



DEPARTMENT OF AGRICULTURE
MADRAS

REPORTS ON THE WORK
OF THE
AGRICULTURAL STATIONS
IN THE MADRAS STATE FOR
1951-52

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**ANNUAL REPORT OF THE SUGARCANE RESEARCH STATION,
NAKAPALLE (VISAKHAPATNAM DISTRICT), FOR 1951-52 (FASLI 1361).**

Season and rainfall.—A total rainfall of 37.62 inches was received on 58 rainy days during the period under report. This was 1.4 inches more than the precipitation in the previous year but was less than the last 10 and 25-year averages by a little more than 3 inches.

The south-west monsoon recorded 18.35 inches on 29 rainy days against 16.21 inches on 33 days during the previous season. This was practically equal to the normal rainfall in this period and benefited the standing crops of punasa, ragi, cumbu, and sugarcane to a great extent.

Rainfall in the north-east monsoon period amounted to 11.55 inches on 15 days and this is a little over 2 inches below the normal average. The crops had to be maintained by lift irrigation in times of scarcity.

The rainfall in the hot weather period was 7.72 inches on 14 rainy days. This is equal to the average fall received during the last ten years. Though there was some adverse effect due to initial drought, sugarcane and fodder crops were benefited by these rains most of which were received in May.

The season may be considered as an average one in all respects. But for the cyclonic winds received in the third week of November which caused some damage for the well-grown cane crops, the season was more or less normal. The data of rainfall are furnished in the following table :—

Rainfall statement.

Rainfall statement.								
Month.	Week.	7th June 1951 to 6th June 1952.		7th June 1950 to 6th June 1951.		Average for ten years (1941-42 to 1950-51).		Average for 35 years (1916-17 to 1950-51) — in Rainfall inches.
		Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
South-west monsoon.								
June	7-13	0.14	1	0.08	..	0.09	1	0.82
	14-20	0.46	2	1.85	4	0.80	2	1.16
	21-27	1.23	3	0.97	2	0.71	2	0.71
June-July ..	28- 4	0.85	2	1.69	3	1.74	3	1.50
	5-11	0.08	..	1.10	2	1.96	2	1.85
	12-18	1.00	..	0.31	2	1.03	2	0.88
	19-25	0.63	1	0.50	1	0.99	2	0.13
July-August ..	26- 1	0.23	1	1.28	2	1.35	2	1.29
	2- 8	0.77	2	0.45	1	0.66	1	0.91
	9-15	0.23	1	0.08	..	1.01	2	1.00
	16-22	5.42	4	0.64	2	0.22	1	1.84
	23-29	4.98	5	1.18	2	1.66	2	0.90
August-September.	30- 5	0.98	1	1.43	5	0.87	2	1.40
	6-12	0.42	2	1.79	3	1.18	2	1.42
	13-19	0.58	3	0.56	2	1.57	3	1.95
	20-26	0.25	1	2.52	2	3.18	3	2.21
Total ..		18.35	29	16.21	33	19.02	32	19.50
North-east monsoon.								
September-October ..	27- 3	3.91	4	..	..	0.88	2	2.03
	4-10	0.49	2	0.23	1	1.47	2	2.72
	11-17	1.60	2	0.17	1	2.59	2	1.81
	18-24	0.89	1	4.07	2	2.48	2	1.65
	25-31	2.05	3	1.81	3	2.33	1	1.83
November	1- 7	0.41	1	3.86	3	1.79	1	1.10
	8-14	..	..	0.11	1	0.59	1	0.56
	15-21	..	..	0.84	2	0.55	1	1.10
	22-28	2.70	2	..	..	0.03	1	0.50
December	29- 5	..	..	..	..	0.08	..	..
	6-12	..	..	..	..	0.61	1	..
	13-19	..	..	..	..	0.34	..	..

Month	Week.	7th June 1951 to 6th June 1952.		7th June 1950 to 6th June 1951.		Average for ten years (1941-42 to 1950-51).		Average for 35 years (1916-17 to 1950-51).
		Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
North-east monsoon—cont.								
December-January.	27-3	..	..	..	..	0.04	..	0.03
	4-10	..	..	..	..	0.01	..	0.01
	11-17	..	..	..	..	0.06	..	0.01
	18-24	..	..	..	..	0.06	..	0.02
	25-31	..	..	..	..	0.01	..	0.0
	Total ..	11.55	15	11.09	13	13.82	14	13.6
Hot weather period.								
February	1-7	..	..	..	..	0.29	..	0.21
	8-14	..	..	..	..	0.14	..	0.19
	15-21	..	..	..	..	0.03	..	0.99
March	22-28	1.52	1	..	..	0.31	..	0.18
	1-7	..	..	..	..	0.07	..	0.14
	8-14	..	..	..	..	0.46	1	0.22
March-April	15-21	0.14	1	..	..	0.01	..	0.06
	22-28	..	..	..	..	0.22	..	0.13
	29-4	0.25	1	0.43	1	0.26	1	0.15
April-May	5-11	..	..	..	..	0.47	1	0.41
	12-18	0.34	1	..	..	0.15	2	0.32
	19-25	0.47	2	0.91	2	0.18	1	0.25
May-June	26-2	0.13	1	1.15	2	0.42	1	0.23
	3-9	..	..	2.20	1	0.49	1	0.51
	10-16	..	..	..	..	0.29	1	0.69
Total	17-23	3.10	3	..	..	1.19	1	0.68
	24-30	1.18	2	2.81	2	1.06	1	0.73
	31-6	0.59	2	1.42	2	0.90	1	0.81
	Total ..	7.72	14	8.92	10	6.99	12	6.95
Total for the year ..		37.62	58	36.22	56	39.83	58	40.09

A. Sugarcane.

I. AGRONOMY.

2. The area under sugarcane was 19.57 acres during 1951-52 as against 20.66 acres in the previous year. Besides an area of 3.19 acres was under short crop for seed purposes. The growth of the sugarcane crop was quite satisfactory but there was slight damage to the cane crop due to the cyclonic winds that occurred in the third week of November 1951. The season was quite favourable for the ripening of sugarcane. On average an acre yield of 41.83 tons per acre was obtained while the yield in the previous year was 42.80 tons per acre. Research work on sugarcane was under progress in the divisions of Agronomy, Chemistry, Physiology, Mycology and Entomology and the work is reported hereunder.

(i) Agronomy.

3. *Varietal study.*—Sugarcane varieties received from the Sugarcane Breeding Institute, Coimbatore, and other places are planted in these plots, in the first stage of their trial after sufficient seed material is multiplied. There were 120 Coimbatore varieties, 14 I.C. varieties and five B.O. varieties under test during this year. These were compared with the three standard 'early' (Co. 527), 'mid' (Co. 449) and 'late' (Co. 419) season varieties in randomized plots of 0.6 cent each in area and replicated twice.

Over a basal dressing of ten tons of farmyard manure, a mixture of ground nut cake and sulphate of ammonia in 2:1 proportion on nitrogen basis, was added, to supply 100 lb. nitrogen per acre, in two equal doses, at planting times.

The varieties in this trial are studied with particular reference to the economic characters such as germination, tillering, height, quality of juice, yield and resistance to pests and diseases. Varieties of outstanding merit are passed on to preliminary yield trials in the second or subsequent season depending upon their performance.

Among the Coimbatore seedling 32 varieties, from Co. 658 to Co. 689, 54 varieties from Co. 690 to Co. 744 and 35 varieties from Co. 746 to Co. 834 were in the third, second and first year of trial respectively. All the I.C. canes were under test only this year and B.O. varieties were in the second year of trial.

Germination of varieties varied between wide limits, Co. 710 recorded the maximum germination of 74.83 per cent as compared to the lowest value of 27.59 per cent recorded in Co. 808. Over 70 per cent germination was given by Co. 670, Co. 674, Co. 690, Co. 691, Co. 695, Co. 703 and Co. 710. Varieties Co. 660, Co. 686, Co. 687, Co. 697, Co. 713, Co. 714 and Co. 718 recorded between 65 to 70 per cent germination against the average germination percentages of 52.11, 50.25 and 49.94 recorded in the controls Co. 419, Co. 449 and Co. 527, respectively. Though the germination was good, almost all the varieties listed above were found to be of no economic importance from the points of juice quality and yield. A study of the percentages of these varieties indicated that Co. 301 induced better germination in the progeny.

Tillering is an important criterion in the selection of varieties. Eight varieties, viz., Co. 726, Co. 732, Co. 735, Co. 747, Co. 750, Co. 758, Co. 776 and Co. 810 put forth more than five tillers per every bud germinated. Between four and five tillers were recorded by 28 Coimbatore canes. Among these good tillers Co. 750 and Co. 732 have other desirable characters also.

With regard to vigour of growth and crop-height Co. 678 stood first with 130 inches of height, followed by Co. 724, with 128 inches in October at the age of six months. Other varieties which recorded more than 120 inches of crop height during this month were Co. 664, Co. 682, Co. 683, Co. 703, Co. 721, Co. 722 and Co. 735. Of these, only Co. 664 and Co. 722 combine other desirable characters also.

Thirty-seven varieties arrowed and Co. 664, Co. 668 and Co. 746 were the earliest to flower. Arrowing was profuse in Co. 664, Co. 666, Co. 668, Co. 674, Co. 694, Co. 703, Co. 719, Co. 755 and B.O. 10 and B.O. 15. Among the Coimbatore seedlings Co. 694 recorded the highest percentage of arrowing (58.39 per cent) followed by Co. 703 (51.95 per cent).

The juice quality of all the varieties was studied from November to April once a month. Based upon the sucrose content and purity values of the juices, varieties are classified as early, mid-season and late maturing as shown below:—

Early group—(With over 16 per cent of sucrose and over 85 per cent purity in December).—Co. 664, Co. 666, Co. 668, Co. 673, Co. 674, Co. 694, Co. 712, Co. 719, Co. 727, Co. 733, Co. 734, Co. 746, Co. 750, Co. 808, Co. 810, B.O. 10, B.O. 11, B.O. 15, B.O. 21, B.O. 24, I.C. 208, I.C. 216 and I.C. 221.

Mid-season group—(With over 18 per cent sucrose and over 85 per cent purity in February).—Co. 659, Co. 671, Co. 672, Co. 679, Co. 683, Co. 689, Co. 705, Co. 716, Co. 718, Co. 729, Co. 738, Co. 744, Co. 747, Co. 758, Co. 761, Co. 775, Co. 779, Co. 785, Co. 792, B.O. 10 and B.O. 11.

Late season group—(With 15 per cent and over of sucrose and 85 per cent and over of purity in April).—All the varieties under trial except seven varieties viz., Co. 721, Co. 743, Co. 771, Co. 800, Co. 807, I.C. 207 and I.C. 214.

Unlike in previous seasons, most of the varieties reached their peak sucrose contents in April instead of February-March. The average sucrose per cent of juice in March for all varieties was only 17.58, against 18.05 per cent in April.

Commercial cane sugar values were calculated for all the varieties included in the different groups and the details pertaining to some promising varieties regarding high C.C.S. per cent together with data on population yield and C.C.S. per acre furnished in Table I.

TABLE I.—Yield and other data of important varieties.

Serial number and variety.	Average yield in tons per acre.	Average cane population per acre.	C.C.S. per cent.	C.C.S. in tons per acre.
(1)	(2)	(3)	(4)	(5)
<i>'Early season' group standard Co. 527 (December harvest).</i>				
1 Co. 727	29.02	45,500	13.56	3.94
2 Co. 719	32.57	49,500	12.75	4.15
3 Co. 527	40.31	44,500	11.11	4.48
<i>'Mid-season' groups standard Co. 449 (February harvest).</i>				
1 Co. 750	41.98	37,500	15.57	6.54
2 Co. 785	27.13	27,500	13.97	3.79
3 Co. 449	32.31	33,000	13.55	4.38
<i>'Late season' group standard Co. 419 (April harvest).</i>				
1 Co. 733	27.46	27,000	15.26	4.19
2 Co. 705	33.04	52,500	14.94	4.94
3 Co. 734	15.19	19,500	14.58	2.21
4 Co. 729	29.35	30,000	14.16	4.16
5 Co. 419	32.68	27,000	13.07	4.27

Taking into consideration all the economic characters the following varieties were found promising and worth further trial and observation:—

Early group.—Co. 719, Co. 727.

Mid-season group.—Co. 750, Co. 785.

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

Varities Co. 729 and Co. 734 have been planted in preliminary yield trial of the following season.

All the I.C. varieties under trial were found to be very poor in their field performance. Similar was the case with most of the B.O. varieties. Only one variety B.O. 11 was retained for further study.

4. *Preliminary yield trials.*—During this year five early maturing varieties, mely, Co. 672, Co. 673, Co. 682, Co. 683 and Co. 684 were tested against Co. 527, the control. The results are furnished in Table II.

TABLE II.—Sugarcane Preliminary yield trial, 1951-52.

Field number—15 North.	Spacing—4 links or 2' 8" between cane rows.
Soil—Loam.	Seed rate—15,000 three-budded sets per acre.
Previous crop—Paddy.	Treatments—Six varieties—Co. 672, Co. 673, Co. 682, Co. 683, Co. 684 and Co. 527 (control).
Manures—Ten tons of farmyard manure per acre as basal dressing and 100 lb. nitrogen (two-thirds in the shape of groundnut cake and one-third as sulphate of ammonia) applied in two equal doses half at planting and half at trenching.	Replications—Four.
Dates of planting—22nd and 23rd February 1951.	Layout—6 × 4 randomized blocks.
Dates of harvest—17th to 22nd December 1951.	Size of plot—Gross—1,820 cents (65 links × 28 links). Net—1,000 cents (50 links × 20 links).
	Year of trial—First.

Summary of results.

	Co. 684.	Co. 682.	Co. 527.	Co. 673.	Co. 683.	Co. 672.	Standard error of treatment mean.	Whether significant or not (P = 0.05).	Critical difference (P = 0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Mean yield of cane in tons per acre.	38.35	37.67	37.40	35.10	32.63	29.33	1.46	Yes	4.40
As per cent on control.	102.6	100.8	100.0	93.8	87.2	78.6	3.903	..	11.77
Conclusion—Co. 684, Co. 682, Co. 527, Co. 673, Co. 683, Co. 672.									

Variety Co. 684 which recorded the highest cane yield of 38.35 tons per acre is selected for further trial.

Maturity observations—Juice quality.—In respect of juice quality Co. 673 recorded the highest sucrose content of 16.37 per cent with 89.25 per cent purity followed by Co. 672 with 16.11 per cent sucrose and 91.49 per cent purity. The results of juice analysis and trial jaggery boilings at harvest are given below. Variety Co. 683 recorded the highest jaggery recovery on cane weight. But Co. 527 gave the highest estimated yield of jaggery per acre, very closely followed by Co. 684.

TABLE III.—Juice analysis and jaggery recovery at harvest.

Variety.	Sucrose per cent.	Purity per cent.	Percentage of jaggery recovery on cane weight.	Calculated yield of jaggery per acre.
Co. 672	16.11	91.49	9.00	2.64
Co. 673	16.37	89.27	9.00	3.16
Co. 682	13.98	88.64	8.42	3.17
Co. 683	15.36	88.59	9.33	3.04
Co. 684	13.80	82.64	8.60	3.26
Co. 527 (control)	13.90	85.74	8.75	3.27

5. *Main yield trials.*—Four series of yield trials were conducted this year and the details are furnished below:—

(a) *Early maturing varieties.*—Three varieties Co. 620, Co. 627, Co. 630 and Co. 527 (control) in this experiment. This is the third year of trial. Variety Co. 527 gave the highest yield of 44.57 tons of millable cane per acre, but was statistically on par with Co. 620 which recorded 40.72 tons per acre. The details and summary of results are furnished in Table IV.

TABLE IV.—Main trial with early maturing varieties.

Field number—14.A.	Spacing—4 links or 2' 8" between cane rows.
Soil—Loam.	Seed rate—15,000 three-budded sets per acre.
Previous crop—Paddy.	Treatments—Four varieties; Co. 620, Co. 627, Co. 630 and Co. 527 (control).
Manures—Ten tons of farmyard manure per acre as basal dressing and 100 lb. Nitrogen two-thirds in the shape of groundnut cake and one-third as sulphate of ammonia applied in two equal doses half at planting and half at trenching.	Replications—Six.
Date of planting—17th and 18th March 1951.	Layout—4 × 6 randomized blocks.
Date of harvest—17th to 20th January 1952.	Size of plot—Gross: 3,104 cents (98 links × 32 links). Net—2,000 cents (82½ links × 24 links).
	Year of trial—Third.

Summary of results.

Particulars.	Co. 527	Co. 620	Co. 630	Co. 627	Standard error of treatment mean.	Whether significant or not.	Critical difference (P = 0.05).
Mean yield of cane in tons per acre.	44.57	40.72	33.96	32.81	1.78	Yes.	5.37
As per cent on control.	100.0	91.4	76.2	73.6	3.993	..	12.05
Conclusion—Co. 527, Co. 620, Co. 630, Co. 627.							

Maturity observations—Juice quality.—Results of periodical analysis of juices from the different varieties are given in Table V.

TABLE V.—Juice analysis of varieties in the yield trials with early maturing varieties.

Variety.	November.		December.		January.		February.		March.		April.	
	Sucrose.	Purity.	Sucrose.	Purity.	Sucrose.	Purity.	Sucrose.	Purity.	Sucrose.	Purity.	Sucrose.	Purity.
	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.
Co. 527	13.47	83.44	16.02	87.42	15.93	88.06	19.11	95.60	20.60	94.89	21.62	94.99
Co. 620	12.22	78.64	15.36	88.55	17.22	87.00	20.02	93.03	18.22	87.06	19.23	92.41
Co. 627	14.98	86.44	14.25	85.37	17.61	88.51	..	..	..	..	..	..
Co. 630	11.79	80.04	13.10	83.66	16.93	87.78	18.10	90.41	16.92	86.02	..	..

Variety Co. 527 only recorded more than 16 per cent sucrose by December. It was also observed that the varieties Co. 527 and Co. 620 kept on their high juice quality till April.

Jaggery recovery.—Variety Co. 527 recorded better jaggery recovery than the other three varieties throughout the season. In February it recorded the highest recovery per cent of 11.7 on cane weight followed by Co. 620 with 11.0 per cent. The data are furnished in Table VI.

TABLE VI.—Present jaggery recovery on cane weight.

Variety.	November.	December.	January.	February.	March.	April.	Estimated yield of jaggery in tons/acre at harvest in January.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Co. 527 (control)	9.7	9.8	10.3	11.7	11.5	9.8	4.60
Co. 620	7.7	9.2	10.6	11.0	9.7	9.0	4.31
Co. 627	8.3	7.3	10.4	..	..	..	3.41
Co. 630	8.3	9.5	10.5	10.3	10.2	..	3.55

Review of results of three years.—The experiment is concluded after three years of trial and the results indicated that none of the varieties excelled Co. 527 the standard, in yield. Co. 620 was a close second was a non-arrowing rich cane. But it was noted to develop hollow even at the age of eight months and was highly susceptible to smut infection. The yield data for the three years are presented in Table VII.

TABLE VII.—Yield of cane in tons/acre.

Year.	Co. 527.	Co. 620.	Co. 627.	Co. 630.
(1)	(2)	(3)	(4)	(5)
1949-50	32.79	32.16	24.00	33.39
1950-51	35.96	37.19	25.58	34.33
1951-52	44.57	40.72	33.96	32.81
Average	37.77	36.69	27.46	33.89
Estimated average yield of jaggery in tons/acre	3.79	4.05	2.98	3.49

(b) **Mid-season maturing varieties (Series I).**—Varieties Co. 624, Co. 475 and Co. 632 were tested against the control Co. 449 for the third year in this experiment. The yield data revealed that Co. 475 recorded the maximum yield of 37.51 tons of millable cane per acre followed by Co. 632 and Co. 449 with 36.32 tons and 34.71 tons per acre respectively. These three varieties were statistically on par. The details of layout and summary of results are furnished in Table VIII.

TABLE VIII.—Sugarcane yield trials with mid-season varieties, 1951-52.

Field numbers—51 and 52.	Date of harvest—16th to 19th February 1952.
Soil—Clay loam.	Spacing—2', 8" or 4 links between cane rows
Previous crop—Paddy.	Seed rate—15,000 (three budded sets/acre).
Manure—Ten tons of farmyard manure per acre as basal dressing and 100 lb. nitrogen per acre.	Variants—Four. Co. 624, Co. 632, Co. 475 and Co. 449 (control).
Two-thirds in the shape of groundnut cake and one-third as sulphate of ammonia applied in two equal doses half at planting and half at earthing up.	Replications—Six.
Date of planting—26th and 27th March 1954.	Lay out—4 + 0 randomized block.
	Size of plot—
	Gross: 85 links × 40 links = 3.40 cents.
	Net: 62½ links × 32 links = 2.00 cents.

Summary of results.

	Co. 475.	Co. 632.	Co. 449.	Co. 624.	Standard error of treatment mean.	Whether significant or not.	Critical difference. (P = 0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mean yield of cane in tons per acre.	37.51	36.32	34.71	30.86	1.36	Yes.	4.10
As per cent on control.	108.7	104.07	100.00	88.99	3.918	..	11.81

Conclusion—Co. 475, Co. 632, Co. 449, Co. 624.

Maturity observations—Juice quality.—In the matter of juice quality Co. 449 proved superior to the rest of the varieties from January onwards. The results are recorded in Table IX.

TABLE IX.—Results of juice analysis.

Main yield trial with mid-season maturing varieties (Series I).

Variety.	November.		December.		January.	
	Sucrose.	Purity.	Sucrose.	Purity.	Sucrose.	Purity.
	(2)	(3)	(4)	(5)	(6)	(7)
(1)	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.
Co. 624	14.36	83.39	16.30	85.63	17.32	89.64
Co. 632	13.62	81.46	14.24	84.05	16.34	88.04
Co. 449 (control)	11.25	79.00	13.79	84.82	18.45	89.91
Co. 475	16.90	86.58	16.78	89.32	17.63	91.28

Variety.	February.		March.		April.	
	Sucrose.	Purity.	Sucrose.	Purity.	Sucrose.	Purity.
	(8)	(9)	(10)	(11)	(12)	(13)
(1)	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.
Co. 624	18.11	90.05	17.70	85.88	18.51	85.30
Co. 632	15.38	83.40	17.05	87.06	16.21	84.03
Co. 449 (control)	17.35	84.64	20.90	92.85	20.73	92.62
Co. 475	15.74	82.37	15.45	86.43	15.33	84.88

Jaggery recovery.—Variety Co. 475 recorded the highest jaggery recovery of 11.6 per cent on cane weight in the month of January while Co. 449 recorded the next highest of 11.2 per cent in March. The jaggery recovery of Co. 624 was inexplicably high. The quality of jaggery from both the varieties Co. 475 and Co. 449 was superior to that from Co. 624 and 632. The periodical recovery of jaggery is furnished in Table X.

TABLE X.—Per cent jaggery recovery on cane weight.

Variety.	November.	December.	January.	February (at harvest).	March.	April.	Estimated yield of jaggery in tons/acre at harvest in February.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Co. 624	8.8	8.5	9.3	11.2	9.0	10.0	3.45
Co. 632	7.4	8.0	7.9	9.7	10.5	6.7	3.51
Co. 449 (control)	7.8	7.8	9.3	11.00	11.2	9.8	3.82
Co. 475	7.8	7.8	11.6	10.81	9.0	8.7	5.85

Review of results of three years.—The experiment completed three years with this season. The results indicated that none of the varieties out yielded Co. 449 (control) in cane tonnage or jaggery. The data are furnished in Table XI.

TABLE XI.—Yield of cane in tons/acre.

Year.	Co. 449.	Co. 632.	Co. 624.	Co. 475.
(1)	(2)	(3)	(4)	(5)
1949-50	38.62	37.96	37.00	35.75
1950-51	40.17	39.15	36.85	38.41
1951-52	34.71	36.32	30.86	37.51
Average	37.83	37.81	34.90	37.22
Estimated average yield of jaggery in tons/acre	4.03	3.71	3.78	3.98

(c) *Mid-season maturing varieties (Series II).*—Four varieties Co. 646, Co. 647, Co. 650, Co. 449 (control) were tried in this experiment. The results of harvest indicated no significant difference in yield between the different varieties. From the point of view of jaggery quality, the control Co. 449 was better than the other three varieties.

The details and summary of results are furnished in Table XII.

TABLE XII.—*Sugarcane yield trials with mid-season maturing varieties—1951-52.*

Field numbers—58 and 59.	Spacing—2' 8" or 4 links between cane rows.
Soil—Clay loam.	Seed rate—15,000 three-budded sets per acre
Previous crop—Paddy.	Variants—Four. Co. 646, Co. 647, Co. 650 and Co. 449 (control).
Manures—Ten tons of farmyard manure as basal dressing and 100 lb. nitrogen per acre (two-thirds in the shape of groundnut cake, and one-third as sulphate of ammonia) applied in two equal doses half at planting and half at earthing up.	Replications—Six.
Date of planting—23rd March 1951.	Layout—4 × 6 randomized blocks.
Date of harvest—20th to 25th February 1952.	Size of plot—
	Gross—82 links × 40 links = 3'28 cents.
	Net—62½ links × 32 links = 2'00 cents.

