to attend to different works varying in the technique to be adopted on each of them which do not lend themselves to the production technique. But if some of such repairs are standardized like the repairs to sprockets, idlers, plow shares cutting edges of bull-dozers, etc., as we did now, and put a regular batch of workers on these jobs who will not be disturbed for any other works overhauling or manufacturing nature other than those required for these specific items of work, they acquire skill and give more and better turn over just as in the case of mass production.

It is also necessary to see that the volume of work being tackled is increased by increasing the operating staff to the extent the demand exists and to the extent the sanctioned supervisory strength can efficiently control them so as to raise the turn over and cut down the overheads.

Proposals were already submitted to make a start in this direction and when the work is oriented on the above lines the workshop would be giving more turn-over year after year.

TRACTOR WORKSHOP, BAPATLA,
29th August 1952.

C. SEETHARAMIAH,
Assistant Agricultural Engineer.

ANNUAL ADMINISTRATION REPORT OF THE TRACTOR WORKSHOPS, COIMBATORE, FOR THE YEAR 1951-52.

I submit below the Annual Administration Report in respect of the Tractor Workshops, Coimbatore, and the working of the Tractor Cultivation Scheme in the Coimbatore district for the fasli year 1951-52.

I. Organization and charge.—I was in charge of the Tractor Workshops, Coimbatore, throughout the year, except for a short interval from 11th August to 19th September 1951 during which period I underwent training at New Delhi, conducted by the Ministry of Agriculture under Part 4 Programme of United States aid to India. Sri J. P. Walter Devasahayam, Estate Mechanical Engineer, Agricultural College, Coimbatore, was in additional charge of the Tractor Workshop during this period.

The Tractor Workshop is located in the M. B. sheds erected in the field No. 38 of the Central Farm, Agricultural College, Coimbatore, and was established with the object of complete servicing and overhauling of tractors in the thirteen districts of the southern zone, putting into commission as many sick units as possible thus reducing the idle periods of the turnover, manufacturing, stocking and essential spares for the departmental tractors in the zone.

II. Staff.—The workshop and its staff were originally sanctioned in G.O. Ms. No. 2401, Development, dated 5th May 1949, on a temporary basis for one year. The sanction was renewed year by year. The sanction for the continuance of the Tractor Workshop and its staff for the year ending with 31st March 1952 was accorded in G.O. Ms. No. 927, Food and Agriculture, dated 7th May 1951, and its continuance beyond 31st March 1952 was sanctioned in G.O. Ms. No. 507, Food and Agriculture, dated 25th March 1952.

Sanctions were also accorded during the year for entertainment at the Tractor Workshop of one miller in G.O. Ms. No. 1742, Food and Agriculture, dated 1st September 1951, and one welder in G.O. Ms. No. 2222, Food and Agriculture, dated 15th November 1951. The miller was appointed from 3rd March 1952 and the welder from 1st May 1952. Details of staff sanctioned for the Tractor Workshop in G.O. Ms. No. 507, Food and Agriculture, dated 25th March 1952, and the staff actually working at present are given below:—

Particulars of establishment.				Sanctioned strength.	Staff actually working during the fasli year 1951-52.
				No.	No.
(a) Gazetted Officers—					
Assistant Agricultural Engineer	—	..		1	1
(b) Non-Gazetted Officers—					
Agricultural Engineering Supervisors	..	..		2	1
Tractor Foremen	..	..		2	2
Assistant Tractor Foremen	..	..		2	1
Office Superintendent	..	..		1	1
Stores Superintendent	..	..		1	1

Particulars of establishment.	Sanctioned strength.	Staff actually working during the last year. 1951-52.
	No.	No.
Upper division clerks	2	2
Lower division clerks	2	2
Typists	2	2
Attender	1	1
Miller	1	1
Welder	1	1
Fitters	6	3
(c) Inferior servants—		
Peons	3	3
Watchmen (paid from contingencies)	2	2

III. (a) *Buildings.*—The office of the Assistant Agricultural Engineer, Tractor Workshop, continues to be located in the two rooms attached to the Assistant Agricultural Engineer's (Research) Workshop on a temporary basis. The proposals submitted by the Director of Agriculture to the Government for the construction of a separate office for the Assistant Agricultural Engineer have been approved and the Government have been pleased to include this work under the Part II Scheme for 1952-53.

The electrification of the M.B. sheds at the Tractor Workshop was taken up by about the middle of November 1951 and completed during February 1952 on contract basis by the Electrical Engineer (General), Madras. The erection of the transformer was taken up during March. As there was no power supply, power was not made available till 1st of May. The Superintending Engineer was pressed and 25 h.p. was sanctioned to run the machine for the present. The plan of the M.B. Shed Tractor Workshop was not approved as there was no ventilators and the construction was not in accordance with the provisions of the Factories Act. The plans have since been modified providing windows on the sides and the same have been sent to the Regional Inspector of Factories for approval and the same is awaited.

(b) *Plants and machinery.*—Soon after the completion of the electrification of the M.B. shed, the erection of the machineries installed temporarily at the Research Engineer's Workshops was taken up. The following machineries have been erected at the M.B. shed and work was commenced in May 1952 when the erection of the transformer was completed and power supply given.

- | | |
|------------------------------|----------------------------------|
| (1) Lathe, 7 inches centre. | (8) Grob band saw. |
| (2) Lathe, 7½ inches centre. | (9) Hack sawing machine. |
| (3) Milling machine. | (10) Drilling machine. |
| (4) Shaping machine. | (11) Air compressor. |
| (5) Tool grinder. | (12) Wolf valve refacer. |
| (6) Do. all. | (13) Metal spray and sand blast. |
| (7) Arc welding plant. | |