Summary of results.

	Co. 650.	Co. 646.	Co. 647.	Co. 449.	Standard error of treatment mean.	Whether significant or not. (P = 0.05)	Critical difference (P = 0.05).
Mean yield of cane in tons per acre.	40.55	40.54	40.33	38.07	1.30	No.	..
As per cent on control.	112.05	112.04	111.08	100.00	3.604	..	..

Maturity observations—Juice quality.—In the matter of juice quality none of the varieties excelled Co. 449. The progressive juice quality of the four varieties is furnished in Table XIII.

TABLE XIII.—*Results of juice analysis.*

Main yield trial with mid-season maturing varieties (Series II).												
Variety.	November.		December.		January.		February.		March.		April.	
	Sucrose.	Purity.	Sucrose.	Purity.	Sucrose.	Purity.	Sucrose.	Purity.	Sucrose.	Purity.	Sucrose.	Purity.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.
Co. 646 ..	8.95	71.09	10.14	72.46	14.19	83.99	15.74	82.37	15.48	86.43	15.33	84.88
Co. 647 ..	7.69	66.93	9.33	72.43	13.96	85.70	16.11	85.24	14.66	85.53	15.01	82.93
Co. 650 ..	11.07	77.47	13.95	83.24	16.13	89.64	15.36	84.12	16.65	87.36	17.14	86.30
Co. 449 (control).	11.25	79.00	13.79	84.82	18.45	89.91	17.35	84.64	20.90	92.85	20.73	92.52

Jaggery recovery.—The periodical recovery of jaggery on cane weight, recorded by each variety is given in Table XIV. The quality of jaggery was the best in the case of Co. 449. Varieties Co. 646 and 647 recorded poor quality jaggeries as in the previous year. The recoveries of jaggery at harvest in February from Co. 646 and Co. 647 were inexplicably high this year when compared to the previous year.

TABLE XIV.—*Per cent—Jaggery recovery on cane weight (Series II).*

Variety.	November.	December.	January.	February (at harvest time).	March.	April.	Estimated yield of jaggery in tons/acre at harvest in February.
Co. 646 ..	7.8	7.0	9.3	9.67	9.0	8.7	3.92
Co. 647 ..	8.3	6.7	9.3	10.83	9.0	8.3	4.34
Co. 650 ..	8.7	9.3	9.6	9.58	9.0	9.0	3.89
Co. 449 (control) ..	7.8	7.5	9.3	9.67	11.2	9.8	3.49

(d) *Late maturing varieties.*—Four varieties, namely, Co. 615, Co. 617, Co. 633 and Co. 419 (control) were compared in this experiment for the third year. The results of the harvest showed that there was no significant difference in yields between the varieties. The control (Co. 419) was better than the other varieties both from the point of jaggery yield or calculated C.C.S. per acre.

The details and summary of results are furnished in Table XV.

TABLE XV.—*Sugarcane yield trial with late maturing varieties—1951-52.*

Field number—14 B.C.	Spacing—2' 8" or 4 links between cane rows.
Soil—Loam.	Seed rate—15,000 three-budded sets per acre.
Previous crop—Paddy.	Variants—Four. Co. 615, Co. 617, Co. 633 and Co. 419 (control).
Manures—Ten tons of farmyard manure as basal dressing and 100 lb. nitrogen per acre (two-third in the shape of groundnut cake and one-third as sulphate of ammonia) applied in two equal doses, half at planting and half at earthing up.	Replications—Six.
Date of planting—19th to 21st March 1951.	Layout—4 × 6 randomized blocks.
Date of harvest—25th to 30th April 1952.	Size of plot—
	Gross—72 links × 40 links = 2'88 cents.
	Net—62½ links × 32 links = 2'00 cents.
	Year of trial—Third.

Summary of results.

	Co. 617.	Co. 615.	Co. 419.	Co. 633.	Standard error of treatment mean.	Whether significant or not.	Critical difference. (P = 0.05).
Mean yield of cane in tons acre.	40.03	38.56	37.95	34.40	2.48	No	..
As per cent on control.	105.5	101.7	100.0	90.7	6.536	..	..

Maturity observations—Juice quality.—Variety Co. 419 recorded good juice quality in the months of March and April and none of the other varieties could surpass it. The progress of juice analysis of these four varieties is recorded in Table XVI.

TABLE XVI.—*Results of juice analysis.*

Variety.	November.		December.		January.		February.		March.		April.	
	Sucrose.	Purity.	Sucrose.	Purity.	Sucrose.	Purity.	Sucrose.	Purity.	Sucrose.	Purity.	Sucrose.	Purity.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.
Co. 615 ..	7.35	60.10	16.56	70.47	15.69	83.51	17.35	86.49	15.77	82.83	14.95	78.11
Co. 617 ..	11.97	80.23	12.19	79.34	15.66	83.37	16.93	90.94	18.61	91.18	18.16	87.39
Co. 633 ..	9.10	72.57	10.06	74.18	13.02	80.41	15.20	84.16	15.16	86.43	14.34	81.29
Co. 419 (control.)	7.49	63.85	10.68	73.35	15.13	81.70	17.11	88.85	19.86	92.89	18.61	85.53

Jaggery recovery.—All the four varieties recorded their peak recovery of jaggery in the month of February. For late crushing for which the varieties are intended, variety Co. 419 recorded the highest recovery of 11.9 in April as is given in Table XVII.

TABLE XVII.—*Per cent jaggery recovery on cane weight.*

Variety.	November.	December.	January.	February.	March.	April.	Estimated yield of jaggery in tons/acre at harvest in April.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Co. 615 ..	..	..	6.3	10.3	11.7	9.7	10.21
Co. 617 ..	..	7.2	6.5	9.3	9.0	10.6	3.9
Co. 633 ..	..	6.5	6.9	8.3	9.7	9.2	4.2
Co. 419 ..	..	6.3	7.5	9.5	11.3	11.9	4.5

Review of results of three years.—None of the varieties excelled Co. 419 in the point of yield or juice quality. Co. 419 recorded an average yield of 42.99 tons of cane per acre followed by Co. 615 with 40.93 tons. Variety Co. 615 exhibited

splits on a number of internodes in most of the canes. Varieties Co. 617 and Co. 633 were very tall growing and subject to lodging. The quality of jaggery also was the best in the case of Co. 419. The yield data for the three years are given in Table XVIII.

TABLE XVIII.—Yield in tons per acre.

Year.	Co. 419.	Co. 615.	Co. 617.	Co. 633.
(1)	(2)	(3)	(4)	(5)
1949-50	48.46	43.00	36.60	40.74
1950-51	42.56	41.20	43.02	43.81
1951-52	37.95	38.58	40.03	34.40
Average	42.99	40.93	39.88	39.65
Estimated average yield of jaggery in tons per acre ..	4.66	4.22	4.26	3.83

6. *Optimum proportion of organic and inorganic nitrogen to sugarcane.*—To find out the proportion in which organic and inorganic forms of concentrated nitrogenous manures, viz., groundnut cake and ammonium sulphate have to be applied to sugarcane, this experiment was laid out. This is the third and final year of the trial. Groundnut cake and sulphate of ammonia were applied to supply 150 lb. nitrogen per acre in nine different proportions over a basal dressing of 10 tons farm yard manure. As in previous two seasons, there were no significant differences in cane yields during this season also. Even with regard to germination tillering, crop height or juice quality no appreciable differences were discernible among the several manurial treatments. It can therefore be concluded that proportion between groundnut cake and sulphate of ammonia in the top dressing to be applied to sugarcane at the rate of 150 lb. nitrogen per acre does not influence yield of cane or juice quality to any appreciable extent. However, the effects of continuous application of inorganic fertilizers year after year in the same field, is separately under test. The details and summary of results are furnished in Table XIX.

TABLE XIX.—Optimum proportion of organic and inorganic nitrogen to sugarcane—1951-52.

Field number—20.

Soil—Clay loam.

Previous crop—Paddy.

Manures—Over a basal dressing of ten tons of farm-yard manure 150 lb. of nitrogen to be supplied in the form of groundnut cake and sulphate of ammonia in nine proportions.

Date of planting—2nd April 1951.

Date of harvest—16th to 20th April 1952.

Spacing—2' 8" or 4 links between cane rows.

Seed rate—15,000 three-budded sets per acre.

Treatments—Nine. Over a basal dressing of ten tons of farm yard manure 150 lb. of nitrogen to be supplied in the form of groundnut cake and sulphate of ammonia in the following nine proportions—
Groundnut cake : ammonium sulphate.

A ..	1	0
B ..	1	1
C ..	1	2
D ..	1	3
E ..	2	1
F ..	2	2
G ..	3	1
H ..	3	2
I ..	3	3

Replications—Four.

Layout—9 × 4 randomized blocks.

Size of plot—

Gross—135 links × 20 links = 2.70 cents.

Net—125 links × 12 links = 1.50 cents.

Year of trial—Third.

Summary of results.

	I	E	H	G	B	D	C	F	A	Standard error of treatment mean.	Whether significant (P = 0.05).	Critical difference (P = 0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Mean yield of cane in tons per acre ..	42.71	42.43	41.78	41.12	40.61	40.46	40.02	38.77	38.55	1.54	No.	..
As per cent on control ..	103.87	103.19	101.65	100.00	98.76	98.39	97.32	94.23	93.75	3.745	..	..

The yield data from the three years of the trial are given in Table XX.

TABLE XX.—Yield of cane in tons per acre in the different treatments during the three years 1949-50 to 1951-52.

Year of trial.	A	B	C	D	E	F	G	H	I	Average.	Whether significant or not.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1949-50	46.26	48.91	44.50	48.17	49.90	48.67	47.83	47.47	47.07	47.64	No.
1950-51	49.66	49.86	49.60	50.77	48.21	46.30	49.91	51.29	49.69	48.48	No.
1951-52	35.55	40.61	40.02	40.46	42.43	38.77	41.12	41.78	42.71	40.72	No.
Average	44.82	46.46	44.71	46.47	46.85	44.58	46.29	46.85	46.49	45.95	..

Juice quality.—Canes from the different treatments were sampled and their juices analysed once a month from November till harvest. The results which are furnished in Table XXI do not indicate any treatment differences in the quality of juices.

TABLE XXI.—Results of chemical analysis of juices.

Treatment.	(1)	November.		December.		January.	
		Sucrose.	Purity.	Sucrose.	Purity.	Sucrose.	Purity.
		(2)	(3)	(4)	(5)	(6)	(7)
		PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.
Groundnut cake.							
A 1 :	0 ..	9.51	72.37	10.72	74.98	14.68	84.68
B 0 :	1 ..	8.54	68.65	11.53	76.86	13.69	81.28
C 1 :	1 ..	8.56	68.26	11.69	77.23	13.80	81.45
D 1 :	2 ..	7.76	63.92	11.39	76.95	14.17	82.66
E 1 :	3 ..	8.32	69.10	12.01	73.48	14.12	82.87
F 2 :	3 ..	9.23	70.24	10.75	74.30	15.28	84.22
G 2 :	1 ..	6.52	69.61	11.69	78.25	14.17	82.66
H 3 :	1 ..	8.79	68.46	11.17	77.32	13.95	82.83
I 3 :	2 ..	9.00	71.77	12.10	79.09	15.15	83.99
		February.		March.		April.	
Treatment.	(1)						
		Sucrose.	Purity.	Sucrose.	Purity.	Sucrose.	Purity.
		(8)	(9)	(10)	(11)	(12)	(13)
		PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.
Groundnut cake.							
A 1 :	0 ..	15.14	85.25	18.36	91.52	18.59	89.42
B 0 :	1 ..	16.70	87.16	18.90	91.84	18.54	87.50
C 1 :	1 ..	17.13	87.85	17.99	90.95	17.60	87.13
D 1 :	2 ..	16.39	87.18	18.35	88.37	18.06	87.67
E 1 :	3 ..	16.45	86.40	19.55	92.17	17.80	85.62
F 2 :	3 ..	16.64	86.67	18.38	90.50	18.91	90.09
G 2 :	1 ..	16.74	87.92	18.95	91.63	18.59	89.88
H 3 :	1 ..	16.94	88.97	18.02	90.74	18.23	89.80
I 3 :	2 ..	17.79	90.58	18.76	91.25	17.63	86.04

7. *Effect of continuous application of ammonium sulphate to sugarcane (permanent manurial experiment).*—This is a long range experiment in which the effects of continuous application of ammonium sulphate as compared to other forms of nitrogenous manures on the soil fertility are sought to be studied on two year rotation of crops.

While the form of manure applied to the sub-plot is the same year after year the dose of nitrogen per acre is varied with the crop. Sugarcane receives 100 lb., ragi 40 lb. and rice 60 lb. of nitrogen per acre. Chemical and bacteriological analysis of the soil were done initially and will be repeated at the end of each season to study the changes in the soil from time to time. Mechanical analysis of the soil from the different treatments was done initially and will be repeated once in three years. This is the first year of the experiment and significantly higher cane yields were recorded when concentrates in any form were applied. The details and summary of results are furnished in Table XXII.

TABLE XXII.—Effect of continuous application of ammonium sulphate to sugarcane (permanent manurial experiment), 1951-52.

Field number—17.	Treatments—Five. Application of manure in the form of—
Soil—Loam.	(A) Ammonium sulphate only.
Previous crop—Paddy.	(B) Groundnut cake only.
Manures—The manurial doses for rotational crops are—	(C) Farm yard manure only.
(1) For sugarcane.—100 lb. of nitrogen applied in two equal doses half at planting and half at earthing up time.	(D) Mixture of groundnut cake and ammonium sulphate in 2:1 proportion on nitrogen basis.
(2) For paddy.—60 lb. nitrogen applied in one dose, 20 days after planting.	(E) No manure.
(3) For ragi.—40 lb. of nitrogen applied in one dose, 15 days after planting.	Layout—5 × 5 latin square.
No basal dressing to be applied and no green manure crops to be raised.	Rotation—Cane-punasa, ragi-paddy-cane.
Date of planting—3rd May 1951.	Varieties—
Date of harvest—22nd to 25th April 1952.	Sugarcane—Co. 419.
	Ragi—A.K.P. 2.
	Paddy—G.E.B. 24.
	Spacing—2'—8" or 4 links between the cane rows.
	Seed rate—For cane 15,000 three budded sets per acre.
	Size of plot—Gross: 60 links × 56 links = 3.36 cents.
	Net: 50 links × 40 links = 2.00 cents.

Summary of results.

	D	A	B	C	E	Standard error of treatment mean.	Whether significant or not. (P = 0.05).	Critical difference. (P = 0.05).
Mean yields of cane in tons per acre	40.74	40.42	39.75	30.45	27.66	2.31	Yes.	7.14
As per cent on control ..	100.0	99.21	97.57	74.74	67.89	5.670	..	17.53
Conclusion—D, A, B, C, E.								

Maturity observation (Juice quality).—Chemical analysis of juices from the different treatments was also done from November till harvest. The data indicated that no manure and farm-yard manure treatments, recorded better juice quality than the other treatments. The results are furnished in the statement in Table XXIII.

TABLE XXIII.—Effect of continuous application of ammonium sulphate—Results of chemical analysis of juices.

Treatment.	November.		December.		January.	
	Sucrose.	Purity.	Sucrose.	Purity.	Sucrose.	Purity.
	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. Ammonium sulphate only ..	8.97	71.09	9.81	69.86	13.39	80.48
B. Groundnut cake only ..	10.40	73.81	11.83	78.56	14.70	84.29
C. Farm yard manure only ..	11.57	76.17	13.97	83.87	17.24	89.60
D. 2/3 cake plus 1/3 ammonium sulphate.	9.76	72.38	10.36	72.14	14.32	83.54
E. No manure	12.24	80.05	12.55	81.17	17.03	88.07
	February.		March.		April.	
	Sucrose.	Purity.	Sucrose.	Purity.	Sucrose.	Purity.
	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.
	(8)	(9)	(10)	(11)	(12)	(13)
A. Ammonium sulphate only ..	15.93	85.46	17.44	83.17	18.89	87.72
B. Groundnut cake only ..	16.27	86.73	18.47	88.98	19.77	90.00
C. Farm yard manure only ..	16.15	89.85	17.69	88.98	20.53	90.83
D. 2/3 cake plus 1/3 ammonium sulphate.	16.71	87.03	17.68	88.36	18.55	85.70
E. No manure	16.80	87.23	17.18	83.97	21.19	93.33

8. **Rotational crops (Field No. 16).**—Ragi followed by paddy were grown as rotational crops in the second field during the year. The yield of ragi was satisfactory but treatment differences were not significant. The paddy crop was attacked by *Pericaria* which was severe in plots receiving ammonium sulphate as manure. These plots recorded significantly poorer yields than the other treatments. Summary of results is furnished in Table XXIV.

TABLE XXIV.—Yield data of rotational crops, 1951-52.

Field number—16.	Details of layout.
Soil—Loamy.	Seed rate—For sugarcane 15,000 three-budded sets per acre.
Previous crop—Paddy.	Treatments—Five. Application of manure in the form of—
Manure—The manurial doses for rotational crops are—	(A) Ammonium sulphate only.
For sugarcane.—100 lb. nitrogen applied in two equal doses, half at planting and half at earthing up time.	(B) Groundnut cake only.
For paddy.—60 lb. nitrogen applied in one dose 20 days after planting.	(C) Farm yard manure only.
For ragi.—40 lb. of nitrogen applied in one dose 15 days after planting.	(D) Mixture of groundnut cake and ammonium sulphate in 2:1 proportion on nitrogen basis.
No basal dressing to be applied and no green manure crops to be raised.	(E) No manure.
Date of planting—	Layout—5 × 5 latin square.
Ragi.—25th May 1951.	Size of plot—
Paddy.—29th August 1951.	Gross—60 links × 56 links = 3.36 cents.
Date of harvest—	Net—50 links × 40 links = 2.00 cents.
Ragi.—26th July 1951.	Varieties—
Paddy.—15th December 1951.	Sugarcane—Co. 419.
Spacing—2' 8" or 4 links between the cane rows.	Ragi—A.K.P. 2.
	Paddy—G.E.B. 24.
	Year of trial—First.

F. 16. Punasa ragi (B).

Summary of results.

	B	C	A	D	E	Standard error of treatment mean.	Whether significant or not. (P = 0.05).	Critical difference. (P = 0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Mean yield of ragi (grain) in lb. per acre.	1,973	1,788	1,750	1,679	1,663	46.62	No.	..
As per cent on control ..	111.55	106.49	104.76	100.0	99.34	2.776	..	..

F. 16. Paddy (B).

Summary of results.

	B	C	D	E	A	Standard error of treatment mean.	Whether significant or not. (P = 0.05).	Critical difference. (P = 0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Mean yield of paddy grain in lb. per acre.	2,530	2,370	2,200	2,140	1,510	88.0	Yes.	278
As per cent on control ..	115.0	107.27	100.0	97.27	68.64	4.0	..	12.64
Conclusion—B, C, D, E, A.								

9. **Soil analysis.**—Soil studies in this "Permanent Manurial experiment" conducted by the division of Chemistry are reported hereunder.

Initial soil analysis—(a) Soil profile study.—A study of the soil profile of this experiment was done, by opening a pit of 6 feet depth and noting the physical and morphological features of the different horizons. Neither the parent rock nor water-table was touched even at a depth of 6 feet. The details are given in Table XXV.

TABLE XXV.—Soil Profile study.

(1) 0-3".—Greyish brown, dry, organic material and plant roots; hard, few quartz stones, no action with dilute Hcl; neutral in reaction.

(2) 3"-18".—Greyish brown; clayey; cracked; compact; plant roots hard and dry; no action with dilute Hcl; neutral in reaction.

Distinct demarkation with "B" horizon.

(3) 18"-28".—Lighter in texture; more sandy; more moist; light brown with pockets of sand; slight effervescence with dilute Hcl; neutral in reaction.

(4) 28"-36".—Dark grey; sandy; wet; slightly heavier than the previous one; compact; burrow holes here and there; no action with dilute HCl; neutral in reaction.

(5) 36"-72".—Uniform for the three feet; light brown, sandy, wet; compact; dark; small patches interspersed throughout; no action with dilute HCl; neutral in reaction.

No parent—rock or water—table touched even at 6 feet.

Representative soil samples from each horizon were taken for separate physical and chemical analysis.

(b) *Initial analysis.*—Soil samples from the first and second feet of both the fields, Nos. 16 and 17 allotted for the experiment were analysed completely for the physical and chemical constituents. The detailed analytical data are furnished in Table XXVI.

TABLE XXVI.—Permanent manurial experiment—Initial soil analysis.
Percentage on air dry basis.

Serial number and details.	Field No. 16. Rotational crops in 1951-52.		Field No. 17 cane during 1951-52.	
	I Foot	II Foot	I Foot	II Foot
1 PH. (1:5) Water extract	7.5	7.4	7.5	7.6
2 Moisture	2.55	2.47	2.96	2.19
3 Loss on ignition	4.13	3.92	4.66	4.96
4 Insolubles	81.40	87.35	77.84	79.89
5 Iron	7.01	5.77	6.10	6.35
6 Alumina	4.52	4.64	6.78	6.16
7 Lime (total)	0.36	0.38	0.46	0.31
8 Total phosphoric acid	0.0826	0.0822	0.0828	0.0782
9 Total nitrogen	0.0392	0.0350	0.0434	0.0378
10 Nitrates	0.20 mg.	0.20 mg.	0.20 mg.	0.30 mg.
11 Organic carbon	0.37	0.31	0.42	0.35
12 Exchangeable calcium (m. eq. per 100 grs. soil) ..	12.6	11.1	14.4	13.9
13 Available P ₂ O ₅	0.0175	0.0159	0.0221	0.0169
14 Available K ₂ O	0.0234	0.0111	0.0085	0.0025
15 Total water-soluble salts	0.0580	0.0600	0.0530	0.0625
16 <i>Mechanical Analysis:</i> —				
(i) Clay	27.70	24.75	32.87	33.74
(ii) Silt	9.70	9.75	9.63	10.12
(iii) Coarse and fine sand	59.36	63.14	54.53	54.23

The data indicated that the soils were slightly poor in total and nitrate nitrogen. The soils are neutral in reaction. The organic carbon content was also poor. The total and available phosphoric acid are fairly high and so too the exchangeable lime. From the mechanical analysis, it can be said that the sub-soils are conducive for good drainage.

Sugarcane—Availability of nitrogen.—The release of nitrogen from the soils treated with the different manures was studied throughout the growth of the cane crop. Soil samples were drawn for this purpose from the top 1 foot from the treatments and analysed for nitrate nitrogen periodically. The results are furnished in Table XXVII.

TABLE XXVII.—Permanent manurial experiment—Sugarcane—Monthly variation in Soil Nitrates.

Serial number and treatments.	(mg. per 100 grs. dry soil) Co. 419.						
	May.	June.	July.	August.	Septem-ber.	October.	Febru-ary.
1 Ammonium sulphate	0.65	0.54	0.33	0.53	0.35	0.18	0.56
2 Groundnut cake	1.25	0.50	0.37	0.39	0.47	0.20	0.60
3 Farmyard manure	0.98	0.43	0.33	0.27	0.35	0.20	0.45
4 Mixture of groundnut cake and ammonium sulphate in 2:1 proportion on nitrogen basis.	1.51	0.48	0.33	0.47	0.36	0.20	0.56
5 No manure	0.42	0.33	0.27	0.13	0.12	0.11	0.17
Initial — 0.20 mg.							

The data indicated that the release of nitrogen was maximum and quickest in the case of ammonium sulphate, next to that being the mixture of cake and ammonium sulphate. "No manure" treatment recorded the lowest nitrate-nitrogen. Except the "no manure" plot, others recorded almost similar levels of nitrates from September to harvest time.

Rotational crops—Ragi.—After the harvest of every rotational crop, the soils were analysed to study the changes in the soil composition under different treatments. The results are furnished in Table XXVIII.

TABLE XXVIII.—Permanent manurial experiment—Rotation crops—Soil analysis, after ragi.
(Field No. 16) Per cent on air dry soil.

Serial number and treatment.	pH*	Nitrates (mg/100 gr. soil).	Total N. per cent.	Organic Carbon per cent.	Exchan- geable Ca (m.e.q.)	Available (P ₂ O ₅). per cent.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 Ammonium sulphate ..	7.3	0.67 mg.	0.0546	0.51	14.08	0.0112
2 Groundnut cake ..	7.3	0.64 "	0.0546	0.57	15.33	0.0118
3 Farmyard manure ..	7.3	0.34 "	0.0513	0.53	17.33	0.0112
4 Mixture of groundnut cake and ammonium sulphate	7.4	0.58 "	0.0644	0.54	14.83	0.0113
5 No manure	7.4	0.33 "	0.0504	0.51	17.08	0.0112

* 1: 5 water extract—colorimetric.

There was a rise in the carbon content and also the total nitrogen presumably the after-effects of the ragi crop. The soil reaction was neutral.

After paddy (before cane for 1952-53).—The soil analysis after paddy crop, given in Table XXIX revealed that there was a slight lowering of the soil pH, presumably due to the water-logged condition during the paddy cultivation. There was also a slight reduction of the nitrates as well as total nitrogen, owing to the same reasons. Among the treatments, the "farm-yard manure" and "no manure" continue to show lower nitrogen in the soil. There were no marked differences in the other soil constituents.

TABLE XXIX.—Permanent manurial experiment—Rotation crops—Soil analysis after paddy.
(Field No. 16) Per cent on air dry soils.

Serial number and treatment.	pH*	Nitrate (Mg. 100 grs. soil).	Total N. per cent.	Organic carbon per cent.	Exchan- geable Ca (m.eq.).
(1)	(2)	(3)	(4)	(5)	(6)
1 Ammonium sulphate	7.1	0.45	0.0452	0.54	15.0
2 Groundnut cake	7.1	0.56	0.0504	0.56	15.2
3 Farmyard manure	7.1	0.39	0.0476	0.56	16.5
4 Mixture of groundnut cake and ammonium sulphate	7.2	0.56	0.0546	0.56	15.2
5 No manure	7.1	0.40	0.0434	0.58	15.5

* 1: 5 water extract—colorimetric.

10. *Swamp trial.*—Variety Co. 630, one of the promising early maturing varieties, was compared with Co. 419, for its tolerance to water-logging. This is the second year of trial. Unlike in the previous season, swamp conditions existed continuously from 18th March 1951 till end of November. Variety Co. 630 did not exhibit visible symptoms of adverse effects of water-logging such as wilting or drying of canes. However Co. 630 recorded significantly less cane-yield than Co. 419 the control. Results are furnished in Table XXX.

TABLE XXX.—Sugarcane—Swamp trial (1951-52).

Details of layout.	
Field number—38-B.	Spacing—2' 8" or 4 links between cane rows.
Soil—Clay loam.	Seed rate—15,000 sets (three budded) per acre.
Previous crop—Paddy.	Treatments—Varieties 2, Co. 630 and Co. 419.
Manures—Basal dressing of ten tons of farm-yard manure and 100 lb. nitrogen (two-thirds in the form of groundnut cake and one-third as sulphate of ammonia) applied in two equal doses half at planting and half at earthing up time.	Replications—Eight.
Date of planting—28th February 1951.	Layout—Beaven's half drill strip method.
Date of harvest—2nd and 3rd January 1952.	Year of trial—Second.
	Size of plot—
	Gross—95 × 20 links = 1.90 cents.
	Net—83½ × 12 links = 1.00 cents.

Summary of results.

Particulars.	Co. 419.	Co. 630.	Standard error.	Significant by T test or not.	Critical difference P = 0.05.
(1)	(2)	(3)	(4)	(5)	(6)
Mean yield of cane in tons/acre.	39.04	25.63	2.53	Yes	5.99
As percent on control ..	100.0	85.65	6.480	..	15.34
Conclusion—Co. 419, Co. 630.					

Juice quality.—Juice quality of the varieties was studied from November till harvest and variety Co. 630 recorded slightly better quality than Co. 419. The data are furnished in Table XXXI.

TABLE XXXI.—Results of chemical analysis of juices (swamp trial).

Variety.	November.		December.		January.	
	Sucrose. per cent.	Purity. per cent.	Sucrose. per cent.	Purity. per cent.	Sucrose. per cent.	Purity. per cent.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Co. 419	15.20	84.73	15.80	82.56	16.25	86.62
Co. 630	15.08	83.18	15.99	84.78	17.63	89.06

Jaggery recovery.—The quality of jaggeries made at harvest time in January was found similar in both the varieties and Co. 630 recorded slightly higher recovery than Co. 419. Particulars of recovery and quality of jaggery are given below :—

TABLE XXXII.—Jaggery yield data.

Variety.	Percentage of jaggery recovery.	Calculated yield of jaggery in tons per acre.	Description of jaggery.
(1)	(2)	(3)	(4)
Co. 419	10.67	4.17	Pleasing brown colour, hard and crystalline.
Co. 630	10.83	2.78	Yellow brown, hard and crystalline.

11. Topping studies on sugarcane.—The effect of removing one three budded top set from a cane at harvest time on the quality and recoverable sugar per cent in Co. 527 and Co. 419 were studied once a month from January to April. One hundred normally dressed canes were taken from each variety every month and divided into ten samples of ten canes each. From each cane one three budded top set was cut. The top sets and the remaining portions of stalks from each sample, were milled separately. A juice sample from the bottoms (stalks without top sets) and another sample after mixing top set juice with this (to give whole cane juice) were taken and analysed for brix and sucrose. C.C.S. was calculated using Winter-Carp formula. The data presented in Table XXXIII indicated that there was significant increase in C.C.S. per cent of canes in both the varieties in all the months when one three budded top set was removed from each cane dressed as at present for milling. Utilization of top sets which are best suited for planting, for seed purposes will result in improvement of sugar recovery and has to be adopted in the interests of growers as well as factory owners.

TABLE XXXIII.—Recoverable sugar per cent from whole and topped canes.

Month.	C.C.S. from canes after removing top sets per cent.	Co. 527 C.C.S. of whole canes per cent.	Difference per cent.	Whether difference is significant.	C.C.S. from canes after removing top sets per cent.	Co. 419 C.C.S. whole canes per cent.	Difference per cent.	Whether difference is significant.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
January	12.790	12.435	0.355	Yes	8.164	7.946	0.215	Yes
February	13.219	13.120	0.099	Do.	10.994	10.800	0.194	Do.
March	14.780	14.393	0.387	Do.	12.995	12.787	0.208	Do.
April	15.770	15.639	0.131	Do.	13.101	13.041	0.060	Do.

12. Yield Maximisation plot—(a) Plant crop.—To find out the maximum yield that could be got under good cultural treatments this bulk trial was repeated for the second year in succession with Co. 419.

After a thorough preparatory cultivation, urine earth from cattle-sheds at 28 tons per acre, ash at 3 tons, compost at 10 tons and four tons of farmyard manure were applied and ploughed in. Planting was done on 22nd February 1951, the seed rate adopted being 27,000 two budded sets per acre. Four hundred pounds of nitrogen per acre was applied as a mixture of groundnut cake and sulphate of ammonia in four doses at planting, 50, 100 and 150 days after planting; at the rate of 100 lb., 150 lb., 75 lb. and 75 lb. nitrogen per acre respectively. At planting and with the third application of concentrates, 50 lb. p205 per acre was applied in the form of super phosphate each time. Earthing up was done with the final application of concentrates. At this time 5,000 lb. of wild indigo per acre was also spread at the base of the clumps and covered up.

The crop grew up tall and came in for severe damage due to cyclonic winds on 24th and 25th November 1951 in spite of heavy earthing up and propping with bamboos. Consequently the yield was low.

Harvest of this crop was done from 4th to 7th March 1952. An acre yield of 63.87 tons of millable cane giving a jaggery recovery of 10.1 per cent on cane weight was recorded and the cost of cultivation amounted to Rs. 2,285-1-4. Quality of jaggery was quite good. The sucrose content was a little over 16 per cent and purity 85 per cent in the juice at harvest time. The average height of millable cane was 13.9 feet and 41,000 stalks were harvested per acre.

(b) Ratoon.—The yield maximisation plot of the previous year, was ratooned and carefully cultivated to find out the maximum yield that could be recorded from a first ratoon crop of Co. 419.

The crop was ratooned from 1st April 1951. Stubble shaving was done and a basal dressing of 20 tons urine earth per acre, supplemented by 10 tons each of farmyard manure and night-soil compost was applied to the field. Besides these 5,000 lb. of green leaf per acre made up of wild indigo and *Gliricidia maculata* leaf was also incorporated into the soil. Four hundred pounds of nitrogen per acre was applied as a mixture of groundnut cake and sulphate of ammonia in three doses at ratooning and two and four months after ratooning at the rate of 100, 200 and 100 lb. nitrogen per acre respectively. With the second and third applications of concentrates 75 lb. and 25 lb. p205 per acre were applied in the form of super phosphate. There was considerable damage to this crop also due to cyclonic winds in the last week of November 1951.

Harvest was taken up on 29th December 1951 and completed the next day. An acre yield of 52.44 tons of millable cane which gave 9.58 per cent jaggery recovery on cane weight was realized. The average height of millable cane was 11.4 feet and 34,840 stalks were harvested per acre.

The plant crop of this ratoon was planted on 10th March 1950. From this date to the date of harvest of the first ratoon crop, 129.35 (76.91 plus 52.44) tons of millable cane per acre could be harvested from a plant and first ratoon crop. The duration of these two crops is practically same as that of a single crop in Hawaii, where the maximum yield recorded was not more than the figure noted above. This suggests the possibility of achieving high acre yields of cane in this country to equal those recorded in other countries, the growing period being same in both the cases.

II. CHEMISTRY.

13. Studies on the nitrogen—nutrition of sugarcane.—Previous studies with the two varieties Co. 527 and Co. 419 on the nitrogen nutrition of sugarcane indicated that 2½ to 5 months after planting, to be the period of rapid uptake by the crop. Thus this warranted adequate supplies of available nitrogen at this state of the crop,

to enable the plants to put forth vigorous growth. The optimum dose of nitrogen was found to be 100 lb. per acre, and depression in the C.C.S. per acre was noticed at 200 lb. nitrogen per acre.

The effects of time of application, dose of nitrogen and population on the efficient utilisation of nitrogen by the variety Co. 419 is sought to be studied in the experiment of the current season.

The yield data together with the details of the treatments are given in Table XXXIV.

TABLE XXXIV.—Studies on the nitrogen nutrition of sugarcane (1951–52).

Details of layout.	
Field number—23.	Treatments—cont.
Soil—Loamy.	D = 100 lb. nitrogen per acre in one dose
Previous crop—Paddy.	50 days after planting.
Manures—Basal dressing of farm yard manure at 10 tons per acre and the nitrogen in 1:2 proportion as sulphate of ammonia and groundnut cake as per treatments.	E = 100 lb. nitrogen per acre in two doses
Date of planting—20th and 21st April 1951.	½ at 50 days and ½ at 100 days after planting.
Date of harvest—4th to 17th April 1952.	F = 75 lb. nitrogen per acre in one dose 50 days after planting.
Spacing—2' 8" or 4 links between cane rows.	G = 75 lb. nitrogen per acre, ½ at 50 days and ½ at 100 days after planting.
Seed rate—(i) Treatments A, B, C, D, and E, at 16,000 three budded sets per acre.	H = 100 lb. nitrogen per acre in one dose 50 days after planting.
(ii) Treatments F, G, H, and I, at 20,000 three budded sets per acre.	I = 100 lb. nitrogen per acre ½ at 50 days and ½ at 100 days after planting.
Treatments—	Replications—Four.
Nine. A = 100 lb. nitrogen per acre ½ at planting plus ½ at earthing up time.	Layout—9 × 4 Randomized blocks.
B = 75 lb. nitrogen per acre in one dose—50 days after planting.	Size of plot—
C = 75 lb. nitrogen per acre in two doses, ½ at 50 days after planting and ½ at 100 days after planting.	Gross = 102 × 32 links = 3.26 cents.
	Net = 95 × 16 links = 1.52 cents.
	Year of trial—First.

Summary of results.

	D	E	I	H	B	A
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mean yield of cane in tons per acre.	47.85	46.33	43.68	43.26	42.13	41.34
As per cent on control ..	115.7	112.0	105.7	104.6	101.9	100.0
	F	C	G	Standard error of treatment mean.	Whether significant or not.	Critical difference (P = 0.05).
	(8)	(9)	(10)	(11)	(12)	(13)
Mean yield of cane in tons per acre.	40.85	40.82	40.70	2.030	No.	..
As per cent on control ..	93.80	93.7	93.5	4.910	..	..

The initial analysis of the soil is furnished in Table XXXV.

TABLE XXXV.—Initial soil analysis.

Serial number and details.	Per cent air-dry soil.
1 PH. (1:5 water extract)	7.9
2 Loss on ignition per cent	3.18
3 Insolubles per cent	83.71
4 Iron (Fe ₂ O ₃ per cent)	5.22
5 Alumina (Al ₂ O ₃) per cent	4.96
6 Lime. (CaO) per cent	0.37
7 Total nitrogen per cent	0.0392 per cent.
8 Nitrate nitrogen (mg.)	0.20 (mg./100 grs. soil)
9 Organic carbon	0.35 per cent.
10 Available P ₂ O ₅	0.037 per cent.

The soil was of medium fertility, comparatively low in nitrogen and carbon.

(i) *Availability of nitrogen.*—Soil samples were drawn monthly from the top one-foot, from the various treatments and analysed for nitrate nitrogen. The results are presented in Table XXXVI.

TABLE XXXVI.—Monthly variation in nitrate—Nitrogen in the soil (mg./100 grs. dry soil).

Serial number and treatment.	Initial.	May.	June.	July.	August.	September.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 A	0.20	0.42	0.92	1.31	0.68	0.60
2 B	0.20	0.35	0.44	0.60	0.67	0.72
3 C	0.20	0.38	0.45	0.47	0.56	0.60
4 D	0.20	0.35	0.46	0.68	0.73	0.84
5 E	0.20	0.37	0.41	0.46	0.56	0.61
6 F	0.20	0.34	0.38	0.48	0.52	0.60
7 G	0.20	0.40	0.41	0.42	0.48	0.51
8 H	0.20	0.33	0.39	0.53	0.57	0.61
9 I	0.20	0.36	0.41	0.38	0.45	0.59

Serial number and treatment.	October.	November.	December.	January.	February.	Harvest.
(8)	(9)	(10)	(11)	(12)	(13)	
1 A	0.41	0.48	0.35	0.27	0.27	0.26
2 B	0.50	0.39	0.35	0.27	0.29	0.26
3 C	0.49	0.42	0.36	0.27	0.33	0.29
4 D	0.51	0.38	0.37	0.27	0.32	0.31
5 E	0.50	0.43	0.40	0.33	0.33	0.31
6 F	0.45	0.36	0.29	0.22	0.22	0.26
7 G	0.37	0.39	0.29	0.22	0.22	0.26
8 H	0.52	0.38	0.29	0.22	0.22	0.26
9 I	0.45	0.42	0.29	0.23	0.22	0.26

Soil samples were drawn from top one foot periodically at different stages of growth of the crop. The data revealed that the nitrates reached a peak in the case of treatment 'A' alone (which received half the manure at planting) in about 2–3 months, at a stage when the crop requirement is little. This was not so in the case of the other treatments which received the manure fifty days later. Besides the seasonal and other factors, the higher peak of the nitrate nitrogen in the case of treatment 'A' as compared to the rest of the treatments, may be attributed to a more rapid depletion by the crop in the case of the latter treatments, while the uptake by the plants in treatment 'A' at the time of peak nitrification is far lower.

(ii) *Nitrogen in plant.*—Simultaneously, plant samples were drawn from the various treatments periodically, by the "unit length method" and analysed for total nitrogen. The results are presented in Table XXXVII.

TABLE XXXVII.—Total nitrogen per cent in whole plant. (Percentage on oven dry basis) (Variety Co. 419).

Serial number and treatments.	June.	July.	August.	October.	January.	Harvest time.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 A	1.54	0.90	0.81	0.53	0.38	0.38
2 B	1.55	1.09	1.12	0.52	0.20	0.22
3 C	1.47	1.01	0.84	0.57	0.31	0.31
4 D	1.65	1.16	1.23	0.60	0.31	0.29
5 E	1.54	1.02	0.92	0.59	0.38	0.39
6 F	1.58	1.04	0.97	0.53	0.21	0.21
7 G	1.57	0.98	0.83	0.59	0.31	0.28
8 H	1.50	1.04	1.01	0.63	0.32	0.31
9 I	1.50	0.95	0.84	0.70	0.39	0.39

The nitrogen-content in whole plant was similar for all the treatments to start with in June in spite of treatment "A" receiving half the dose of manure (50 lb. N) at planting time. By July-August when the plants commenced rapid growth the treatments which received the manurial doses either in full at 50 days or in two halves at 50 and 100 days, had the advantage to start with higher nitrogen in plant tissue, especially in comparison to treatment "A". The nitrogen-content of whole plant seemed to level up by the time of harvest, irrespective of the treatments, and the effects of the different seed rates were not felt at any stage of the crop-growth.

The uptake of nitrogen by the crop up to the various stages was computed from the nitrogen content of the plant and the fresh weight of the plants per unit area. The figures are presented in Table XXXVIII.

TABLE XXXVIII.—Uptake of nitrogen per acre (lb.)

Serial number and treatments, (1)	June. (2)	July. (3)	August. (4)	October. (5)	January. (6)	Harvest. (7)
1 A	15.47	37.59	94.57	108.4	127.2	124.6
2 B	13.10	47.49	135.09	103.6	112.6	77.1
3 C	11.65	54.62	94.88	125.7	127.0	100.2
4 D	9.49	77.42	149.43	120.5	125.2	116.6
5 E	10.93	68.96	123.44	152.5	136.5	135.3
6 F	12.27	74.16	189.13	134.7	119.6	62.7
7 G	8.77	43.60	168.92	141.4	129.2	80.2
8 H	11.86	79.92	198.21	139.2	126.9	97.4
9 I	8.46	61.05	156.64	164.3	134.5	120.0

An examination of the periodical uptake of nitrogen by the crop up to the different stages, indicated that in spite of a higher initial nitrogen in the soil in the case of treatment "A" the uptake was similar to the other treatments which did not receive any manure at planting. By the time the plants began growing rapidly there was a rapid rise in the uptake of nitrogen in the case of the treatments "B" to "I", followed by a rapid increase in the fresh weight. The maximum uptake of nitrogen was attained earlier in the case of treatments which received all the manure at 50 days as compared to the rest.

(iii) *Juice quality.*—The results of periodical juice analysis are furnished in Table XXXIX.

TABLE XXXIX.—Juice analysis data.

Serial number and treatments, (1)	November. (2) (3)		December. (4) (5)		January. (6) (7)		February. (8) (9)		March. (10) (11)		C.C.S. percent at harvest. (12)
	Sucrose per cent.	Purity per cent.	Sucrose per cent.	Purity per cent.	Sucrose per cent.	Purity per cent.	Sucrose per cent.	Purity per cent.	Sucrose per cent.	Purity per cent.	
1 A	8.83	69.86	12.41	80.05	13.75	80.61	15.71	85.35	17.82	87.66	12.41
2 B	9.21	71.17	12.26	79.82	14.53	83.71	17.10	88.10	18.13	86.90	12.77
3 C	7.93	65.86	10.75	75.95	14.50	84.03	16.84	87.68	17.72	86.18	12.44
4 D	8.56	68.81	11.80	77.34	14.37	83.73	16.65	87.14	17.82	87.87	12.63
5 E	7.54	65.34	11.10	76.76	13.45	78.30	16.44	87.88	17.61	87.70	12.39
6 F	9.23	70.78	12.95	80.65	13.91	80.03	17.89	90.31	19.05	86.36	13.39
7 G	8.51	68.41	11.35	75.86	13.83	81.55	17.22	88.72	18.25	87.08	12.87
8 H	9.26	69.94	12.39	79.62	14.63	83.81	17.03	88.63	17.66	87.95	12.81
9 I	7.24	62.74	10.68	74.91	13.24	78.52	17.01	88.53	18.25	89.29	13.02

There were no marked differences in the sucrose-content of juices as influenced by the various treatments. However by harvest time, the treatments which received full dose of manure at 50 days after planting were slightly richer than the rest.

The differences in yield between the various treatments were not significant (vide Table XXXIV) however the treatments (100 lb. N) which received the manure in full at 50 days or in two halves at 50 and 100 days recorded slightly higher yields than the control treatment "A". No clear effect of the different seed-rate was felt either in respect of the ultimate yield or population.

The experiment is being repeated next year.

14. *Foliar diagnosis studies.*—Studies were continued for the second season in succession, to observe the levels of leaf nitrogen indicative of sufficiency or otherwise of nitrogen in the soil. Leaf samples were taken from the lamina in the third dewlap position by 'punch method', fortnightly up to July and later at monthly intervals up to harvest time.

A. Levels of nitrogen.

The details of layout and summary of results are furnished in Table XL.

TABLE XL.—Details of layout.

* Sugarcane foliar diagnosis studies (1951-52).

Field number.—24.

Soil.—Loam.

Previous crop.—Paddy.

Manures.—Ten tons of farm-yard manure per acre as basal dressing and the concentrates applied as per the treatments in two equal doses half at planting time and half at earthing up. Two-thirds in the form of groundnut cake and one-third as ammonium sulphate on nitrogen basis.

Variety.—Co. 419.

Date of planting.—21st April 1951.

Date of harvest.—12th to 19th March 1952.

Spacing.—2 feet 8 inches or 4 links between cane rows.

Seed rate.—16,000 sets (three budded) per acre.

Treatments.—

Four—(a) 0 lb. nitrogen per acre.

(b) 100 lb. " "

(c) 200 lb. " "

(d) 300 lb. " "

Replications.—Four.

Layout.—4 × 4 randomized blocks.

Size of the plot—

Gross—75 × 32 links = 2.40 cents.

Nett—65 × 24 links = 1.56 cents.

Summary of results.

(1)	100 N. (2)	300 N. (3)	200 N. (4)	0 N. (5)	Standard error of the treatment mean. (6)	Whether significant or not. (7)	Critical difference p = 0.05. (8)
Mean yield of cane in tons per acre.	47.43	47.25	45.20	38.28	1.57	Yes.	5.02
As per cent on control ..	100.0	99.5	95.3	80.60	3.310	..	10.58
Conclusion:—100 N, 300 N, 200 N, 0 N.							

B. Forms of nitrogen.

The details of layout for the permanent manurial experiment with different forms of nitrogen are given in the agronomy report, vide Table XXII; the summary of results is reproduced below:—

Summary of results.

(1)	Mixture of ammonium sulphate and groundnut cake. (2)	Ammonium sulphate. (3)	Groundnut cake. (4)	Farm-yard manure. (5)	No manure. (6)	Standard error of the treatment mean. (7)	Whether significant or not. (8)	Critical difference (P=0.05). (9)
Mean yield of cane in tons per acre.	40.74	40.42	39.75	30.45	27.66	2.31	Yes.	7.14
As per cent on control ..	100.0	99.2	97.6	74.7	67.9	5.670	—	17.58

The data on periodical leaf analysis, under different levels of nitrogen and different forms, are given in Table XLI.

TABLE XLI.—Leaf nitrogen and yield of Co. 419 (per cent nitrogen in leaf on dry basis).

Serial number and treatment.	Yield in tons per acre.	C.C.S. per acre.	June.	July.		August.	
				1st. FN.	2nd. FN.	1st. FN.	2nd. FN.
(1)	(2)	(3)	(4)	(5)		(6)	(7)
<i>A. Doses of nitrogen.</i>							
Date of planting—21st April 1951.							
1 0 lb. N	38.28	5.14	2.24	2.18	1.87	1.83	1.89
2 100 lb. N	47.43	6.05	2.36	2.24	2.10	2.09	2.03
3 200 lb. N	45.20	5.16	2.45	2.37	2.25	2.11	2.19
4 300 lb. N	47.25	5.51	2.48	2.34	2.32	2.31	2.45

B. Forms of nitrogen.

Dates of planting—2nd and 3rd May 1951—(Dose : 100 lb. N per acre).

Serial number and treatment.	September.		October.	November.	January.	Harvest time.
	1st. FN. (8)	2nd. FN. (9)				
1 Ammonium sulphate	40.42	5.41	2.55	2.38	..	2.11 ..
2 Groundnut cake	39.75	5.62	2.41	2.23	..	1.97 ..
3 Farmyard manure	30.45	4.51	2.25	2.21	..	1.63 ..
4 Mixture of ammonium sulphate and groundnut cake.	40.74	5.31	2.48	2.30	..	2.05 ..
5 No manure	27.66	4.27	2.22	2.08	..	1.67 ..

A. Doses of nitrogen.

Date of planting—21st April 1951.

Serial number and treatment.	September.		October.	November.	January.	Harvest time.
	1st. FN. (8)	2nd. FN. (9)				
1 0 lb. N	1.72	1.81	1.78	1.51	1.49	1.24
2 100 lb. N	1.84	1.89	1.82	1.64	1.56	1.40
3 200 lb. N	1.97	2.10	2.04	1.65	1.54	1.60
4 300 lb. N	2.13	2.11	2.02	1.85	1.61	1.59

B. Forms of nitrogen.

Dates of planting—2nd and 3rd May 1951—(Dose : 100 lb. N per acre).

Serial number and treatment.	September.		October.	November.	January.	Harvest time.
	1st. FN. (8)	2nd. FN. (9)				
1 Ammonium sulphate	1.93	..	1.87	1.73	1.66	1.44
2 Groundnut cake	2.01	..	1.97	1.73	1.52	1.21
3 Farmyard manure	1.53	..	1.52	1.40	1.37	0.88
4 Mixture of ammonium sulphate and groundnut cake.	2.02	..	1.93	1.67	1.49	1.42
5 No manure	1.52	..	1.40	1.30	1.21	0.77

The data indicated a gradual increase in leaf nitrogen from 0 lb. to 300 lb. N throughout the growth of the cane crop. There was significant increase in yield in the case of 100 lb. N over 0 lb. N this year, while beyond 100 lb. N, there was no increase in yield. The studies are being continued.

With reference to the form of nitrogen, it can be seen that 'no manure' and 'farmyard manure' recorded the lowest leaf nitrogen, especially from the third month after planting while no clear differences could be traced out among the remaining treatments.

Thus the data revealed interesting information showing that the leaf nitrogen is indicative of the nutrient status of the plant. It can also be said that the leaf nitrogen values under 'no manure' and 'farmyard manure' treatments are indicative of 'deficiency values' in view of the significantly lower yields. The studies are being continued.

Maturity observations.—Juice analysis was conducted to judge the effect of the treatments and to see if any correlation between leaf nitrogen and sucrose in the juice existed. The results are presented in Table XLII.

TABLE XLII.—Juice quality of Co. 419 (under different levels of nitrogen).

Serial number and details.	0 lb. N. PER ACRE.	100 lb. N. PER ACRE.	200 lb. N. PER ACRE.	300 lb. N. PER ACRE.
1. December—				
Brix, per cent	16.74	15.14	15.00	14.34
Sucrose, per cent	14.09	11.87	11.82	10.73
Purity, per cent	84.14	78.41	78.81	74.84
2. January—				
Brix, per cent	18.96	17.56	16.86	17.36
Sucrose, per cent	15.90	14.75	14.05	13.95
Purity, per cent	83.85	84.01	83.32	80.37
3. March (harvest)—				
Brix, per cent	20.26	19.59	18.46	18.36
Sucrose, per cent	18.56	17.75	16.14	16.35
Purity, per cent	91.61	90.61	87.43	89.05
C.C.S., per cent	13.42	12.76	11.41	11.66

The data revealed that with lower nitrogen content in leaf, higher sucrose content was recorded. A depression in the juice quality was noticed in the 200 lb. N and 300 lb. N treatments, compared to the 0 lb. N and 100 lb. N treatments.

15. *Permanent manurial experiment—Soil studies.*—The soil analytical data from the permanent manurial experiment have been reported under the report of the Agronomy Division.

16. *Cane trash composting trials.*—Studies were continued to test the previous season's observations that pig-dung used as starter in the composting of cane trash hastened and completed decomposition earlier than cow-dung, the usual starter for these studies, cow-dung and pig-dung were added at 20 per cent and 30 per cent levels on the weight of cane-trash. There were two replications for each treatment. In each pit, 1½ tons of cane trash was put in, and the quantities of the dungs added for each replication were 672 lb. for 20 per cent and 1,008 lb. for 30 per cent levels, for both the cow-dung and pig-dung treatments. Once a month regularly, turnings were given for all the treatments.

Before starting the composting, initial samples of cane trash, cow-dung and pig-dung were taken for chemical analysis. At the time of each turning, samples were taken from each pit for analysing for N, P, and K. The analytical data are furnished in Table XLIII.

TABLE XLIII.—Cane trash compost data (on dry basis).

Details.	Moisture. PER CENT.	Loss on ignition. PER CENT.	Insolubles. PER CENT.	Nitrogen. PER CENT.	P2O5. PER CENT.	Potash. PER CENT.
<i>Original samples—</i>						
Pig-dung	6.79	36.61	58.27	1.69	1.54	0.66
Cow-dung	61.90	36.96	58.38	0.99	0.80	0.80
Cane-trash	10.24	87.90	10.32	0.45	0.36	1.27
<i>One-month old samples—</i>						
20 per cent pig-dung compost.	69.42	70.58	24.78	0.68	0.63	1.02
30 per cent pig-dung compost.	61.06	66.16	26.58	0.71	0.74	0.99
20 per cent cow-dung compost.	71.38	74.69	19.74	0.46	0.34	1.22
30 per cent cow-dung compost.	68.36	69.06	22.88	0.62	0.32	1.20
<i>Two-months old samples—</i>						
20 per cent pig-dung compost.	62.70	43.70	48.81	0.71	0.66	0.98
30 per cent pig-dung compost.	64.94	38.46	53.84	0.77	0.62	0.88
20 per cent cow-dung compost.	68.33	47.17	45.27	0.47	0.57	0.98
30 per cent cow-dung compost.	69.93	56.10	35.47	0.59	0.49	1.08

Details. (1)	Moisture. (2) PER CENT.	Loss on ignition. (3) PER CENT.	Insolubles. (4) PER CENT.	Nitrogen. (5) PER CENT.	P2O5. (6) PER CENT.	Potash. (7) PER CENT.
<i>Three-months old samples—</i>						
20 per cent pig-dung compost.	69.98	28.97	62.99	0.72	0.65	0.68
30 per cent pig-dung compost.	66.58	26.89	64.37	0.82	0.62	0.72
20 per cent cow-dung compost.	70.33	30.69	61.98	0.58	0.58	1.05
30 per cent cow-dung compost.	74.41	35.40	67.88	0.62	0.56	0.89
<i>Four-months old (final) samples—</i>						
20 per cent pig-dung compost.	56.63	20.71	70.50	0.76	0.68	0.74
30 per cent pig-dung compost.	61.42	22.87	69.37	0.79	0.68	0.64
20 per cent cow-dung compost.	63.32	32.10	62.66	0.57	0.60	0.99
30 per cent cow-dung compost.	62.91	33.44	60.82	0.71	0.60	0.87

Observations during the progress of composting and at each turning indicated that the decomposition was quicker in the case of the pig-dung treated cane-trash. The final product was more friable and looked darker in the case of 'pig-dung' as compared to the 'cow-dung' treated samples. Chemical analysis data showed that the manurial value of the pig-dung treated compost was better than the cow-dung treated one, especially in respect of nitrogen and phosphoric acid.

To find out whether the quicker decomposition with pig-dung was due to any special type of bacteria or greater bacterial population in pig-dung as compared to cow-dung, samples of composts were sent, at 2 months and finally at completion of composting to the Government Agricultural Chemist, Coimbatore, for bacterial examination. The results of the bacterial study are given in Table XLIV.

TABLE XLIV.—Results of bacteriological analysis of composts.

(By Government Agricultural Chemist, Coimbatore.)

Serial number and details. (1)	20 per cent pig-dung compost. (2)	30 per cent pig-dung compost. (3)	20 per cent cow-dung compost. (4)	30 per cent cow-dung compost. (5)	Remarks. (6)
<i>First batch of samples (2 months old).</i>					
1 Total bacterial population per gram of the sample.	22,610,000	29,330,000	14,920,000	25,340,000	Growth observed in all the cultures for B. coli in dilution up to lakh, but with no gas formation in any at the end of 24 and 48 hours incubation at 37°C.
2 Cellulose decomposers (dilution method) per cent per gram of the sample.	12,060	12,830	11,140	13,430	
3 B. coli (dilution method) per gram of the sample.	Nil.	Nil.	Nil.	Nil.	
4 Humus ..	3.382	8.626	3.029	14.19	
5 Water soluble organic matter.	2.629	4.827	2.584	4.566	
6 Hemicellulose ..	0.1866	0.3282	0.1343	0.5973	
7 Cellulose ..	0.9942	1.058	1.379	1.272	
8 Total of all the fractions (items 4 to 7).	5.1918	14.8392	7.1263	20.6253	Soil samples are from the 'No manure plot' of 'old permanent Manurial Experiment' Central Farm, Coimbatore treated with different composts.
<i>Second batch of samples (4 months old).</i>					
9 Carbon dioxide CO ₂ evolution—					
A. Soil alone—100 grs.	7.92	7.92	7.92	7.92	
B. Soil—100 grs. plus 5 grs. of compost.	9.02	12.12	14.224	14.19	
C. Percentage of increase over control.	13.89	53.03	79.54	79.18	

Serial number and details. (1)	20 per cent pig-dung compost. (2)	30 per cent pig-dung compost. (3)	20 per cent cow-dung compost. (4)	30 per cent cow-dung compost. (5)	Remarks. (6)
<i>Second batch of samples (4 months old).</i>					
1 Total bacterial population per gram of the sample.	4,391,000	4,843,000	4,525,000	8,425,000	Growth was noticed in all the cultures up to the lakh dilution, but gas formation characteristic of B. coli occurred only in 1,000 dilution of the composts.
2 Cellulose decomposers (dilution method) per cent per gram of the sample.	10,520	10,480	10,350	10,590	
3 B. coli (dilution method) per gram of the sample.	1,052	1,048	1,035	1,059	
4 Humus ..	2.475	2.477	0.7193	3.904	
5 Water soluble organic matter.	2.524	3.603	2.675	2.881	
6 Hemicellulose ..	0.4018	0.1846	1.8620	2.4800	
7 Cellulose ..	1.04	0.9707	0.9361	0.672	
8 Total of all the fractions (items 4 to 7).	6.4408	7.2353	6.1924	9.9370	Soil samples were taken from the 'No manure plot' of 'old permanent manurial Experiment' Central Farm, Coimbatore, treated with different composts.
9 Carbon dioxide (CO ₂) evolution from soils treated with composts—					
A. Soil alone—100 grs.	6.66	6.66	6.66	6.66	
B. Soil 100 grs. plus 5 grs. of compost.	6.82	8.84	11.53	11.70	
C. Per cent increase over control.	3.024	32.73	73.11	75.67	

The data did not indicate any superiority, both as regards the type or number of bacteria, of pig-dung over cow-dung. Hence, considering the process of decomposition, as reflected in the organic fractions, as well as the carbon-dioxide evolution, at this stage, no definite factors can be attributed biologically to pig-dung.

To test the possibility of the higher nitrogen and phosphoric acid contents in the pig-dung as compared to cow-dung being responsible for the earlier decomposition of the pig-dung treated compost, further studies have been planned. The studies are being continued.

17. *Composition of cane juice and jaggery quality.*—Studies were continued during this year also to find out the effect of (1) swamp condition and (2) varietal differences in juice and their effect on jaggery composition and quality. The ultimate object is to confirm previous findings as regards the potent factors in juice responsible for jaggery quality.

(a) *Swamp trials.*—The juices were completely analysed as in last year and the data are presented in Table XLV.

TABLE XLV.—Composition of juice under swamp conditions.

(Co. 419 juice).

Serial number and details of analysis.	Co. 419 juice (swamp conditions).
1 PH ..	5.0
2 Acidity (c.c. N/10 Na OH/100 c.c.) ..	12.0 c.c.
3 Total solids, per cent ..	19.49
4 Sucrose, per cent ..	17.82

Serial number and details of analysis.						Co. 419 juice (swamp conditions).
5	Glucose per cent	..	..	..	..	00.487
6	Purity per cent	..	..	..	..	91.43
7	Ash per cent (per 100 c.c. juice)	..	..	..	..	0.37 grs.
8	Chlorine (per 100 c.c. juice)	..	..	..	..	0.099 grs.
9	Colloids (per 100 c.c. juice)	..	..	..	..	0.51 grs.
10	Nitrogen (mg. per 100 c.c. juice)—					28.0 mg.
	(a) Total nitrogen	..	..	..	..	20.07 mg.
	(b) Non-protein N	..	..	..	..	4.2 mg.
	(c) Ammoniacal N	..	..	..	..	3.4 mg.
	(d) Amide N	..	..	..	..	8.86 mg.
	(e) Amino N	..	..	..	..	

Compared to last year, the juice composition this season under swamp conditions was definitely better as was shown by the lower nitrogen content than in last season and the low glucose. The detailed nitrogen fractions were estimated and it has found that amino-nitrogen formed the biggest component of the total non-protein nitrogen in the juice. This was also reflected in the comparatively higher acidity of the juice.

(b) *Varieties*.—Two varieties Co. 527 and Co. 419 were chosen for the study. It is well known that the general quality of jaggery of Co. 527 is superior to Co. 419. Juice samples were analysed and jaggery composition was also noted. The juice composition is given in Table XLVI.

TABLE XLVI.—Composition of juices of Co. 419 and Co. 527.

Serial number and details of analysis.		Co. 419.	Co. 527.
1	Brix per cent	20.64	19.68
2	Sucrose per cent	18.44	17.94
3	Purity per cent	89.34	90.12
4	Glucose per cent	1.10	0.34
5	Ash (grs./100 c.c. juice)	0.350 grms.	0.324 grms.
6	Phosphoric (acid grs./100 c.c. juice)	0.032	0.042
7	Chlorine (per 100 c.c.)	0.103	0.105
8	Total colloids per cent (per 100 c.c.)	0.48	0.37
9	Total Nitrogen (milligram per 100 c.c. juice.)	19.0 milligram.	16.2 milligram.
10	Non-protein nitrogen (milligram per 100 c.c.)	15.6	12.8
11	Amino-nitrogen (milligram 100 c.c.)	7.0	5.6

It can be seen from the data that the juice of Co. 527 contained less of harmful constituents than Co. 419. The phosphoric acid content, which is beneficial for good jaggery was more in Co. 527 while the total and non-protein nitrogen are lesser than in Co. 419. Amino-nitrogen also was estimated by titration and it was found that Co. 419 had more of it than Co. 527. The data confirmed previous findings that low non-protein nitrogen and colloids and high phosphate are beneficial. It was also found that much of the non-protein nitrogen was in the form of amino-nitrogen and this should be lower for good quality of jaggery.

The corresponding jaggeries were analysed for some of the very important constituents and analytical results are given in Table XLVII.

TABLE XLVII.—Analysis of jaggeries (dry basis).

Serial number and details of analysis.		Co. 419.	Co. 527.
1	Moisture per cent	8.50	7.20
2	Sucrose per cent	72.79	80.27
3	Glucose per cent	9.55	6.79
4	Glucose ratio	13.12	8.45
5	Total non-sugars per cent	9.16	5.74
6	Nitrogen (milligram 100 grs. jaggery)—		
	(a) Total nitrogen	56.61	36.21
	(b) Non-protein nitrogen	42.95	19.61
	(c) Protein nitrogen	13.66	17.60
7	Non-protein as percentage of total nitrogen	75.78	53.71

Serial number and details of analysis.		Co. 419.	Co. 527.
8	Colloids per cent	5.52	3.48
9	Physical features of jaggery—		
	(a) Colour	Brown.	Yellowish.
	(b) Hardness	Hard.	Very hard.
	(c) Structure	Moderate crystals.	Very good crystals.
	(d) Keeping quality	Under study.	Under study.

The jaggery analysis confirmed the juice analysis results and indicated the role played by the colloids and non-protein-nitrogen. It appears that the better quality of Co. 527 is due to the lower level of these constituents in juice and in the jaggery.

18. *Studies on the use of lime as clarificant*.—As in the last year these studies have been continued to find out the optimum pH of cane juice to get good quality jaggeries. For these studies, cane from the variety, Co. 419 manured at the rate of 100 lb. N was taken.

Jaggeries at three stages during the maturity phase of the cane, namely, (a) December—when the cane is immature, (b) March—when the cane is at peak maturity and (c) May—when the cane has deteriorated and the quality of the juice is poor were prepared. The present report deals with the December and March studies only as the May studies could not be completed at the time of the report.

The following were the pH values to which the juices were brought before finally converting them into jaggery:—

- (1) Unlimed.
- (2) Limed to pH 6.0
- (3) " pH 6.4
- (4) " pH 6.8
- (5) " pH 7.2
- (6) " pH 7.6
- (7) " pH 8.0

Juice samples were analysed before each jaggery boiling. Before and after addition of lime, the pH value of the juices was estimated as also the titratable acidity. The results of Juice analysis and jaggery quality are given in Table XLVIII.

TABLE XLVIII.—Studies on the use of lime as clarificant—Variety (Co. 419).

Serial number and month of preparation.	pH of the juice.		Titratable acidity of juice (c.c. N/10 NaOH/100 c.c. juice).		Juice analysis (original juice.)			Purity.	Physical characteristics of the jaggery.
	Before liming.	After liming.	Before liming.	After liming.	Brix.	Sucrose.	Glucose.		
			PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1952									
1 December.	5.2	Unlimed.	..	..	13.69	10.73	..	73.37	Soft sticky, yellow, setting poor.
2 "	5.2	6.0	..	..	13.26	9.91	..	74.66	Soft sticky, light brown, poor setting.
3 "	5.2	6.4	..	..	13.26	9.91	..	74.66	Hard, yellow, good setting.
4 "	5.0	6.8	..	..	13.16	9.68	..	73.55	Hard, light brown, moderate crystalline.
5 "	5.0	7.2	..	..	13.16	9.68	..	73.55	Dark brown, hard, crystalline.
6 "	5.2	7.6	..	..	13.29	9.66	..	71.93	Dark, slightly moist.
7 "	5.2	8.0	..	..	13.29	9.66	..	71.93	Very dark, poor setting.
8 March.	5.0	Unlimed	19.0 c.c.	..	20.33	17.75	1.02	87.09	Hard, yellow, slightly moist.
9 "	5.0	6.0	19.0 c.c.	10.0 c.c.	21.01	18.02	0.96	85.77	Hard, yellow, crystalline.
10 "	5.0	6.4	18.0 c.c.	7.0 c.c.	21.01	18.02	0.96	85.77	Very hard, light brown, good crystallisation.
11 "	5.0	6.8	16.0 c.c.	6.0 c.c.	21.08	19.03	1.12	90.27	Very hard brown.
12 "	5.0	7.2	16.0 c.c.	..	21.08	19.03	1.12	90.27	Very hard, dark brown.
13 "	5.0	7.6	17.0 c.c.	..	21.08	19.03	1.12	90.27	Very hard, black.
14 "	5.0	8.0	16.0 c.c.	..	21.08	19.03	1.12	90.27	Very black, very hard excellent crystallisation.

It can be seen from the above table that as in last year, pH 6.4 appears to be the optimum for both colour and hardness even for immature canes of Co. 419. It is also seen that too much liming of immature juices is bad, leading again to soft jaggeries showing thereby that too much liming increases the mineral content with low sucrose. In the case of mature canes as in March even at pH 6.0 the jaggery was good though it can here also be said that pH 6.4 is the optimum for combining colour and hardness. With increase in the addition of lime and alkalinity of the juices, the titratable acidity decreases. However, this situation results in the darkening of the colour.

Along with bringing the pH of the juices to the desired level it was attempted to see how far the liming can be controlled by means of simple indicator papers. The B.D.H. narrow-range indicator paper was tested with each boiling and it was found that the indicator paper was a fairly simple and reliable guide for proper liming.

Studies in deteriorated juices are in progress and will be reported later.

19. *Studies on the use of Superphosphate as clarificant.*—Earlier studies on the relationship between juice composition and jaggery quality showed that whenever the juice quality was poor and jaggeries were of poor quality, as for example under high doses of nitrogen or under swamp conditions, the juices had low phosphate content. Hence it was attempted to study the effect of super on the colour and setting properties of the jaggery and also whether by combining high liming and removing the excess lime with super the jaggery quality can be improved in the case of immature and deteriorated juices. In addition to the above; castor and groundnut seed extracts as suggested by the Director of Sugarcane Research, Bihar were also tried.

The following were the main treatments:—

- (1) 0.025 per cent super on juice weight.
- (2) 0.05 per cent super on juice weight.
- (3) Liming to pH 7.5 and deliming with 0.025 per cent super phosphate.
- (4) Liming to pH 7.5 and deliming with 0.05 per cent super phosphate.

Juice samples were analysed before boiling and the pH and titratable acidity were estimated before and after each treatment. The results are furnished in Table XLIX.

TABLE XLIX.—*Studies on the use of Superphosphate as clarificants—Variety (Co. 419).*

Serial number and month of preparation and details.	pH of the juice.			Titratable acidity*	After addition of super.	Juice analysis.			Purity per cent.	Physical characteristics of the jaggery.
	Before liming.	After liming.	Before liming.			Brix per cent.	Sucrose.	Glucose.		
				(1)							(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
PER CENT. PER CENT.										
December.										
1 (a) 0.025 per cent super alone ..	5.2	5.0	10.0 c.c.	14.0 c.c.	14.39	10.78	2.48	74.91	Soft yellow setting poor.	
2 (b) 0.05 per cent super alone ..	5.2	5.0	10.0 c.c.	17.0 c.c.	14.39	10.78	2.48	74.91	Very soft setting bad.	
3 (c) Liming to pH 7.5 and 0.025 per cent super	5.2	6.4	8.0 c.c.	..	15.42	12.58	2.36	81.58	Hard, light brown.	
4 (d) Liming to pH 7.5 and 0.05 per cent super	5.2	6.2	8.0 c.c.	..	15.42	12.58	2.36	81.58	Hard, brown good crystallisation.	

Serial number and month of preparation and details.	pH of the juice.		Titratable acidity*	After addition of super.	Brix per cent.	Juice analysis.		Purity per cent.	Physical characteristics of the jaggery.				
	Before liming.	After liming.				Before liming.	Sucrose.			Glucose.			
			(1)								(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
										PER CENT.	PER CENT.		
March.													
1 (a) 0.025 per cent super alone	5.0	4.7	12.0 c.c.	19.0 c.c.	21.06	19.02	1.10	90.31	Soft, yellow, poor crystallisation.				
2 (b) 0.05 per cent super alone	5.0	4.6	15.0 c.c.	22.0 c.c.	21.06	19.02	1.10	90.31	Do.				
3 (c) Liming to pH 7.5 and 0.025 per cent super	5.0	7.2	12.0 c.c.	..	21.06	19.02	1.10	90.31	Very hard, slightly dark good crystallisation.				
4 (d) Liming to pH 7.5 and 0.05 per cent super	5.0	7.0	13.0 c.c.	..	21.06	19.02	1.10	90.31	Do.				
* c.c. N/10. Na OH per 100 juice.													

* c.c. N/10. Na OH per 100 juice.

From the above table it can be seen that phosphate treatment alone for the juice is unsuited for good setting. The poor setting is mainly due to an increase in the juice acidity and consequent inversion during the course of boiling. Compared to this the treatments wherein the juice was excess limed up to pH 7.5 and delimed with super at 0.025 per cent and 0.05 per cent resulted in very hard jaggeries but the deliming was not sufficient enough to improve the colour. Hence a further treatment where in the juice was limed to excess and then delimed with super to pH 6.0 to 6.4 was also tried during this season. Here the original acidity in the juice is completely neutralized and clarification done and later the excess lime is removed by super to the optimum p—conducive to good colour and hardness. In the case of this treatment the jaggery setting was good even for immature juice. It combined colour and hardness to a good extent. This treatment is being further tested.

Along with the above, extracts of castor and groundnut seed (as suggested by the Director of Sugarcane Research, Bihar) were tried as clarificants but they were not found to be good.

III. PHYSIOLOGY.

20. *Water requirement of sugarcane crop—I. First ratoon—Variety Co. 419.*—This is the second year for studying the water requirement of first ratoon cane crop. The irrigations were given at intervals of 12, 18 and 24 days. A basal dressing of 10 tons farm yard manure was applied to the ratoon in addition to 100 lb. nitrogen as a mixture of ammonium sulphate and groundnut cake in the ratio of 1 : 2 on nitrogen basis.

The crop lodged very badly due to heavy rains and gales during November. The details and summary of results are furnished in Table L.

TABLE L.—*Details of layout.*

Water requirement of sugarcane ratoon crop (1951-52.)

Field number—9-A.	Treatments—Three.
Soil—Sandy loam.	(a) Irrigation once in 12 days.
Previous crop—Plant crop (Co. 419)	(b) " " 18 "
Manures—The tons of Farm-yard manure applied as basal dressing and 100 lb. of Nitrogen (2/3 as in the form of groundnut cake, and 1/3 as sulphate of ammonia) in two equal doses applied on 9th May and 20th June 1951.	(c) " " 24 "
Date of ratooning—12th April 1951.	Variety—Co. 419.
Date of harvest—23rd to 28th December 1951.	Replications—Six.
Spacing—2' and 8' or 4 links between cane rows.	Layout—3 x 6 randomised block.
	Size of plot—
	Gross—95 x 40 links = 3.800 cents.
	Net—78 x 24 links = 1.872 cents.

Summary of results.

	Irrigation once in			Standard error of treatment mean.	Whether significant or not.	Critical difference ($P = 0.05$)
	12 days.	18 days.	24 days.			
Mean yield of cane in tons per acre.	44.93	40.85	40.81	0.9369	Yes.	2.948
As per cent on control	100.0	90.93	90.84	2.085	..	6.561
Conclusion—12 days, 18 days, 24 days.						

The yield data indicated that irrigation at close intervals (12 days) was significantly superior to irrigations once in 18 or 24 days. During 1950-51, however, the yield differences between the treatments were not statistically significant. The total quantities of water, computed in acre inches required for irrigating the different treatments are given in Table LI.

TABLE LI.—Quantity of water applied to different treatments.

(Sugarcane ratoon crop.)

Particulars.	Irrigations.		
	Once in 12 days.	Once in 18 days.	Once in 24 days.
By irrigation	13.15	6.56	5.98
By rainfall	46.54	46.54	46.54
Total	59.69	53.10	52.52
Number of irrigations given	14	7	6

The water requirement of a ratoon crop was lower than the plant crop. But the plant crop stood for a longer period in the field for 12 months as against the 10 month period for a ratoon. Data of growth measurements at harvest are presented in Table LII.

TABLE LII.—Mill yard data.

Particulars.	Irrigation.		
	Once in 12 days.	Once in 18 days.	Once in 24 days.
1 Average length of the millable cane in inches ..	112.5	104.6	103.4
2 Average number of millable canes per plot ..	643	600	580
3 Average weight of millable cane in pounds ..	3.28	3.02	3.07
4 Average number of internode per cane ..	21.6	20.7	20.48
5 Average length of internode in inches ..	5.13	4.97	4.88
6 Average girth of internodes in inches ..	0.97	0.97	1.00
7 C.C.S. in tons per acre (calculated) ..	2.585	2.687	2.492
8 C.C.S. per cent calculated	5.75	6.58	6.10

The data furnished in Table LII indicate that cane growth was better in plots that received irrigations once in 12 days. The length of internodes, number of internodes, the length of the millable cane and its weight were higher in plots that received irrigation once in 12 days. The differences between the calculated C.C.S. yield per acre were negligible. Soil moisture was estimated a day prior to each irrigation and the data are furnished below. There was no marked difference between the various treatments.

TABLE LIII.—Average soil moisture per cent during the different periods.

Particulars.	Irrigations.		
	Once in 12 days.	Once in 18 days.	Once in 24 days.
(1) 0-6" depth—			
From ratooning to May	9.54	10.02	10.47
From June to November	13.75	14.08	13.62
From December to harvest	11.95	11.40	11.04
(2) 6-12" depth—			
From ratooning to May	8.89	10.30	9.96
From June to November	14.02	14.19	14.28
From December to harvest	13.31	13.46	12.01

Periodical juice analysis were conducted and the average figures are furnished in Table LIV.

TABLE LIV.—Results of Juice analysis.

Date.	Sucrose per cent Irrigation.			Purity per cent Irrigation.		
	Once in 12 days.	Once in 18 days.	Once in 24 days.	Once in 12 days.	Once in 18 days.	Once in 24 days.
November	8.15	8.36	8.65	69.29	72.51	71.48
December	9.20	10.14	9.51	70.54	74.82	73.44

The juices from the different treatments analysed are similar in November and with very little difference at harvest time.

Trial jaggeries were made from the three treatments. There was no differences in texture or colour of jaggery between the treatments.

II. Water requirements of sugarcane in relation to kind of manure.—The form in which the nitrogenous manure is applied is known to influence the growth and yield of cane. Water has similar influence. In this experiment the interaction between these two independent factors is sought to be studied.

Co. 419 was the variety under study. Total dose of nitrogen was 100 lb. per acre, applied half at planting and half at earthing up time. Basal dose of farm yard manure was not applied to this experiment. Nitrogen was applied in three forms (1) groundnut cake, (2) ammonium sulphate, (3) mixture of ammonium sulphate and groundnut cake in 1 : 2 proportion on nitrogen basis.

The details of layout and summary of results are furnished in Table LV.

TABLE LV.—Water requirement of sugarcane in relation to kind of manure (1951-52).

Field number—10 A.	Treatments—cont.
Soil—Sandy loam.	(b) Major 3—
Previous crop—Fodder Janna.	(i) Ammonium sulphate to supply 100 lb. nitrogen per acre.
Manure—No basal dressing of farm yard manure was applied. The above mentioned concentrates were applied in two equal doses half at planting and half at earthing up time.	(ii) Groundnut cake to supply 100 lb. nitrogen per acre.
Date of planting—6th February 1951.	(iii) Mixture of ammonium sulphate and groundnut cake in 1 : 2 ratio on nitrogen basis to supply 100 lb. nitrogen per acre.
Date of harvest—12th and 14th February 1952.	Replications—Four.
Spacing—2' 8" or 4 link between cane rows.	Layout—2 x 3 x 4 randomised split plot design.
Seed rate—15,000 three-budded sets per acre.	Size of plot—
Treatments—	Gross—65 x 48 links = 3.12 cents.
(a) Major—2	Nett—55 x 32 links = 1.76 cents.
(i) Irrigation once in 12 days.	Year of trial—First.
and	
(ii) Irrigation once in 24 days.	

Summary of results.

Major treatments (Irrigations).

	Once in 12 days.	Once in 24 days.	Standard error of treatment mean.	Whether significant or not.	Critical difference $P = 0.05$.
Mean yield of cane in tons per acre.	54.71	50.17	1.292	No.	..
As per cent on control ..	100.00	92.49	2.361	..	..

Summary of results.

Minor treatments (Manures).

	Mixture of ammonium sulphate and G.N.C. 1/3 : 2/3 on nitrogen basis.	Sulphate of ammonia.	G.N.C.	Standard error of treatment mean.	Whether significant or not.	Critical difference $P = 0.05$.
Mean yield of cane in tons per acre.	53.72	52.01	51.58	0.7398	No.	..
As per cent on control.	100.00	96.81	96.01	1.376	..	..

The differences in cane yields either due to the interval of irrigation or due to kind of manure were not statistically significant.

The total quantity of water computed in acre inches required for irrigating the different treatments is given below:—

TABLE LVI.—Quantity of water applied to different treatments.

Quantity of water in acre inches.	Irrigation once in 12 days.			Irrigation once in 24 days.		
	Ammonium sulphate.	G.N.C.	Mixture.	Ammonium sulphate.	G.N.C.	Mixture.
By irrigation ..	26.14	26.53	26.83	14.18	14.31	12.97
By rainfall ..	47.07	47.07	47.07	47.07	47.07	47.07
Total ..	73.21	73.65	73.95	61.25	61.38	60.04
Number of irrigations.	22			13		

Data of growth measurements at harvest time are furnished in Table LVII.

TABLE LVII.—Mill yard data.

	Irrigated once in 12 days.			Mean values for		Irrigated once in 24 days.		
	Ammonium sulphate.	G.N.C.	Mixture.	12 days.	24 days.	Ammonium sulphate.	G.N.C.	Mixture.
Average length of millable canes in inches.	133.0	130.2	131.1	131.4	126.2	132.8	123.9	131.5
Average number of millable canes per plot.	540	570	560	563	532	520	540	535
Average weight of millable cane in lb.	3.6	3.12	3.29	3.36	3.19	3.55	2.99	2.99
Average number of internodes.	27	26	26	26	27	28	27	26
Average length of internodes in inches.	4.9	4.7	4.7	4.76	4.53	4.4	4.5	4.7
Average girth of internodes in inches.	0.94	0.87	0.91	0.91	0.87	0.92	0.88	0.82
C.C.S. per cent calculated.	10.09	10.81	11.16	10.69	11.35	10.98	11.57	11.49
C.C.S. tons per acre calculated.	5.61	5.88	6.18	5.89	5.69	5.32	5.78	5.99

It is seen from the above table that irrigations at shorter interval (once in 12 days) increased the total number of canes, the length of cane, the mean weight of the millable cane and also the length and girth of the internode up to 5 per cent over that recorded in the longer interval of irrigation. With regard to the form of manure ammonium sulphate increased the length and weight of millable cane and number of internodes, but recorded the lowest C.C.S. per acre. In all these cases the differences were not more than 5 per cent. The differences between groundnut cake and mixture were not perceptible.

Soil moisture data recorded a day prior to irrigation are furnished in Table LVIII.

TABLE LVIII.—Average per cent soil moisture.

Particulars.	Irrigation once in 12 days.			Mean values.		Irrigation once in 24 days.		
	Ammon. sulph.	G.N.C.	Mixture.	13 days.	24 days.	Ammon.	G.N.C.	Mixture.
0-6" depth—								
Planting to May ..	4.99	4.93	5.59	5.17	5.23	4.84	5.49	5.36
June to November.	14.44	14.57	14.42	14.47	14.79	14.79	14.52	15.09
December to harvest.	11.63	12.48	11.13	11.75	11.02	11.04	11.21	10.80
6-12" depth—								
Planting to May ..	5.49	4.67	5.66	5.27	5.41	5.49	5.08	5.06
June to November.	16.15	15.78	16.58	16.17	16.65	16.98	16.62	16.34
December to harvest.	12.37	13.09	12.26	12.57	11.70	11.50	12.48	11.13

It is seen from the above table that the moisture levels in the different treatments, both major and minor did not show any perceptible difference. This is in conformity with the results recorded during the past season.

Results of juice analysis from the different treatments are presented in Table LIX.

TABLE LIX.—Results of periodical juice of analysis.

Date and particulars.	Sucrose per cent.										12 Mean days.	24 Values days.	
	Once in 12 days.						Once in 24 days.						
	Amm. sulph.			G.N.C. Mixture.			Amm. sulph.			G.N.C. Mixture.			
	Amm. sulph.	G.N.C.	Mixture.	Amm. sulph.	G.N.C.	Mixture.	Amm. sulph.	G.N.C.	Mixture.				
November ..	8.54	8.51	8.63	3.79	8.60	8.17	8.53	8.79					
December ..	9.77	10.80	10.33	10.22	10.68	10.37	10.30	10.42					
January ..	12.00	12.93	11.99	12.45	12.79	13.60	12.31	12.75					
February ..	14.79	15.52	16.05	15.86	16.50	16.45	15.45	16.27					

Date and particulars.	Purity per cent.						12 Mean days.	24 Values days.
	Once in 12 days.			Once in 24 days.				
	Amm. sulph.	G.N.C.	Mixture.	Amm. sulph.	G.N.C.	Mixture.		
November	70.16	69.80	70.35	62.72	65.87	66.67	70.10	65.08
December	68.69	74.72	73.32	72.50	74.64	73.76	72.58	73.61
January	82.72	84.52	82.29	82.47	83.92	85.82	83.18	84.07
February	82.92	84.81	84.59	83.83	86.00	85.36	84.10	85.08

It will be seen from the above table that with regard to the quality of juices, the interaction between interval of irrigation and form of manure was erratic. There was a fairly uniform trend from December to February with regard to over all quality of juices.

Irrigation at longer intervals seemed to improve the juice quality.

21. Study of soil moisture in relation to form and dose of nitrogen—(a) Pot experiment.—Two levels of soil moisture in combination with form of nitrogen and dose of nitrogen were studied in pots.

(a) Soil Moisture—Above 10 per cent on wet basis.

Above 5 per cent on wet basis.

(b) Dose of Nitrogen—100 lb. Nitrogen per acre.

200 lb. Nitrogen per acre.

(c) Form of Nitrogen—Inorganic as ammonium sulphate.

Organic as groundnut cake.

Mixture as 2/3 as G.N. cake and 1/3 as Ammonium sulphate.

Soils { (a) Loamy soil and
(b) Clayey soil.

As control, blank pots without any crop but with soil moisture levels similarly maintained were also run.

TABLE LX.—Summary of results.

Treatment.	Yield of cane.			
	Loamy soil.		Clayey soil.	
	In gms. per pot.	In tons per acre.	In gms. per pot.	In tons per acre.
Above 10 per cent—				
100 N cake	2050.75	49.85	1012.91	24.55
200 N cake	2695.75	65.38	1222.50	29.65
100 N Ammonium sulphate	2351.25	57.01	1229.50	29.80
200 N Ammonium sulphate	3014.00	73.10	966.66	23.44
100 N Mixture	2088.00	50.64	1141.75	27.70
200 N Mixture	2839.25	68.85	1016.75	24.66
Above 5 per cent—				
100 N cake	1768.00	42.82	Died.	Died.
200 N cake	2379.25	72.66	..	..
100 N Ammonium sulphate	1755.75	42.58	..	..
200 N Ammonium sulphate	2155.91	52.28	..	..
100 N Mixture	1742.50	42.25	..	..
200 N Mixture	1895.00	45.96	..	..

When the soil moisture dropped to the specified treatment level, measured quantity of water was added to bring the soil moisture to field capacity.

The periodical amounts of water added to the different treatments are indicated in the accompanying table. Population counts were recorded in August and at harvest. The data are furnished in Table LXI.

TABLE LXI.—Periodical amounts of water in c.ft. given to the treatments in pot experiment (loamy soil).

Treatment.	February.		March.		April.		May.		June.		July.	
	Cr.	Bl.	Cr.	Bl.	Cr.	Bl.	Cr.	Bl.	Cr.	Bl.	Cr.	Bl.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Above 10 per cent—												
A	7	7	21	35	63	70	98	98	126	119	147	147
B	7	7	21	21	63	56	98	84	126	105	154	126
C	7	7	28	28	63	63	98	91	126	112	147	133
D	7	7	28	35	70	70	105	98	133	119	161	140
E	14	7	35	28	70	63	105	91	133	112	154	133
F	14	7	28	28	70	63	105	91	133	112	154	133
Above 5 per cent—												
A	7	..	21	7	49	42	77	63	98	77	112	91
B	7	..	28	21	56	56	84	77	112	91	126	98
C	7	..	28	14	56	49	84	70	112	84	126	98
D	7	..	28	21	49	49	77	70	105	84	126	98
E	7	..	21	14	56	42	84	63	112	77	126	84
F	7	..	21	21	49	56	77	77	98	91	112	98

	August.		September.		October.		November.		December.		January.		February.	
	Cr.	Bl.	Cr.	Bl.	Cr.	Bl.	Cr.	Bl.	Cr.	Bl.	Cr.	Bl.	Cr.	Bl.
(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)
Above 10 per cent—cont.														
A	161	161	182	182	189	182	210	203	238	217	266	238	273	238
B	175	140	203	161	210	161	238	182	259	196	267	217	294	217
C	168	147	196	168	203	168	231	189	259	203	287	224	294	224
D	182	154	210	175	217	175	245	196	273	210	301	231	308	231
E	168	147	189	168	196	168	224	189	252	203	280	224	287	224
F	175	147	203	168	210	168	238	189	266	203	294	224	301	224
Above 5 per cent—cont.														
A	119	91	133	98	138	98	140	105	154	112	168	119	182	126
B	133	98	147	105	147	105	154	112	168	119	182	126	196	133
C	133	98	147	105	147	105	154	112	168	119	182	126	196	133
D	133	98	147	105	147	105	154	112	168	119	182	126	196	133
E	133	84	147	91	147	91	154	98	168	105	182	112	196	119
F	119	98	133	105	133	105	140	112	154	119	168	126	182	126

A = 100 N cake.
B = 200 N cake.
C = 100 N Ammonium sulphate.
D = 200 N Ammonium sulphate.

E = 100 N Mixture.
F = 200 N Mixture.
Cr. = Cropped.
Bl. = Blank (uncropped).

TABLE LXII.—Periodical amounts of water added in litres to the treatments in pot experiment (clayey soil).

Treatment.	February.		March.		April.		May.		June.		July.		August.	
	Cr.	Bl.	Cr.	Bl.	Cr.	Bl.	Cr.	Bl.	Cr.	Bl.	Cr.	Bl.	Cr.	Bl.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Above 10 per cent—														
A	14	..	28	7	49	35	70	49	84	63	98	70	105	70
B	14	..	28	7	49	14	70	28	84	42	98	49	105	49
C	21	..	28	14	42	35	70	49	84	63	98	70	105	70
D	21	..	28	14	49	35	70	49	84	63	98	70	105	70
E	14	..	28	7	35	21	56	35	70	49	84	56	91	56
F	21	..	28	14	49	21	63	35	77	49	91	56	98	56
Above 5 per cent—														
A	7	..	14	..	14	..	14	..	21	7	21	7	21	7
B	7	..	7	..	7	..	7	..	14	7	14	7	14	7
C	7	..	14	..	14	..	14	..	21	7	21	7	21	7
D	7	..	7	..	7	..	7	..	14	7	14	7	14	7
E	7	..	7	..	7	..	7	..	14	7	14	7	14	7
F	7	..	7	..	7	..	7	..	14	7	14	7	14	7

Treatment.	September.		October.		November.		December.		January.		February.	
	Cr.	Bl.	Cr.	Bl.	Cr.	Bl.	Cr.	Bl.	Cr.	Bl.	Cr.	Bl.
(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)
Above 10 per cent—cont.												
A	112	70	112	70	119	70	126	70	133	70	140	70
B	112	49	112	49	119	49	126	49	133	49	140	49
C	112	70	112	70	119	70	126	70	133	70	140	70
D	112	70	112	70	119	70	126	70	133	70	140	70
E	98	56	98	56	105	56	112	56	119	56	126	56
F	105	56	105	56	112	56	119	56	126	56	133	56
Above 5 per cent—cont.												
A	21	7	21	7	21*	7	..	..	..	..	..	..
B	14	7	14	7	14	7	..	..	..	..	..	..
C	21	7	21	7	21	7	..	..	..	..	..	..
D	14	7	14	7	14	7	..	..	..	..	..	..
E	14	7	14	7	14	7	..	..	..	..	..	..
F	14	7	14	7	14	7	..	..	..	..	..	..

* Plants wilted and died, in all the treatments above 5 per cent level.

A = 100 N cake.
B = 200 N cake.
C = 100 N Ammonium sulphate.
D = 200 N Ammonium sulphate.
E = 100 N Mixture.
F = 200 N Mixture.
Cr. = Cropped.
Bl. = Blank (uncropped).

TABLE LXIII.—Average number of shoots in each treatment.

Treatment.	Number of shoots in August.		Number of shoots in February (harvest).	
	Loamy.	Clayey.	Loamy.	Clayey.
Above 10 per cent—				
100 N cake	3.0	3.25	2.00	2.25
200 N cake	2.5	5.75	2.50	4.25
100 N Ammonium sulphate	2.75	4.25	2.25	3.75
200 N Ammonium sulphate	5.50	5.50	3.50	5.00
100 N Mixture	2.75	4.25	2.25	2.75
200 N Mixture	3.25	4.50	2.75	7.00
Above 5 per cent—				
100 N cake	4.25	..	3.25	..
200 N cake	4.25	..	2.75	..
100 N Ammonium sulphate	3.75	..	3.50	..
200 N Ammonium sulphate	5.50	..	..	..
100 N Mixture	3.25	..	2.50	..
200 N Mixture	5.00	..	3.25	..

Under higher levels of moisture tillering was better in clayey soils, but under lower levels the plants do not survive in clayey soils. In the treatment where soil moisture was always kept above 5 per cent, tillering was better than under higher levels of moisture in loamy soils. This is indicative of better tillering under mild drought in loamy soil.

The total amount of water added in litres and the number of irrigations per pot per treatment are furnished in Table LXIV.

TABLE LXIV.—Total quantity of water added to each pot.

	Loamy soil.								Clayey soil.							
	Cropped.				Blank.				Cropped.				Blank.			
	in		Number of Irrigations.		in		Number of Irrigations.		in		Number of Irrigations.		in		Number of Irrigations.	
	Quantity litres.				Quantity litres.				Quantity litres.				Quantity litres.			
	A.	B.	A.	B.	A.	B.	A.	B.	A.	B.	A.	B.	A.	B.	A.	B.
100 N cake	273	182	39	26	238	126	34	18	140	14	20	2	70	7	10	1
200 N cake	294	196	42	28	217	133	31	19	140	7	20	1	40	7	7	1
100 N Ammonium sulphate.	294	196	42	28	224	133	32	19	140	14	20	2	70	7	10	1
200 N Ammonium sulphate.	308	196	44	28	231	133	33	19	133	7	19	1	70	7	10	1
100 N Mixture.	287	196	41	28	224	119	32	17	126	7	18	1	56	7	8	1
200 N Mixture.	301	182	43	26	224	133	32	19	133	7	19	1	56	7	8	1

N.B.—A—Soil moisture level maintained at above 10 per cent. B—Soil moisture level maintained at above 5 per cent.

The data indicated that under higher levels of nitrogen more water was needed in both the types of soils. Under lower levels of moisture, there was greater utilization and response to nitrogen in loamy soil than in clayey soil. In regard to form of nitrogen in relation to moisture levels, plants responded better to ammonium sulphate in loamy soils than in clayey soils even at 10 per cent soil moisture level. In the loamy soil, higher yields were recorded under higher dose of nitrogen but this was very marked in treatments under higher soil moisture.

These studies indicated that ammonium sulphate can be expected to be utilized efficiently in clayey soils with plentiful water-supply only, while in loamy soils it can be utilized efficiently even at comparatively lower levels of soil moisture. The difference due to form and dose of nitrogen were brought out only under higher soil moisture levels, while under drought the differences seemed to be negligible.

Periodical height measurements were recorded and the data are furnished in Table LXV.

TABLE LXV.—Average height of plants in inches (loamy soil).

Month.	Above 10 per cent.						Above 5 per cent.					
	100 N cake.	200 N cake.	100 N Ammonium sulphate.	200 N Ammonium sulphate.	100 N Mixture.	200 N Mixture.	100 N cake.	200 N cake.	100 N Ammonium sulphate.	200 N Ammonium sulphate.	100 N Mixture.	200 N Mixture.
July ..	43.5	42.3	39.3	38.3	37.0	38.8	32.5	34.5	34.5	29.0	31.8	31.8
August ..	50.5	50.8	55.0	57.5	51.8	53.5	45.8	47.8	46.8	42.0	44.8	44.8
September ..	75.8	76.8	69.5	72.0	66.5	69.5	58.8	63.3	60.8	55.6	58.0	57.5
October ..	85.8	86.3	78.8	80.8	76.0	80.3	66.3	70.0	68.5	62.0	64.8	64.5
November ..	99.5	103.6	91.8	92.5	86.8	88.8	75.3	80.3	72.3	70.7	76.3	71.0
December ..	116.8	113.0	99.3	101.0	95.8	96.8	78.8	83.5	75.0	72.3	78.3	74.8
January ..	118.3	114.5	105.8	102.5	98.5	102.0	78.8	83.8	75.3	74.3	79.3	75.3

TABLE LXVI.—Average height of plants in inches (clayey soil).

Month.	Above 10 per cent.					
	100 N cake.	200 N cake.	100 N Ammonium sulphate.	200 N Ammonium sulphate.	100 N Mixture.	200 N Mixture.
July ..	24.8	24.8	19.3	18.8	18.5	17.8
August ..	35.5	37.0	31.7	32.0	31.3	30.3
September ..	55.0	49.8	43.3	42.3	44.5	41.3
October ..	57.3	54.0	48.7	49.7	47.8	44.0
November ..	64.0	63.8	57.7	53.5	55.5	53.0
December ..	66.3	65.8	60.0	54.0	60.0	54.5
January ..	66.3	65.8	60.7	60.0	62.0	55.5

N.B.—Plants growing in pots maintained at above 5 per cent soil moisture, died by middle of May 1951. These pots were replanted with seedlings of same age on 16th June 1951. Even these plants died by end of December.

In general the growth of plants was better under soil moisture maintained above 10 per cent than under lower soil moisture levels.

Arrowing was recorded in plant in loamy soil at 10 per cent level of moisture under lower soil moisture and in clayey soil, there was no arrowing. Ammonium sulphate reduces arrowing more effectively than the two other forms of nitrogen.

Analysis of the juices of the plants in the loamy soil was done and the results are furnished in Table LXVII.

TABLE LXVII.—Chemical analysis of juices (loamy soil).

	Cor. Brix.	Sucrose.	Purity.	C.C.S.	C.C.S. in tons/acre (calculated).
	PER CENT.	PER CENT.	PER CENT.	PER CENT.	
Above 10 per cent—					
A ..	23.70	21.43	90.43	15.39	7.67
B ..	22.75	20.28	89.14	14.47	9.46
C ..	24.40	20.01	82.01	13.69	7.81
D ..	21.15	19.49	92.15	14.64	10.70
E ..	21.10	18.83	89.24	12.44	6.81
F ..	21.60	19.51	90.32	14.00	9.64
Above 5 per cent—					
A ..	22.40	20.40	91.07	14.70	6.29
B ..	23.00	20.93	90.98	15.07	6.91
C ..	17.40	14.58	82.00	10.09	4.29
D ..	18.80	15.71	83.56	10.86	5.68
E ..	22.10	19.68	89.06	14.03	5.93
F ..	18.70	15.58	83.32	10.45	5.89

A = 100 N cake.
B = 200 N cake.
C = 100 N Ammonium sulphate.
D = 200 N Ammonium sulphate.
E = 100 N Mixture.
F = 200 N Mixture.

Under higher soil moisture levels the form of nitrogen did not affect the quality of the juice to any appreciable extent while under lower soil moisture conditions, ammonium sulphate seemed to depress juice quality much more than the other forms of nitrogen. Quality of juice was in general poor under low soil moisture.

(b) Observation plots.—Field observation plots were laid down to study the growth and maturity of sugarcane in relation to soil moisture and nitrogen. These plots were supplementary to the pot experiment reported above.

The following treatmental details are furnished:—

Soil moisture—Two levels.

A. Above 10 per cent on wet basis.

B. Above 5 per cent on wet basis.

Manurial—

A. Inorganic as ammonium sulphate.

B. Organic as groundnut cake.

C. Mixture: 2/3 as groundnut cake and 1/3 as ammonium sulphate.

The level of nitrogen is 100 lb. per acre applied in two doses first half at planting and the second half at earthing up. Varieties Co. 419, Co. 449 and Co. 527.

The quantity of water given at different periods is furnished in Table LXVIII.

TABLE LXVIII.—Quantity of water added per plot in cubic feet.

Period.	Co. 419.			Co. 449.		
	A	B	C	A	B	C
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Above 10 per cent—						
Hot weather ..	119.84	302.56	316.66	342.10	318.85	276.44
South-west monsoon ..	132.26	151.78	184.88	151.01	164.82	165.81
North-east monsoon ..	78.03	94.59	71.38	117.93	82.93	103.50
Hot weather ..	271.26	297.13	310.21	274.60	275.81	280.45
Total in cubic feet ..	681.39	846.06	894.13	885.73	842.41	825.70
Total in acre inches ..	29.33	36.42	35.91	38.12	36.25	35.55
Above 5 per cent—						
Hot weather ..	173.56	75.90	104.57	108.79	108.42	112.84
South-west monsoon ..	..	..	..	..	..	..
North-east monsoon ..	..	..	..	..	..	..
Hot weather ..	87.12	80.07	82.47	92.06	92.06	68.42
Total in cubic feet ..	260.68	155.97	187.04	200.85	200.48	181.26
Total in acre inches ..	11.22	6.71	8.05	8.05	8.63	7.80

Period.	Co. 527.			(Blank—no crop).			Rainfall.	Number of rainy days.
	A	B	C	A	B	C		
(1)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Above 10 per cent—								
Hot weather ..	274.47	343.14	375.55	91.53	141.53	172.82	8.89	10
South-west monsoon ..	163.80	155.41	162.71	33.07	50.96	66.52	26.60	35
North-east monsoon ..	86.60	91.65	87.52	40.51	42.04	38.99	10.45	15
Hot weather ..	252.48	284.81	252.35	109.15	123.70	109.15	1.33	6
Total in cubic feet ..	777.25	824.91	878.13	274.26	308.23	387.43	47.27	66
Total in acre inches ..	33.46	35.50	37.73	23.61	25.54	33.86	..	..
Above 5 per cent—								
Hot weather ..	104.85	100.52	114.44	65.18	58.37	87.58	..	..
South-west monsoon ..	..	..	..	..	..	..	..	..
North-east monsoon ..	..	..	..	..	..	..	..	..
Hot weather ..	58.22	58.06	60.76	16.38	16.38	16.38	..	..
Total in cubic feet ..	163.07	158.58	175.20	81.54	74.75	103.96	..	..
Total in acre inches ..	7.02	6.81	7.54	7.02	6.44	8.95	..	..

A = Inorganic as ammonium sulphate.

B = Organic as groundnut cake.

C = Mixture as 2/3 groundnut cake and 1/3 ammonium sulphate.

During both the monsoon periods, i.e., from June to December the soil moisture remained above 5 per cent level without any irrigation.

About eight irrigations were required to keep up the soil moisture above 10 per cent level, while none was required to keep the soil moisture at above 5 per cent level, during the monsoon period from June to December. Irrigations in the two hot weather periods in the crop cycle were found to be important while the two monsoons kept up the soil moisture at a fair level when crop growth was not seriously affected. The total quantity of water utilized by the crop was small when compared to loss by evaporation. There was a reduction in yield under lower soil moisture and it was greater in Co. 527 than in Co. 419 and Co. 449

The following table of average height of plants in inches illustrates the growth rate of plants under different soil moisture conditions with the three forms of nitrogen :—

TABLE LXIX.—Average height of plants in inches and yield in tons/acre.

Month.	Above 10 per cent.								
	Co. 419.			Co. 449.			Co. 527.		
	A	B	C	A	B	C	A	B	C
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
August ..	67.33	76.18	70.90	77.5	77.4	73.40	69.5	72.8	72.3
September ..	91.7	102.10	93.40	107.8	107.4	104.70	94.2	94.6	90.6
October ..	117.60	123.50	120.40	126.4	136.3	135.3	121.0	122.5	123.8
November ..	133.60	142.50	140.9	139.8	148.9	146.7	134.0	135.9	135.8
December ..	142.3	145.8	145.3	148.8	152.3	155.1	133.2	140.2	141.7
Yield—									
In lb./plot ..	562	607	682	583	605	558	754	801	781
In tons/acre ..	30.24	32.67	36.70	31.47	32.56	30.02	40.55	43.10	42.04
Month.	Above 5 per cent.								
	Co. 419.			Co. 449.			Co. 527.		
	A	B	C	A	B	C	A	B	C
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	
August ..	62.40	51.50	53.4	67.4	62.5	68.3	56.6	66.6	71.1
September ..	92.8	86.4	82.2	96.8	94.2	97.4	81.7	90.9	97.4
October ..	119.90	113.56	105.30	120.9	118.5	121.6	113.9	117.6	119.5
November ..	136.8	134.5	131.6	135.0	136.4	137.5	126.9	130.0	134.9
December ..	142.4	140.1	134.6	141.1	140.6	140.8	129.7	136.8	140.6
Yield—									
In lb./plot ..	587	590	603	519	594	566	647	643	658
In tons/acre ..	31.89	31.76	32.45	27.94	31.97	30.41	34.81	34.60	35.10

A = Inorganic as ammonium sulphate.

B = Organic as groundnut cake.

C = Mixture as 2/3 groundnut cake and 1/3 as ammonium sulphate.

The beneficial effects of higher soil moisture were recorded with organic manures in respect of Co. 419 and Co. 449 while Co. 527 recorded benefits due to increased soil moisture without differential effects due to form of manure. Depression in yields due to lower soil moisture was greater in Co. 527 than in the other varieties.

Periodical juice analysis was done and the results are furnished in Table LXX.

TABLE LXX.—Result of chemical analysis of juices.

Month of analysis.	Co. 419.						Co. 449.			
	Inorganic.		Organic.		Mixture.		Inorganic.		Organic.	
	A.	B.	A.	B.	A.	B.	A.	B.	A.	B.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Above 10 per cent soil moisture										
November ..	7.86	66.05	8.37	68.61	5.61	55.00	10.66	78.38	10.40	78.20
December ..	10.14	73.36	10.29	73.91	7.73	65.39	14.08	87.34	12.80	84.66
January ..	12.58	79.61	..	..	9.27	69.59	14.60	81.02	16.25	89.78
February ..	15.53	82.65	17.41	89.28	17.61	87.61	18.33	94.19	18.27	92.96
March ..	17.85	89.84	18.90	91.16	15.59	84.55	19.38	93.46	18.73	92.03
April ..	18.00	81.91	15.49	76.93	19.03	89.02	18.88	90.01	19.73	91.58
Above 5 per cent soil moisture.										
November ..	5.92	55.33	6.00	57.14	6.34	58.70	8.21	65.16	8.05	65.98
December ..	8.69	60.74	8.36	67.32	9.12	69.04	10.39	77.98	12.63	82.24
January ..	11.03	73.41	11.48	73.02	8.42	63.22	15.28	86.70	15.74	86.56
February ..	13.11	78.20	16.37	83.52	12.28	72.24	13.11	73.20	16.37	83.52
March ..	15.87	82.50	15.45	84.70	15.78	83.41	19.55	90.76	20.02	84.26
April ..	18.40	85.27	14.17	80.98	15.68	70.68	18.06	87.40	20.10	93.67

Month of analysis.	Co. 449—cont.		Co. 527.					
	Mixture.		Inorganic.		Organic.		Mixture.	
	A. (12)	B. (13)	A. (14)	B. (15)	A. (16)	B. (17)	A. (18)	B. (19)
Above 10 per cent soil moisture.								
November ..	9.93	76.98	9.75	78.00	9.79	75.07	9.76	73.94
December ..	13.85	85.41	11.82	81.40	12.85	83.87	13.22	87.70
January ..	14.61	85.27	15.31	85.92	14.22	84.55	15.77	88.00
February ..	17.24	89.33	18.13	92.69	18.17	91.95	18.98	82.59
March ..	19.63	92.23	19.60	92.30	20.07	93.61	19.36	94.73
April ..	19.10	89.33	20.30	90.40	19.17	91.07	20.30	91.11
Above 5 per cent soil moisture.								
November ..	8.79	68.67	8.49	66.33	9.91	74.51	8.56	69.43
December ..	11.94	82.00	11.58	80.30	12.61	83.95	11.01	78.54
January ..	14.83	76.14	15.11	87.76	16.17	88.22	12.97	80.48
February ..	12.23	72.24	18.13	92.03	15.55	80.87	17.70	91.78
March ..	18.52	91.54	19.71	92.81	19.50	94.01	18.34	90.61
April ..	20.52	96.40	20.20	91.09	20.20	92.79	20.92	94.32

A = Sucrose per cent. B = Purity per cent.

The juices from higher soil moisture plots were better than those from plots at lower soil moisture earlier in the season. But as the season advanced the juices from both the soil moisture treatments analysed alike except in Co. 419.

22. *Control of maturity of cane.*—A combination of cultural treatments known to affect juice quality were tried on Co. 419. These comprised mainly of time of planting, manuring and irrigation. It was noted from the data that sucrose per cent may be increased by over 2 per cent in the early season, while the differences may be levelled up by peak maturity period. This is indicative of the need for differential culture of cane for early harvests in order to increase recovery per cent in sugar factories.

Analysis of juices was done and the results are furnished in Table LXXI.

TABLE LXXI.—Results of chemical analysis of juices.

Month.	Forced maturity.			Delayed maturity.			Normal (control).		
	Brix.	Sucrose.	Purity.	Brix.	Sucrose.	Purity.	Brix.	Sucrose.	Purity.
	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.
November ..	11.80	7.78	85.93	..	..	..	11.8	7.78	65.93
December ..	14.52	11.22	77.27	11.77	9.87	83.85	13.42	9.69	72.21
January ..	16.92	13.34	78.79	15.02	10.98	73.11	16.42	13.44	81.98
February ..	17.64	14.43	81.80	18.10	14.94	82.27	19.06	16.23	85.15
March ..	19.98	17.73	68.90	19.64	16.93	86.20	19.34	17.31	89.48
April ..	21.08	18.74	85.27	19.94	16.32	81.83	21.54	17.92	83.22
May ..	20.12	17.32	67.02	19.32	17.37	89.89	18.22	13.74	73.49

23. *Study of weedicides.*—To control the weeds such as *Trianthema decandra*, *Trianthema portulacastrum*, *cyperus* sp., *Gynandropsis pentaphylla*, etc., in sugarcane fields by the use of chemicals the following weedicides were tried during the early planting season of 1952:—

- (1) Agroxone at 4 lb. principle per acre in 100 gallons of water.
- (2) Fernoxone at 2½ lb. powder per acre in 100 gallons of water.
- (3) Agroxone at 4 lb. active principle in combination with diesel oil emulsion made up to 100 gallons per acre.
- (4) Fernoxone at 2½ lb. powder in combination with diesel oil emulsion made up to 100 gallons/acre.
- (5) Phenoxylene 30 at 2/3 gallons of liquid (commercial product) per acre.
- (6) Diesel oil emulsion alone.

The diesel oil emulsion was prepared with 5 lb. of soap in 4 gallons of diesel oil made up to 100 gallons with water to spray one acre.

The following are indicated from the studies during this season:—

(a) Agroxone and Fernoxone were equally effective at 4 lb. active principle per acre.

(b) Agroxone or Fernoxone were more effective at 4 lb. active principle in diesel oil emulsion base than when used alone.

This recipe (b) was found very effective against *Trianthema decandra* a pernicious weed on the farm.

(c) The stage of the weed was most important at which the spraying of the weedicide has to be taken up; the best stage being before the seventh day after planting the cane when the weeds just germinate but will not complete the emergence of the first leaf.

If the weeds have put forth fairly good vegetative growth and attain an age of 3 to 4 weeks neither Agroxone nor Fernoxone could kill the weeds completely; but only cause a temporary setback in their growth.

(d) After the first spray, the second flush of germination of weeds was found to be negligible in the sprayed plots as compared to plots weeded with manual labour.

(e) At the current price of the chemicals the cost of spraying an acre with Fernoxone will come to Rs. 40 including the cost of labour.

24. *On cheaper methods of propping.*—To test the efficacy of 'trash twist' propping in combination with deep trenching and high earthing up of every row as compared to normal propping and earthing up alternate rows, this trial was conducted in duplicate observation plots. Planting was done on 8th May 1951 with Co. 419 and the crop was harvested from 6th to 8th May 1952. The growth was moderate. The number of bamboos used was 1,000 in trash twist propping against 4,000 utilized in normal propping.

In spite of cyclonic winds in the last week of November there was practically no lodging in this crop. The average acre yield recorded was 33 tons of millable cane. The results of this trial indicated that trash twist propping may be done for moderate crops of about 33 tons without fear of damage due to cyclones.

IV. MYCOLOGY.

25. *Red rot (caused by Colletotrichum falcatum Went) Varietal resistance trials (Field inoculations).*—Twenty-seven sugarcane varieties were tested for their resistance to Red rot by artificially inoculating over fifty standing canes in each variety with culture of *Colletotrichum falcatum* Went by the plug method with suitable controls (uninoculated canes of each variety). After an interval of four months the inoculated canes were cut, split open longitudinally and the lengths of lesion both above and below the inoculated point were measured and the number of internodes affected were also recorded. The data on the spread of infection are furnished in Table LXXII.

TABLE LXXII.—Varietal resistance to red rot.

Variety.	Average number of internodes affected.	Percentage over total number of internodes in cane.	Average length of lesion in cms.	Percentage over length of cane.
(1)	(2)	(3)	(4)	(5)
Co. 281 ..	1.9	10.56	20.1	7.44
Co. 349 ..	2.8	11.67	22.3	9.74
Co. 419 ..	1.2	4.76	9.7	3.27
Co. 421 ..	1.4	5.60	12.2	3.13
Co. 449 ..	0.3	1.19	3.1	0.90
Co. 467 ..	1.2	5.22	12.7	3.83
Co. 471 ..	1.6	8.00	16.00	5.23

Variety.				Average number of internodes affected.	Percentage over total number of internodes in cane.	Average length of lesion in cms.	Percentage over length of cane.
(1)				(2)	(3)	(4)	(5)
Co. 475	..	..	..	1.4	5.01	12.0	3.72
Co. 527	..	..	..	0.9	3.75	7.8	2.68
Co. 615	..	..	..	1.5	7.50	13.4	4.23
Co. 617	..	..	..	0.8	3.48	8.4	2.59
Co. 620	..	..	..	0.8	3.33	5.7	2.06
Co. 624	..	..	..	0.5	1.92	3.1	0.97
Co. 627	..	..	..	0.7	3.18	6.2	2.01
Co. 630	..	..	..	0.7	3.33	5.2	1.44
Co. 632	..	..	..	1.1	4.58	8.9	2.75
Co. 633	..	..	..	0.5	1.85	3.7	1.09
Co. 646	..	..	..	1.6	6.40	11.3	3.58
Co. 647	..	..	..	1.3	5.42	11.0	3.68
Co. 650	..	..	..	0.4	1.60	4.7	1.53
Co. 672	..	..	..	1.5	5.56	13.6	4.30
Co. 673	..	..	..	0.4	1.60	3.7	1.16
Co. 677	..	..	..	2.1	8.08	19.7	7.65
Co. 681	..	..	..	1.1	5.24	10.6	2.83
Co. 682	..	..	..	1.0	3.88	9.9	2.77
Co. 684	..	..	..	0.4	1.74	4.3	1.42
Poj. 2878	..	..	..	0.7	3.33	6.5	2.15

The light race of *Colletotrichum falcatum* Went was used. The experiment was planted in April 1951 and inoculations were done in the month of November 1951 (fifty canes per variety). Observations were recorded on 7 April 1952 at harvest time.

Though the infection spread beyond the inoculated point in most of the varieties, the spread is not much except in the varieties Co. 281, Co. 349 and Co. 677. Most of the varieties tested appear to be fairly resistant.

26. *Sugarcane smut* (caused by *Ustilago scitaminea* Syd).—Smut is still the most important disease in the State. In the districts of North Arcot, South Arcot, Salem and Tiruchirappalli the incidence is on the increase.

In the district of Tiruchirappalli in the badly affected areas in the second ratoons the incidence of smut ranged from 15 to 40 per cent. In the plant crop it ranged up to 10 per cent. In the district of North Arcot the incidence of smut in the ratoons was up to 68 per cent and in the plant crop up to 10 per cent.

The incidence of smut was very little in the varieties Co. 449 and Co. 527.

(a) *Varietal resistance tests*.—Twenty-seven agronomically important varieties were tested for their susceptibility to smut. Single budded setts were inoculated with viable smut spores by soaking method and planted in the field. Smut incidence was recorded at regular intervals by taking weekly counts. The results are furnished in Table LXXIII.

TABLE LXXIII.—*Varietal Susceptibility to smut.*

Variety.	Infection per cent of clumps.	Number of days taken for the first appearance of smut whips.	Variety.	Infection per cent of clumps.	Number of days taken for the first appearance of smut whips.		
Co. 281	..	4.5	246	Co. 630	.. Nil.	..	
Co. 349	..	44.4	40	Co. 632	..	13.3	77
Co. 419	..	37.7	70	Co. 633	..	28.6	51
Co. 421	..	12.5	84	Co. 646	..	43.9	84
Co. 449	..	9.7	70	Co. 647	..	29.4	77
Co. 467	..	32.8	60	Co. 650	..	4.5	150
Co. 471	..	9.1	93	Co. 672	..	51.7	70
Co. 475	..	55.8	60	Co. 673	..	31.0	77
Co. 527	..	Nil.	..	Co. 677	..	48.7	70
Co. 615	..	Nil.	..	Co. 681	..	82.0	70
Co. 617	..	27.9	84	Co. 682	..	11.4	127
Co. 620	..	86.0	60	Co. 684	..	12.5	105
Co. 624	..	6.1	150	POJ. 2878	..	5.6	350
Co. 627	..	57.1	70				

The results confirmed the observations recorded last year. Among the important varieties Co. 449 and Co. 527 continue to be less susceptible, Co. 419 susceptible and Co. 475 and Co. 620 highly susceptible.

(b) *Loss in yield due to smut*.—Loss in yield due to smut chiefly depends upon the number of shoots affected per clump, and the stage of the crop when the incidence occurs in the field. When the incidence occurs early in the season there was greater chance for all the shoots of the clump to be affected, thus leading to total loss of the clump. When the incidence occurred late in the season some of the older shoots seemed to escape total destruction by the fungus, but all the same, there were indications that even such shoots were below normal in growth. In Table LXXIV data are presented to indicate that total loss due to early infection is greater than in later infection.

TABLE LXXIV.—*Percentage of clumps totally smutted in relation to first incidence of smut.*

Month of planting: April 1951.

Serial number.	First appearance of smut whips.	Percentage of clumps totally smutted to number of clumps smutted.
1 April	..	Nil.
2 May	..	Nil.
3 June	..	28.6
4 July	..	15.7
5 August	..	9.6
6 September	..	Nil.
7 October	..	6.5
8 November	..	3.4
9 December	..	Nil.

Three budded sets, dipped in spore suspension, were planted in replicated plots alongside healthy sets as control. When the incidence of smut was noted in a clump in the treated plots, such clumps were marked with labels. Healthy clumps in control plots were similarly marked and watched throughout the season for freedom from the disease. At harvest, yield data including data on several yield attributes were recorded in respect of healthy and smutted clumps. The data are summarised in Table LXXV.

TABLE LXXV.—*Comparison between healthy and smutted clumps in Co. 419 (Age—11 months).*

Particulars.	Healthy clumps.	Smutted clumps.	Difference.	Significant or not.	S.E. of mean difference.
(1)	(2)	(3)	(4)	(5)	(6)
1 Mean number of canes/clump	3.72	2.84	0.88	Yes.	0.1427
2 Mean weight of millable cane/clump in lb.	14.15	8.62	5.53	Yes.	0.5008
3 Average length of cane in inches.	124.75	108.33	16.42	Yes.	2.0949
4 Average number of internodes per cane	25.33	22.25	3.08	Yes.	0.4054
5 Average girth of cane in cms	2.63	2.39	0.24	Yes.	0.0480
6 Average weight of single cane in lb.	3.80	3.04	0.76	Yes.	0.0558
7 Number of clumps studied	307	285	..	..	..

In the preliminary examination of the data presented above, differences arising out of number of smut whips per clump and the time of incidence have not been taken into consideration. Yet the data clearly indicated that even after ignoring the abovementioned two factors the apparently healthy canes of smutted clump are below normal in growth and development. All the yield attributes, viz., number of canes per clump, height, weight, girth and number of internodes are seen to be less in canes of affected clumps and such differences were statistically significant. When composite samples of healthy and affected canes were separately analysed for juice quality, the healthy ones recorded 18.53 per cent sucrose and 91.00 per cent purity as against 18.73 per cent sucrose and 91.09 per cent purity in canes of affected clump.

On the basis of such preliminary data total loss in yield due to incidence of varying degrees (expressed as percentage) of affected clumps to total number of clumps in a field) was computed and presented in table LXXVI. Though the loss is a computed figure, it brings out the possible loss in tonnage of cane due to smut. Further detailed studies are in progress to assess the incidence and the corresponding loss suffered by the crop.

TABLE LXXVI.—Calculated loss in yield in relation to percentage of incidence (on clump basis).

Serial number.	Percentage of smutted clumps.	Percentage loss in yield of millable cane.
1	5	1.95
2	10	3.91
3	15	5.86
4	20	7.82
5	25	9.77
6	30	11.72
7	35	13.68
8	40	15.63
9	45	17.60
10	50	19.54
11	75	29.31
12	100	39.08

(c) Variations in susceptibility to smut of buds from different parts of cane.—Buds from the different portions of cane inclusive of under ground portions were tested for their susceptibility to smut, and it was found that the underground buds and the top one-third of the cane were more susceptible to smut than the buds from bottom two-thirds of the cane. These results confirm the previous observations made on the station.

(d) Abnormal arrowing in sugarcane.—In the course of studies in smut disease of sugarcane on the station instances of abnormal arrowing were noticed, as described below:—

Arrowing was observed in 3 clumps of Co. 617 and 2 clumps of Co. 419 at the age of 3 months. The details of abnormality are described below:—

Clump 1, Co. 617.—There were two tall reed-like shoots with three smaller shoots at the base. One of the reed-like shoots ended in smut whip while the other ended in a fasciated inflorescence.

Clump 2, Co. 617.—There were 15 shoots in the clump. Except four shoots which appeared normal all the rest were thin and reed like. A normal arrow, an arrow ending in smut whip, an arrow with abnormal structure of florets, a fasciated arrow with long leaf-like florets and normal smut whips were seen in the other shoots.

Clump 3, Co. 617.—There were nine shoots in the clump and all except two of them were thin and reed like. Of the reed like shoots one ended in an arrow, another in an arrow with incomplete emergence and five in smut whips.

Clump 4, Co. 419.—There were eleven shoots of which ten were normal. The other ended in an arrow with a terminal smut whip. One of its lateral branches also was smutted.

Clump 5, Co. 419.—There were fifteen shoots in the clump of which only one was thin and reed like ending in an arrow, while the rest appeared normal. The arrowed shoot ended in a smut whip terminally and also in one of the laterals. One of the normal shoots ended in a smut whip.

The abnormal arrowing is attributed to the pathological condition of the plant predisposing it to flowering. Anatomical examination of the stems readily revealed the presence of hyphae in the parenchymatous tissues in all the internodes.

27. Minor diseases—(a) Leaf spot (caused by *Helminthosporium* sp.).—During the year reports were received from Godavari district that a leaf spot disease occurred causing drying of sugarcane leaves. A survey was made in this area and specimens of affected leaves were collected and examined. The main organism associated with the leaf spot was found to be *Helminthosporium*. In some cases *Cercospora* was also found mixed up with *Helminthosporium*.

The leaf spot disease occurred in an epidemic scale in September–October and subsided with the change of climate in November. With a view to find out whether there was any variation in the susceptibility with reference to varieties the intensity of the leaf spot infection was estimated. Co. 419 was found to be most susceptible (61 per cent) and next in importance was Co. 527 (16 per cent). Varieties Co. 620 (8 per cent), Co. 630 (9 per cent) and Co. 650 (10 per cent) were slightly susceptible. Varieties Co. 475, Co. 473, Co. 449 and Co. 469 were completely free.

(b) Pine-apple disease (*Ceratostomella paradoxa* de Seynes).—A survey indicated that the pine-apple disease is prevalent throughout the State as a minor disease.

V. ENTOMOLOGY.

28. Among the different pests on sugarcane, borers continued to be the most important during the season. 'Pyrilla' and 'Mealy bugs' appeared in small numbers. The incidence of other pests like 'white flies,' 'termites,' 'grass-hoppers,' 'hispa,' 'aphids,' 'skippers' and 'scale insects' was negligible. Among non-insect pests, jackals, rats, squirrels and 'mites' were seen damaging cane crops to a small extent only.

I. Stem-borers—(a) *Argyria sticticrasis* H.—This pest continued to be the most important one, causing 'dead hearts' in young cane crops. Later on when internodes were being formed, the pest appeared as an 'internode borer.' Natural parasitisation of eggs by *Trichogramma* reached up to 38.8 per cent.

(b) *Diatroea venosata* WLK.—The pest was found as 'internode borer' along with *Argyria sticticrasis* H. during the season.

(c) *Scirpophaga* sp.—The incidence of this pest was negligible during the season.

II. *Pyrilla*.—The pest appeared from August and continued till harvest. Parasitisation of eggs by *Tetrastichus* and fungal attack on nymphs and adults by *Metarrhizium anisopliae* were present to a considerable extent in the later stages.

III. *Mealy-bugs*.—The pest was present to a considerable extent on the different varieties of cane.

IV. *Aleurolobus* sp.—The pest was seen in traces only during the season.

V. *Mites*.—Red mites (*Paratetranychus indicus*) did not appear during the season. But 'white mites' another species of *Paratetranychus* appeared on leaves of young shoots.

29. Chemical Control of borers.—To study the effect of spraying 0.32 per cent D.D.T. and 0.081 per cent B.H.C. during fourth, sixth and ninth weeks age of the crop against the 'early shoot borer' (*Argyria sticticrasis* H.) of cane and three more sprayings at 21 days interval commencing from fourth month age of the crop against the 'internode borers' the following trials were carried out during the season. Relevant data are furnished in Table LXXVII.

TABLE LXXVII.—Yield in borer control study plots.

Treatment.	Yield per acre in tons.	In imperial maund.	As per cent over control.	Number of canes per acre.	C.C.S. acre in tons.
Control	40.92	1113.94	100.00	28,650	5.15
0.32 per cent D.D.T.	48.21	1312.28	117.82	30,688	6.59
0.081 per cent B.H.C.	42.34	1152.50	103.47	29,405	5.01

TABLE LXXVIII.—Fortnightly egg population count on 5 per cent basis and natural parasitisation by 'Trichogramma' in the chemical control of borers.

Date of observation.	Control.		0.32 % D.D.T.		0.081 % B.H.C.	
	Number of Argylea eggs.	Number of eggs parasitised by Trichogramma.	Number of Argylea eggs.	Number of eggs parasitised by Trichogramma.	Number of Argylea eggs.	Number of eggs parasitised by Trichogramma.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
5th May 1951	..	..	36	30	48	48
22nd May 1951	100	80	125	..	85	53
8th June 1951	474	135	148	42	209	107
23rd June 1951	89	16	125	..	55	..
7th July 1951	99	20	83	16	118	24
26th July 1951	98	38	142	73	158	29
	860	287	664	161	673	261
Percentage of natural parasitisation ..	..	..	33.4	24.2	38.8	..

The data indicated less egg deposition and natural parasitisation by 'Trichogramma' in the D.D.T. sprayed plots.

Borer infestation.—During the first four months age of the crop results of fortnightly borer infestations in the control, D.D.T. and B.H.C. sprayed plots were as follows:—

TABLE LXXIX.—Fortnightly borer infestation.

Date of observation.	Control.			0.32 per cent D.D.T.			0.081 per cent B.H.C.		
	Total shoots.	Number of deadhearts.	Percentage of borer infestation.	Total shoots.	Number of deadhearts.	Percentage of borer infestation.	Total shoots.	Number of deadhearts.	Percentage of borer infestation.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
7th May 1951	2,997	431	14.4	2,478	198	8.0	2,823	153	5.4
21st May 1951	4,425	394	8.9	3,942	239	6.1	3,920	312	8.0
7th June 1951	3,800	329	8.6	3,278	112	3.4	3,340	247	7.4
25th June 1951	4,233	206	4.9	3,513	160	4.6	3,753	273	7.3
10th July 1951	4,224	170	4.0	3,737	107	2.9	4,064	188	4.2
Total for the first four months age of the crop.	4,538	1,530	33.7	4,095	816	19.9	4,122	1,173	28.5

Plots sprayed with D.D.T. showed less borer infestation.

Particulars of mortality of tillers are furnished in the Table LXXX.

TABLE LXXX.—Details of emergence and mortality due to the 'early shoot borer'.

Particulars.	Control.			0.32 per cent D.D.T.			0.081 per cent B.H.C.		
	Total emerged.	Number died due to the 'early shoot borer'.	Percentage of mortality.	Total emerged.	Number died due to the 'early shoot borer'.	Percentage of mortality.	Total emerged.	Number died due to the 'early shoot borer'.	Percentage of mortality.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Primaries	68	25	36.8	94	28	29.8	72	41	56.9
Tillers emerged in April ..	121	16	13.2	93	2	2.2	53	8	15.1
Tillers emerged in May ..	76	45	59.2	92	45	48.1	144	50	34.7
Tillers emerged in June ..	13	4	30.8	5	1	20.0	21	1	4.8
Tillers emerged in July ..	..	..	..	..	..	..	..	..	..
Tillers emerged in August ..	..	..	..	..	..	..	..	..	..

Details of primaries and tillers that subsequently arose in different months are furnished in Table LXXXI.

TABLE LXXXI.—Details of primaries and tillers in relation to time of origin.

Particulars.	Total canes.	Average number of internodes.	Average length of cane.	Average weight of cane.
(1)	(2)	(3)	(4)	(5)
Primaries	364	27	11'-4"	3 LB. 13 OZ.
Tillers emerged in April ..	166	23	10'-5"	2 LB. 15 OZ.
Tillers emerged in May ..	106	19	8'-11"	1 LB. 15 OZ.
Tillers emerged in June ..	42	20	8'-11"	2 LB. 2 OZ.
Tillers emerged in July ..	34	16	7'-0"	1 LB. 6 OZ.
Tillers emerged in August ..	..	..	..	..

The data indicated that there were more primary and early emerged shoots in treated and these were noted to be better in yield than the late shoots which are more characteristic of borer infested plots.

Effect of the chemicals on the internode borers.—(a) *Loss in tonnage.*—The loss in yield due to the 'internode borer', was computed and furnished in the Table LXXXII.

TABLE LXXXII.—Effect of 0.32 percent D.D.T. and 0.081 percent B.H.C. on the 'internode borers'.

Treatment.	Total weight of the canes per plot of 1.6 cents.	Healthy canes.		Internode infested canes.		Average number of internodes per cane.	Average number of internodes infested per cane.	Percentage of canes infested.	Loss in tonnage due to borer infestation.
		Number canes.	Average weight of a single cane.	Number canes.	Average weight of a single cane.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Control ..	1,738 LB.	262	3.66 LB.	218	3.34 LB.	25.9	2.0	43.7	PER CENT. 3.82
0.32 per cent D.D.T.	1,609	414	3.73	19	3.00	25.0	1.4	4.4	0.89
0.081 per cent B.H.C.	1,434	334	3.19	112	2.95	25.4	2.1	24.4	1.84

Total loss was reduced by controlling the borers with chemical sprays. In the control of the internode borers, 0.32 per cent D.D.T. was found to be more effective than 0.081 per cent B.H.C.

(b) *Juice quality.*—The results of chemical analysis of juices of healthy and infested canes did not disclose any appreciable difference in the quality of juice. However the infested internodes alone, were found to be poor in quality.

TABLE LXXXIII.—Data on juice analysis—Borer control trials.

Date of observation	Control.			0.32 per cent D.D.T.			0.081 per cent B.H.C.		
	Brix. %	Sucrose. %	Purity. %	Brix. %	Sucrose. %	Purity. %	Brix. %	Sucrose. %	Purity. %
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
10th November 1951 ..	15.54	12.41	79.86	15.34	11.97	78.03	15.04	11.89	79.06
11th January 1952 ..	18.02	15.08	83.74	18.59	16.23	87.52	18.12	15.13	83.23
9th February 1952 ..	19.08	17.83	88.10	19.44	17.30	88.93	20.34	18.29	89.87
10th March 1952 ..	19.77	18.33	92.54	20.63	19.56	93.88	20.74	19.19	92.40
3rd April 1952 ..	21.13	19.21	93.45	21.37	19.66	91.96	21.55	19.34	89.68
2nd May 1952 ..	21.74	18.19	83.70	21.86	19.25	88.07	22.20	19.86	89.45

The studies reported here indicated increased yield of about 7.29 tons cane per acre, when borers were controlled by chemical sprays and the nett profit might be as much as Rs. 212 per acre due to control of the borers. Control of borers is thus an extremely profitable step in increasing yield and thus decreasing cost per ton of cane.

The data are furnished below:—

Economics of chemical spraying.

Treatment.	Yield in tons per acre.	Extra yield over control.	Value of the extra yield at Rs. 47-10-0 per ton.	Cost of sprayings.	Extra profit per acre.
(1)	(2)	(3)	(4)	(5)	(6)
			RS. A. P.	RS. A. P.	RS. A. P.
Control	40.92	..	..	..	..
0.32 per cent D.D.T. spraying ..	43.21	7.29	342 10 0	130 10 0	212 0 0
0.081 per cent B.H.C. spraying ..	42.34	1.42	66 12 0	129 1 0	— 62 5 0

30. *Biological control of the 'early shoot borer'.*—The following statement shows the effect of liberation of parasites (Table LXXXIV):—

TABLE LXXXIV.—Effect of 'Trichogramma' on borer infestation.

Particulars of locality.	Control plots.			Parasite released plots.		
	Total shoots.	Total dead-hearts.	Percentage of infestation.	Total shoots.	Total dead-hearts.	Percentage of infestation.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Kandrakota (East Godavari district).	2,062	177	8.58	2,015	145	7.15
Tummapala (Visakhapatnam district).	2,145	976	45.51	2,163	960	44.38
Vuyyur (Krishna district) ..	949	98	10.33	964	100	10.37

31. *Loss due to the 'early shoot borer'.*—The percentage loss in tonnage due to the borer infestation in three varieties, viz., Co. 419, Co. 475 and Co. 527 planted on 14th to 16th April 1951 was computed and given in Table LXXXV.

TABLE LXXXV.—Loss due to the 'early shoot borer.'

Particulars.	Number of clumps.		Total tillers produced during the season.		Average number of tillers produced per clump.		Number of tillers that matured into canes per clump.
	Number of clumps that contributed to cane population.	Number of clumps that failed to contribute to cane population due to borer.	In clumps that contributed to cane population.	In clumps that failed to contribute to cane population due to borer.	In clumps that contributed to cane population.	In clumps that failed to contribute to cane population due to borer.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Co. 419 clumps—							
Healthy	52	..	210	..	4.04	..	2.31
Infested in May	109	..	652	..	6.00	..	2.22
Infested in June	84	4	443	9	5.15	2.50	2.18
Infested in July and later ..	9	1	37	2	4.11	2.00	2.00
Co. 475 clumps—							
Healthy	68	..	306	..	4.05	..	4.74
Infested in May	153	5	1,019	13	6.66	4.33	2.46
Infested in June	86	..	486	..	5.65	..	2.24
Infested in July and later ..	6	3	25	3	4.17	1.00	1.67
Co. 527 clumps—							
Healthy	68	..	318	..	4.68	..	2.82
Infested in May	223	4	1,443	5	6.47	1.25	2.21
Infested in June	71	3	442	5	6.23	1.67	2.63
Infested in July and later ..	16	1	96	1	6.40	1.00	2.87

Particulars.	Percentage of mortality.		Percentage of survival.	Percentage of clumps.		Average weight of a single clump.	Loss in weight per clump.	Percentage loss.
	The early shoot borer.	Other agents.		That contributed to cane population.	That failed to contribute to cane population due to borer.			
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Co. 419 clumps—						LB.		
Healthy	..	42.86	57.94	20.08	..	6.79	..	..
Infested in May	33.90	28.99	37.42	42.08	..	5.29	1.50	9.30
Infested in June	27.88	32.08	40.48	32.43	1.54	6.10	0.79	5.81
Infested in July and later ..	28.21	25.64	46.15	3.47	0.39	5.18	1.61	1.21
Total loss								15.82
Co. 475 clumps—								
Healthy	..	39.22	60.78	21.32	..	7.33	..	..
Infested in May	28.97	34.50	36.53	47.96	0.94	5.75	1.53	11.28
Infested in June	25.70	34.53	39.73	26.06	..	5.55	1.78	6.55
Infested in July and later ..	32.14	32.14	35.71	1.88	0.94	3.56	3.77	1.91
Total loss								19.74
Co. 527 clumps—								
Healthy	..	39.62	60.38	17.66	..	5.63	..	..
Infested in May	26.59	39.20	34.06	57.92	1.04	3.81	1.82	19.76
Infested in June	23.04	34.23	41.83	18.70	0.81	5.03	0.60	2.30
Infested in July and later ..	21.64	34.02	44.34	3.90	0.26	5.62	0.01	0.27
Total loss								22.83

The loss due to the borer was much more in Co. 527 than Co. 419 and Co. 475.

32. *Mealy bugs.*—The peak infestation period was noted to be August-September. This pest did not affect either germination or growth when the infestation was moderate.

B. Other Crops.

PADDY.

33. Paddy was planted in an area of 31.80 acres during the year under report as against 35.50 acres planted during 1950-51. The average acre yield of paddy in the non-experimental area was 2,373 lb. as against 1,815 lb. of last year and ten-year average of 2,530 lb. The quinquennial average yields of paddy per acre are given below:—

	LB.
1923-24 to 1925-26 (three years)	2,609
1926-27 to 1930-31 (five years)	2,509
1931-32 to 1935-36 (five years)	2,480
1936-37 to 1940-41 (five years)	2,562
1941-42 to 1945-46 (five years)	2,804
1946-47 to 1949-50 (four years)	2,509
1950-51 to 1951-52 (two years)	2,135

BAM. 32 with a grain yield of 2,670 lb. per acre among early strains and AKP. 12 with 3,186 lb. of grain per acre among late strains recorded the maximum yield during the year. Paddy blast was noticed on BAM. 1 and BAM. 3 during the second fortnight of September 1951. It was found more severe on BAM. 1. Rice case worm attack was noticed on PTB. 16 and GEB. 24 and the attack was checked by timely control measures. The cyclone in the month of November 1951 caused considerable lodging of the crop. There was severe shedding of grain in SR. 26 B.

The average yields of different strains grown for seed multiplication are furnished in table LXXXVI.

TABLE LXXXVI.—Acre yields of different strains of paddy.

Serial number and strain number.	Popular name.	Area grown during 1951-52 in acres.	Average yield of grain in lb. per acre, 1952.	Average yield of grain in lb. per acre, 1950-51.
1 AKP. 1	Bobbiliganti	0.40	1,750	1,396
2 AKP. 2	Sunkisannam	2.10	2,245	1,376
3 AKP. 3	Gunupursannam	0.50	2,670	1,605
4 AKP. 4	Mypali	2.24	3,125	2,585
5 AKP. 5	Mypali	1.55	2,022	1,576
6 AKP. 6	Mypali	0.80	1,500	2,321
7 AKP. 7	Bayyahunda	0.15	1,846	1,978
8 AKP. 8	Maharajabhogam	0.30	2,200	1,898
9 AKP. 9	Bangarutheega	0.25	1,522	1,173
10 AKP. 11	Ramasagaram	0.35	2,929	2,065
11 AKP. 12	Ramagada	0.35	3,186	2,230
12 AKP. 13	Mutant Maharajabhogam	0.40	1,140	1,071
13 BAM. 1	Boraponko	1.36	1,000	953
14 BAM. 3	Sora Bayyahunda	2.25	2,847	1,430
15 BAM. 6	Ratnachudi	1.70	2,479	2,974
16 BAM. 8	Navakotisannam	0.15	1,867	1,467
17 BAM. 32	Delhi Prayaga	0.30	2,670	..
18 SR. 26-B	Vadakoyya	2.40	2,537	3,191
19 GEB. 24	Kichilisamba	2.50	2,539	2,077

34. *Crop improvement—Yield trials.*—Fourteen promising cultures from Maruteru, Prayaga and Gummasari, Prayaga Salur and Swargathara series were put under comparison against their local bulks and popular strains of other varieties of the same duration. Salient features of these trials with the summaries of results are furnished below:—

(a) *Maruteru series.*—Three promising Maruteru cultures were put under comparison against AKP. 4, the popular strain of the station and the results indicated no significant difference among the yields of different strains. The details of layout and the summary of results are furnished in Table LXXXVII.

TABLE LXXXVII.—Yield trial with Maruteru rice cultures, 1951-52.

Field number—32. Soil—Clay loam. Previous crop—Sunn hemp. Manures—Sunn hemp at 6,000 lb. per acre and ammonium sulphate to supply 30 lb. of 'N' per acre. Bone meal at 112 lb. per acre. Date of planting—4th September 1951. Date of harvest—24th December 1951.	Treatments—Four; Cultures Nos. 7584, 8240, 9855 and AKP. 4 (Control). Replications—Six. Layout—4 × 6 randomized blocks. Size of plot—Gross—14' 0" × 10' 8" = 0.336 cents. Net—13' 4" × 10' 0" = 0.30 cents. Year of trial—Second year.
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Summary of results.

	Culture No. 7584.	Culture No. 8240.	Culture No. 9855.	AKP. 4. (control).	Standard error of treatment mean.	Whether significant or not.	Critical difference (P = 0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mean yield of grain in lb. per acre	4,637	4,531	4,379	4,352	92.00	No.	..
As per cent on control.	106.3	104.1	100.6	100.0	2.11	..	..

(b) *Prayaga and Gummasari series.*—Three cultures were compared against the popular strain of this station AKP. 5 as control. Gummasari 3948 was found to be a better yielder than No. 3,680 and No. 3976 but was statistically on par with the control AKP. 5. The details of layout and summary of results are furnished in Table LXXXVIII.

TABLE LXXXVIII.—Yield trial with Prayaga and Gummasari cultures, 1951-52.

Field number—32. Soil—Clay loam. Previous crop—Sunn hemp. Manures—Sunn hemp at 6,000 lb. per acre. Ammonium sulphate to supply 30 lb. of 'N' per acre. Bone meal at 112 lb. per acre. Date of planting—3rd September 1951. Date of harvest—26th December 1951.	Treatments—Gummasari 3948, Prayaga 3660, Gummasari 3976 and AKP. 5 (control). Replications—Six. Layout—4 × 6 randomized blocks. Size of plot—Gross—14' 0" × 10' 8" = 0.336 cents. Net—13' 4" × 10' 0" = 0.300 cents. Year of trial—Second year.
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Summary of results.

	Gummasari 3948.	AKP. 5. (control).	Prayaga 3660.	Gummasari 3976.	Standard error of treatment mean.	Whether significant or not.	Critical difference (P = 0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mean yield of grain in lb. per acre	3,683	3,229	3,083	3,063	124.58	Yes.	375.39
As per cent on control	114.2	100.0	95.5	94.8	3.86	..	11.62

Conclusions—Gummasari 3,948, AKP. 5, Prayaga 3660, Gummasari 3976.

(c) *Prayaga Salur series.*—Six cultures were compared against the local bulk. The differences in yield among the varieties were not significant. But however PS. 32 was the best among the cultures tried and gave 66 per cent more yield than the control (PS. Bulk). The details of layout and the summary of results are furnished in Table LXXXIX. The review of the three-year results indicated that the strains tried were not superior to the local bulk in any of the years and the trial will be discontinued.

TABLE LXXXIX.—Yield trial with Prayaga Salur rice cultures, 1951-52.

Field number—32. Soil—Clay loam. Previous crop—Sunn hemp. Manures—Sunn hemp at 6,000 lb. per acre. Ammonium sulphate to supply 30 lb. of 'N' per acre. Bone meal at 112 lb. per acre. Date of planting—3rd September 1951. Date of harvest—27th December 1951.	Treatments—Seven. P.S. 32, P.S. 22, P.S. 13, P.S. 21, P.S. 17, P.S. 25 and P.S. (Bulk). Replications—Six. Layout—7 × 6 randomized blocks. Size of plot—Gross—14' 0" × 10' 8" = 0.336 cents. Net—13' 4" × 10' 0" = 0.30 cents. Year of trial—Third year.
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Summary of results.

	P.S. 32.	P.S. 13.	P.S. Bulk (control).	P.S. 25.	P.S. 22.	P.S. 21.	P.S. 17.	Standard error of treatment mean.	Whether significant or not.	Critical difference (P = 0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Mean yield of grain in lb. per acre	3,354	3,187	3,146	3,125	3,042	3,042	2,958	181.25	No	..
As per cent on control.	106.6	101.3	100	99.3	96.7	96.7	94.0	5.76	..	..

The yield data for the three years are furnished below:—

Prayaga Salur series.

(Mean yields of grain in lb. per acre.)

Year.	P.S. 13.	P.S. 17.	P.S. 21.	P.S. 22.	P.S. 25.	P.S. 32.	P.S. Bulk (control).	'Z' test.	Standard error of treatment mean.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1949-50	3,560	3,530	3,550	3,595	3,500	3,615	3,485	No	165
1950-51	2,271	2,083	2,063	2,083	2,333	2,479	2,083	No	117
1951-52	3,187	2,958	3,042	3,042	3,125	3,354	3,146	No	91

(d) *Swargathara series.*—Two cultures were compared against the local bulk (Swargathara bulk). The treatment differences were not significant. The details are furnished in Table XC. The review of the results of the three years indicated that none of the other selections SWTA. 17 and SWTA. 20 were superior to the bulk. This trial will be discontinued from next year.

TABLE XC.—Yield trial with Swargathara rice cultures 1951-52.

Field number—32. Soil—Clay loam. Previous crop—Sunn hemp. Manures—Sunn hemp at 6,000 lb. per acre. Ammonium sulphate to supply 30 lb. of 'N' per acre. Bone meal at 112 lb. per acre. Date of planting—4th September 1951. Date of harvest—20th December 1951.	Treatments—Three; SWTA. 20, SWTA. 17, SWTA. (bulk). Replications—Six. Layout—3 × 6 randomized blocks. Size of plot—Gross—14' 0" × 10' 8" = 0.336 cents. Net—13' 4" × 10' 0" = 0.30 cents. Year of trial—Third year.
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Summary of results.

	SWTA. 17.	SWTA. (bulk) control.	SWTA. 20.	Standard error of treatment mean.	Whether significant or not.	Critical difference (P = 0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mean yield of grain in lb. per acre.	2,583	2,542	2,458	64.58	No	..
As per cent on control.	101.0	100	96.7	2.63	..	..

Swargathara series.

(Mean yield of grain in lb. per acre.)

Year.	SWTA. 17.	SWTA. 20.	SWTA. bulk (control).	'Z' test.	Standard error of treatment mean.
(1)	(2)	(3)	(4)	(5)	(6)
1949-50	2,440	2,460	2,510	No	51
1950-51	2,854	2,875	2,813	No	85
1951-52	2,583	2,459	2,642	No	65

Conclusions—
 1951-52 Not significant.
 1950-51 Do.
 1949-50 Do.

35. *Manurial trials—Residual effect of continuous green manuring.*—The effect of continuous green manuring on paddy was studied for 20 years, i.e., from 1926-27 to 1946-47. From 1947-48 onwards the study of residual effect of continuous green manuring was taken up. The results indicated that the plots which received continuous application of green manure at 3,000 lb. per acre gave 3.6 per cent increased yield over the no manure plots but 'Z' test was not satisfied. The percentage increase in yield on the manured plots over the no manure ones for the past five years is furnished in Table XCII. The details of layout and the summary of results are given in Table XCI.

TABLE XCI.—Residual effect of continuous green manuring to rice.

Field number—12.	Treatments—Two.
Soil—Clay loam.	(1) Application of green manure every year for 20 years continuously till 1946-47 at 3,000 lb. per acre.
Previous crop—Paddy.	(2) No manure.
Manures—Nil.	Layout—Beaven's half drill strip method.
Date of planting—12th September 1951.	Size of plot—
Date of harvest—18th December 1951.	Gross—140' 0" x 20' 0" = 6.3 cents.
	Nett—133' 0" x 13' 6" = 4.04 cents.
	Year of trial—Fifth year.

Summary of results.

(1)	Plots that received green manure.	Plots that were not manured.	Mean difference.	Whether significant or not.
(2)	(3)	(4)	(5)	
Mean yield of grain in lb. per acre ..	3,054	2,947	107	No
As per cent on control	103.6	100	3.63	..

TABLE XCII.—Results of the study of residual effect of continuous green manuring.

Serial number.	Year of trial.	Percentage of increase in yield over no manure.
(1)	(2)	(3)
1 1947-48		14.0
2 1948-49		10.0
3 1949-50		10.8
4 1950-51		10.3
5 1951-52		3.6

The above data indicate that the residual effect of continuous green manuring lasts for nearly five years.

36. *Paddy types.*—Out of 152 types grown for study, poor yielding and late maturing types totalling twenty were rejected during the year. Among the three cultures received from Cuttack, T. 1242 and T. 1145 were found to mature in 143 days and 100 days respectively. They yielded 4,560 lb. and 3,240 lb. of grain per acre respectively. Two Chinese types, namely, C.H. 45 and C.H. 47 were also tried during the season. Both of them were found to yield less than 1,000 lb. of grain per acre and among them C.H. 47 gave better yield than C.H. 45. Among the other types of paddy tried on the station, the following performed well. Co. 2, Co. 7, Co. 12, MTU. 16, MTU. 19, ASD. 5, PTB. 16, SLO. 17, BAM. 29 and BAM. 30.

37. *Late planting trial.*—As per instructions of the Director of Agriculture, an experiment was laid out with twelve strains of paddy under two dates of planting in two series with seedlings of two different ages, namely, 35 days and 50 days at the time of planting to find out a suitable strain for late planting. The results indicated that—

(a) Under late planted conditions, ADT. 18 and Co. 18 among the short duration strains, ADT. 8 among medium duration strains, and Co. 25 among late duration strains did well and gave satisfactory yields.

(b) The strain Co. 25 planted with 50 days old seedlings recorded the highest acre yield of 3,518 lb. of grain closely followed by AKP. 11 with 3,232 lb. under similar conditions.

(c) The short duration strains of AKP. 2, Co. 18, ADT. 18 did better when planted with thirty-five days old seedlings than with 50 days old ones.

(d) Irrespective of the age of seedlings the following strains ripened at the same time : AKP. 2, GEB. 24, AKP. 11, PTB. 16, ASD. 5, T. 672 and Co. 25. The acre yields of paddy in two series are furnished in Table XCIV.

TABLE XCIII.—Late planting trial with strains of rice (1951-52).

Field number—30-B and 33.	Varieties—Twelve : AKP. 2, AKP. 11, AKP. 4, GEB. 24, Co. 3, Co. 18, Co. 25, T. 672, PTB. 16, ADT. 8, ADT. 18, ASD. 5.
Soil—Clay loam.	Layout—In duplicate plots.
Previous crop—Sunn hemp.	Replications—Two.
Manures—Sunn hemp at 6,000 lb. per acre.	Size of plot—20' 0" x 18' 8" = 0.75 cent.
Date of planting—I series, 5th October 1951 ; II series, 20th October 1951.	Age of seedlings—35 days and 50 days.
Date of harvest—2nd January to 8th February 1952.	Year of trial—First year.

TABLE XCIV.—Summary of results—Yield of grain in the late planting trial.

Serial number.	Strain number.	Age of seedlings.	Acre yield in lb. of grain per acre.	
			I Series planted on 5th October 1951.	II Series planted on 20th October 1951.
1	AKP. 2	35 days.	2,321	1,464
		50 "	2,286	1,750
2	GEB. 24	35 "	2,473	2,911
		50 "	2,518	2,250
3	T. 672	35 "	2,321	2,625
		50 "	2,643	1,929
4	AKP. 4	35 "	3,000	1,750
		50 "	2,473	2,607
5	AKP. 11	35 "	2,147	1,929
		50 "	3,232	2,196
6	Co. 3	35 "	2,500	2,607
		50 "	2,786	2,840
7	Co. 18	35 "	2,857	2,429
		50 "	2,491	2,393
8	ADT. 8	35 "	2,911	2,142
		50 "	2,947	2,714
9	ADT. 18	35 "	2,786	1,554
		50 "	2,268	1,840
10	PTB. 16	35 "	2,625	2,250
		50 "	2,875	2,429
11	ASD. 5	35 "	2,587	2,536
		50 "	2,714	2,679
12	Co. 25	35 "	3,036	2,875
		50 "	3,518	3,142

(a) SEMI-DRY PADDY.

38. *Semi-dry paddy*.—To find out a suitable strain for growing under semi-dry conditions five strains, namely, ADT. 22, BCP. 1, BCP. 2, Co. 19 and Co. 25 were tried in observation plots. They were broadcast in the field in the months of July-August 1951 and grown as semi-dry paddy. This was the first trial for this observation. The results indicated that Co. 19 recorded the highest yield of 2,122 lb. per acre closely followed by ADT. 22 and BCP. 1. The yield data are recorded in Table XCV.

TABLE XCV.—Semi-dry paddy—Yield data.

Serial number	Name of strain.	Yield of grain per acre in lb.
1	ADT. 22	1,867
2	Co. 19	2,122
3	Co. 25	1,756
4	BCP. 1	1,833
5	BCP. 2	1,556

39. *Incorporation of cane trash in paddy puddle*.—To find out the effect of incorporating cane trash with and without sulphate of ammonia in paddy puddle on yield of paddy an observation plot was laid out. There was a virulent attack of paddy blast in the plots to which ammonium sulphate was applied. Luxuriant growth was noticed in these plots as reflected in the straw yields at the beginning. The blast attack was more severe in the plots applied with ammonium sulphate alone than in the treatment with cane trash and ammonium sulphate.

Summary of results.

Treatment.	Acre yield in lb.		Per cent over control.	
	Grain.	Straw.	Grain.	Straw.
(a) No manure (control)	948	1,492	100	100
(b) Cane trash at 4 tons per acre.	936	1,328	98.73	89.01
(c) Ammonium sulphate at 2 cwt. per acre	732	1,208	77.02	94.37
(d) Cane trash at 4 tons per acre and ammonium sulphate at 2 cwt. per acre	832	2,436	87.76	163.27

(b) MILLETS.

40. The area grown for seed multiplication under different strains and the average acre yields of grain are furnished in Table XCVI.

TABLE XCVI.—Acre yields of grain of different millets on the station.

Season.	Crop.	Strain.	Area.	Acre yield of grain in lb. 1951-52.	Acre yield of grain in lb. 1950-51.
(1)	(2)	(3)	(4)	(5)	(6)
			ACS.	LB.	LB.
Punasa	Ragi	A.K.P. 2	2.44	1,655	1,763
Pyr	"	A.K.P. 6	1.35	3,376	2,394
Rainfed	Ganti	A.K.P. 2	5.27	603	740
Irrigated	"	A.K.P. 2	0.70	2,560	1,486
Rainfed jonna	Jonna	A.K.P. 1	4.17	1,617	1,480

(c) FRUITS.

41. *Mango*.—The mango crop was satisfactory as a result of spraying guesarol on the trees during the flowering period. Two alphonso trees and three of the Langra trees did not flower so far though they were more than twelve years old. Out of the sixty-four trees in twenty-five varieties in the orchard collection, forty-four trees yielded fruits during the year. A total yield of 3,244 fruits weighing 2,006 lb. was obtained from mangoes.

New introductions.—Rajamanu in F. No. 50 planted in 1949 came to bearing and it yielded 22 fruits weighing 7½ lb. In the school garden one plant of Jalal Saheb yielded 60 fruits weighing 53 lb. Two more plants, one Neelum and another Alampur Baneshan, also came to bearing for the first time.

Citrus.—Hawaii citron planted in December 1949 produced a number of fruits. They were all big-sized and useful for pickles. The Italian lemon, Villafrance and lime planted during the previous year commenced bearing.

Sapota.—Palasapota and Calcutta round yielded best in the orchard while the quality of the former was superior. The yield of fruits from the best performers is noted below:—

Variety.	Number of fruits.	Weight of fruits in lb.
Calcutta round	5,088	547
Pakala oval	4,006	347

Banana.—Three varieties, Karpura Chekrakeli, Bontha and Tella Chakrakeli were tried and only the first named one was found to be fairly resistant to Panama disease. The plant and ratoon crops yielded 22,873 lb. of fruits valued at Rs. 2,219-13-0.

Due to Panama disease, the yield of bunches was poor. The average weight of bunches from ratoon crop is noted below:—

Karpura Chakkarakeli—15 lb.

Pachcha Bontha—10 lb.

Among the other fruits guavas and cashewnut yielded satisfactorily. The Singapore jack plant, planted in 1947 flowered this year also but did not set fruit.

42. *Nursery*.—The position of supply and propagation of various fruit plants from the station is summarised in the Table XCVII.

TABLE XCVII.—Stock position of fruit plants.

Kind.	Opening balance.	Receipts.	Total.	Sales.	Transfers.	Closing balance.
Mango grafts	427	1,505	1,932	79	538	1,315
Guava layers	..	690	690	50	..	640
Sapota grafts	324	1,203	1,527	38	6	1,483
Lemon	100	1,206	1,306	87	216	1,023
Rose apple	2	4	6	6	..	..
Pumelo budded	..	30	30	3	1	26
Batavian oranges budded	..	8	8	..	..	8
Vadlapudi budded	..	14	14	..	..	14
Grape vine cuttings	..	44	44	44	..	..
Passion fruit cuttings	..	3	3	3	..	..
Total	853	4,707	5,560	290	761	4,509

(d) VEGETABLES.

43. An area of 0.48 acre was grown to cabbages and an acre yield of 12,700 lb. of heads was obtained.

Elephant yam and ragi were grown as mixtures during the punasa and pyru seasons. Their acre yields are recorded below:—

(i) Punasa	Yam 20,520 lb.	
	Ragi 1,962 lb.	LB.
(ii) Punasa Ragi	..	1,962
Pyrn Ragi	..	2,400
Yam	..	12,000

Fourteen varieties of sweet potato were tried and 1 B 22 and V 12 recorded yields of 10,000 lb. per acre followed by B. 4004 and B 196.

(e) ECONOMIC PLANTS.

44. (a) *Linseed*.—IP 68 and K 2 were tried which gave 110 lb. and 191 lb. of seed per acre respectively. The latter proved to be better in yield and vigour of the crop.

(b) *Perennial cotton*.—Thirty-three seedlings of Caramura 2 were planted on 6th March 1952 and 50 seedlings of Moco were planted in May 1952. They are progressing well.

(c) *Balsa*.—Plants planted in July 1948 are progressing well. The girth of the stem and the height up to first branching are furnished below :—

	Maximum.		Average of eleven trees.	
	FT.	IN.	FT.	IN.
Girth	3	7	2	9
Height	10	7	8	7

They flowered in December and pods came to harvest in April-May. The most vigorous of the trees bore 200 pods and each pod yielded one ounce of lint and fuz. The lint is fine, short, light brown in colour and good for stuffing cushions. The seed is small and there are about 600 seeds in a pod. They germinate soon after harvest and viability lasts for over an year.

(d) *Kudzu vine* (*Pueraria thurbergiana*).—Five plants planted on 1st August 1950 grew during rainy season to about 7 feet to 8 feet but dried up in summer. They produced shoots on receipt of rain and grew to a height of 5 feet so far. Flowering did not occur yet.

(e) *Kudzu* (*Pueraria hirsuta*).—Twelve crowns were obtained from Delhi and planted in May 1952. Seven of them established and grew to a length of 7 feet so far.

(f) *Calapogonium*.—Two lb. of seed was sown in the coconut tope under shade in May 1952. The crop is progressing satisfactorily.

(g) *Coconuts*.—Twenty-six new seedlings were planted and two of them died. A total yield of 3,952 nuts was obtained from 87 trees bearing on the station.

(f) MISCELLANEOUS.

45. (i) *Cotton in rice fallows*.—As per the plan given by the Cotton Specialist, Coimbatore, four experiments were laid out to find out whether cotton can profitably be grown after paddy. The first experiment was in split plot design to find out the optimum time of sowing and response to manuring by ammonium sulphate. The second was a trial for the selection of promising ones out of seventy selections. In the third eight varieties were sown in unreplicated blocks. In the fourth trial the effect of growing cotton on the next paddy crop as compared to a green manure crop and fallow was sought to be studied. The picking of cotton in the experiments was in progress, and the results will be given in the next report.

(ii) *Groundnut and Kasigogu* (*Hibiscus sabdariffa*) in rice fallows.—TMV. 2 groundnut and Kasigogu (Mesta for fibre) were cultivated in the rice fallows after the harvest of paddy crop. TMV. 2 groundnut was harvested and it gave an acre yield of 950 lb. of pods in about 4½ months.

(iii) *Fodder crops*.—The following fodders were grown and fed to cattle in addition to concentrates :—

	LB.
Fodder Jonna	116,839
Cow pea	32,500
Pillipesara	16,125
Guinea grass	8,240
Napier grass	3,925

	LB.
Water grass	3,605
Paddy straw	117,495
Ragi straw	12,820
Jonna straw	22,800
Green grass	292,000

46. (iv) *Green manure crops*.—(a) Sunnhemp was grown in an area of 14.05 acres as a green manure crop to paddy and gave an acre yield of 10,036 lb. of green matter as against 13,800 lb. in the previous year.

(b) *Pillipesara* was grown in an area of 1.75 acres as a green manure crop, and gave an acre yield of 16,450 lb. as against 6,175 lb. of green matter per acre in the previous year.

(c) Cow pea grown in an area of 1.75 acres as green manure crop gave an yield of 18,483 lb. per acre.

(d) *Pillipesara* and Sunnhemp were grown as a mixture in an area of 1.06 acres, and the following yields were obtained :—

Sunnhemp	2,850 lb. per acre.
Pillipesara	4,600 „

(e) *Gliricidia maculata*.—There were 1,365 shrubs, aged 2 to 3 years at the close of the last fasli year. During this year taking advantages of the rains received during June and July 1951 about 1,600 seedlings were planted in vacant spaces and along irrigation channels and road margins. At present there are 2,928 shrubs which are coming up well. A quantity of 144 lb. of seed was collected during the period.

(f) *Sesbania speciosa*.—Seedlings of *Sesbania speciosa* were planted in all vacant spaces and field bunds of paddy and sugarcane. During the year a total quantity of 3,198½ lb. of seed was collected.

47. *T.V.A. System of application of phosphates*.—To see whether the application of phos phosphate would increase the production of green matter and would make the phosphate more easily available to the succeeding paddy crop, an observation plot was laid out. The results indicated that

(a) the plots that received triple super phosphate at the rate of 112 lb. per acre at the time of sowing the green manure crop gave 12.6 per cent increased yield of green matter over the control ;

(b) it was observed at the time of harvest of sunnhemp that the sunnhemp crop raised in plots manured with super phosphate showed better formation of bacterial nodules than the control plot (no manure). The yields of sunnhemp from the two plots are recorded in Table XCVIII.

TABLE XCVIII.—Acre yield of sunnhemp in lb.

Field number.	Plots manured with super phosphate.	Control plots (no manure)	Age of crop.
18	16,200	15,560	61 days.
19	17,440	15,600	„
25 (A)	16,800	13,800	„
25 (B)	16,400	14,400	„
Average	16,710	14,840	„

C. Livestock.

48. (i) *Cattle*.—The general condition of the cattle was good. The number of pairs of work animals maintained was 15½ including one pair of buffaloes. The position at the end of the year was as follows:—

Work cattle	..	..	..	..	..	..	31
Cows	..	..	..	..	..	..	3
Breeding bulls	..	..	..	..	..	..	2
Bull calves	..	..	..	..	..	..	6
Heifer calves	..	..	..	..	..	..	2
Total	..	..	..	..	..	..	44

There were 49 bull services, 39 by the Buffalo Bull No. 3 and 10 by the the Ongole Bull No. 3. Cow No. 9 gave 43 lb. of milk during July 1951 and afterwards went dry. Cow No. 12 gave 307 lb. milk in 51 days and went dry.

(ii) *Poultry*.—A small flock of poultry birds consisting of white leghorns was maintained. The general condition of the poultry was good. The receipts and disposal of birds and eggs are furnished in Table XCIX.

TABLE XCIX.

Particulars.	Opening balance on 1st July 1951.	Receipts.	Total.	Sold or transferred.	Died.	Total.	Closing balance.
1. White leghorn hens	22	15	37	5	6	11	26
2. Do. cocks	8	7	15	8	1	9	6
3. Do. chicks	33	208	336	256	65	321	15
4. Country hens	2	1	3	..	..	..	3
Total	70	321	391	269	72	341	50

The percentage of mortality worked out to 18.4 as against 6.98 of last year. During this year 1,858 eggs were obtained and they were disposed of for both hatching and table purposes. The amount realized by sale of birds and eggs during this year was Rs. 792-5-6.

D. Agricultural Education.

49. (a) There were 32 boys on rolls in the Juvenile Labour School attached to the Farm and 30 were promoted to the higher classes. The school was closed with effect from 7th April 1952 as per the G.O. No. 606, dated 7th April 1952.

(b) *Training of demonstration maistris and fieldmen*.—Two hillmen from Srikakulam agency underwent practical training as maistris. Thirteen maistris and twenty-three fieldmen trainees were also trained for a period of six months.

Exhibitions.

50. The quarterly exhibition and field days were celebrated on the station on four occasions. They proved highly popular and many ryots visited the station to witness the exhibition and field demonstrations of the various improvements in the cultivation of crops. The Annual Farmer's Day was celebrated on 2nd February 1952 and it 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.

The Research Station participated in the exhibitions held at Madras, Kakinada, Chodavaram and Srikakulam.

SUGARCANE RESEARCH STATION, ANAKAPALLE, S. V. PARTHASARATHY,

31st August 1952.

Sugarcane Specialist.

APPENDIX I.

STATEMENT OF CHARGES AND RECEIPTS FOR THE YEAR 1951-52 (JULY TO JUNE).

Charges.

40. c. Agriculture—Experimental Farms—A. Agricultural Research Stations—						RS.	A.	P.
1. Pay of officers	..	..	..	..	..	2,458	6	0
2. Pay of establishment	..	..	..	..	..	12,725	11	0
3. Travelling allowance	..	..	..	..	..	1,153	1	0
4. Dearness allowance	..	..	..	..	..	4,613	10	0
5. House-rent allowance	..	..	..	..	..	479	1	0
1. Livestock and dead stock	..	..	..	..	..	5,975	14	3
2. Petty construction and repairs	..	..	..	..	..	849	11	0
3. Other contingencies	..	..	..	..	..	945	12	0
4. Working expenses	..	..	..	..	..	85,091	4	6
5. Dearness allowance to menials	..	..	..	..	..	9,683	8	0
6. Service postage	..	..	..	..	..	550	0	0
7. Rates and taxes	..	..	..	..	..	1,317	6	0
40. e. Agriculture—D. Agricultural Schools—						392	2	0
1. Pay of establishment	..	..	..	..	..	194	7	0
2. Dearness allowance	..	..	..	..	..	97	6	0
3. Other contingencies	..	..	..	..	..	..	..	..

Receipts.

1. Sale of farm produce	..	..	..	..	..	24,977	11	5
2. Miscellaneous	..	..	..	..	..	2,527	12	0
3. Rents on buildings	..	..	..	..	..	101	8	0
4. Recoveries of overpayments	..	..	..	..	..	..	..	..
5. Value of farm produce, supplied as free transfer	..	..	..	..	..	9,849	14	4
Expenditure—40. d. Agriculture—Agricultural Demonstration and propaganda—I. Ordinary areas excluding Post-War Reconstruction Scheme for training of Fieldmen and Maistris—						1,371	5	0
1. Pay of establishment	..	..	..	..	..	280	8	0
2. Dearness allowance	..	..	..	..	..	3,670	11	0
3. Contingencies	..	..	..	..	..	..	..	..
40. o. Works—Construction of Gas house and Gas plant	..	..	..	..	..	2,485	10	0

APPENDIX II.

STATEMENT OF EXPENDITURE AND INCOME FROM BULK CROPS GROWN ON THE STATION DURING 1951-52.

Area in acres.	Cost of cultivation per acre.						
	21-80	1-07	13-79	8-02	4-17	0-32	2-25
	Paddy.	Cane.	Ragl.	Ganti.	Jonna.	Plantain.	Vegetables.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
Preparatory cultivation.	23 5 5	72 2 10	42 1 0	37 12 0	17 4 0	222 12 0	86 0 0
Manures and manuring.	57 15 3	614 3 2	29 0 0	14 2 6	24 8 0	945 6 0	198 5 4
Seeds and sowing	33 11 5	67 3 4	36 4 0	18 13 6	3 0 6	91 5 0	253 14 8
After cultivation	5 1 11	725 5 3	28 12 0	2 4 0	28 6 0	739 2 0	240 5 8
Irrigation	6 0 0	35 14 3	12 8 0	0 4 0	..	143 13 0	235 4 8
Harvesting, threshing, cleaning and transporting cane to factory.	58 5 0	437 6 10	70 3 0	22 0 6	24 11 6	66 0 0	123 5 4
Total expenditure per acre.	184 7 9	1,952 3 8	218 12 0	95 13 6	98 7 0	2,208 15 0	1,137 3 8
Total income per acre.	345 5 3	2,769 12 1	425 1 6	102 0 0	265 0 0	2,219 13 0	2,160 10 8
Profit per acre	160 13 6	817 8 5	206 5 0	6 2 6	166 9 0	10 14 0	1,023 7 0

APPENDIX III.

SEED DISTRIBUTION.

	LB.	Value.		
		RS.	A.	P.
Paddy—				
AKP. 1	700	80	7	1
AKP. 2	4,680	536	4	0
AKP. 3	1,338	153	5	0
AKP. 4	6,681	695	15	0
AKP. 5	3,157	328	13	8
AKP. 6	1,022	596	4	4
AKP. 9	165	18	15	6
AKP. 11	1,036	118	11	4
AKP. 12	1,140	118	12	0
AKP. 13	400	41	10	8
SR. 26-B	4,469	512	1	2
GEB. 24	9,101	1,042	13	2
BAM. 1	1,472	153	5	4
BAM. 3	8,004	917	2	0
BAM. 6	4,244	486	4	8
BAM. 8	280	29	2	8
BAM. 32	801	80	10	6
	48,690	5,918	10	1

Millets—

Ragi AKP. 1	10	0	15	0
„ AKP. 2	4,315	404	8	6
„ AKP. 6	14	1	5	0
„ AKP. 7	40	3	12	0
Ganti AKP. 1	30	2	15	6
„ AKP. 2	5,475	541	12	9
Jonna AKP. 1	5,840	577	14	8
Sugarcane seed material	3.05 tons.	162	15	0
Agathi	813 lb.	101	10	0
Prosopis juliflora pods	100 „	12	8	0
Gliricidia maculata	92 „	46	0	0
Sesbania speciosa	2,980 „	553	12	0
New era cowpea	251 „	125	2	0
Guinea grass slips	5,000 „	6	4	0
		2,536	6	5

ATTEMPTS MADE TO STEP UP THE INCOME OF THE FARM.

1. Intensive cultivation of bulk crops by increased manuring with a view to maximise production.
2. Bringing more area under mixed cropping of ragi and yam.
3. Intensive cultivation of exotic vegetables of cabbage and knol-khol by periodical sowings and prolonging the harvesting season.
4. Planting of coconut seedlings along the borders wherever possible.
5. Raising root stock materials on a large scale and propagation of fruit plants.
6. Planting green manure shrubs along the field bunds, irrigation channels and vacant spaces so as to meet the entire requirement of the paddy crop by cutting down the area under green manure crops preceding paddy and diverting this area for food and other economic crops, such as cotton, groundnut and mesta—(Gogu for fibre) in rice fallows.

SUGARCANE RESEARCH STATION, ANAKAPALLE

7. Conversion of trash obtained from the entire area under sugarcane into compost with press-mud cake, cow-dung and pig-dung as quick acting starters and applying the same to the dry and garden land area.

8. Augmenting the water-supply and increasing the irrigation facilities by tapping underground water. Boring operations with a hand-boring set in selected spots for tapping fresh springs were taken up.

9. Even with the meagre irrigation facilities now available the fallows have been reduced by increasing the area under the following crops:—

1 Pyru ragi	1.00
2 Cotton, groundnut, mesta and redgram in rice fallows	1.50
3 Mixed cropping of ragi with groundnut, yam, pillipesara and cotton	1.50
4 Fodder crops	4.00
5 Vegetables	0.50
6 Millets	3.25
7 Kolinji and green gram mixture	0.75
8 Sugarcane	2.54
Total	15.04

10. Reducing the cost of wrapping and propping operations in sugarcane by propping the outskirts with minimum number of bamboos and adopting trash-twist method wherever feasible.

ANNUAL REPORT OF WORK DONE ON THE AGRICULTURAL
RESEARCH STATION, SAMALKOT, FOR THE YEAR 1951-52 (FASLI
1361).

SECTION I—SEASON AND RAINFALL.

1. A total precipitation of 36.79 inches of rain was recorded on 60 rainy days during the year under report against a ten-year average of 41.12 inches of rain on 46.4 rainy days. The precipitation during the South-west monsoon was normal and the distribution was uniform. The season was favourable for the first crop paddy throughout the entire period of its growth. The dry weather from November facilitated the post harvest operations. Extreme hot weather prevailed during the summer months of April and May.

The weather can be said to be not altogether good for the crops on the station. The sudden and heavy downpour of rain during the second fortnight of July and third week of November and the abrupt cut in the supply of irrigation water in the Godavari canal, from the second week of March accompanied by hot and dry weather affected the crop adversely. The standing crops of sugarcane and bananas were affected by high winds and cyclone and lodged badly. The second-crop paddy in all the bulks and experimental area was a complete failure and the crop in one-third of the second-crop area had to be cut and fed to cattle. Again the short duration varieties of paddy were caught in the unabated rains during September as a result of which the flowering and consequent grain setting were affected. The medium and long duration paddies, however, fared well and recorded fairly good yields.

2. *South-west monsoon.*—A total precipitation of 20.51 inches of rain was recorded on 38 rainy days as against a ten-year average of 21.51 inches of rain on 35.4 rainy days. The monsoon was weak at the onset but gained strength towards the end of June. The distribution of rain was uniform. The monsoon was most vigorous during the second fortnight of July, during which period a total precipitation of 8.69 inches of rain was recorded on eight rainy days. The inclement weather prevailed throughout the fortnight accompanied by strong gales causing the lodging of the cane crop in all the plots under the co-ordinated crop weather study, and bananas in the bulk area. The period was, however, particularly beneficial for the paddy crop which made a luxuriant growth. The short duration paddies were caught in the rains at the time of flowering and the yields are consequently affected.

3. *North-east monsoon.*—The monsoon commenced right earnest with a heavy precipitation of 4.47 inches of rain on 6 rainy days during the first week of the monsoon period. A total precipitation of 9.11 inches of rain was recorded on 15 rainy days as against a normal rainfall of 15.02 inches of rain on 31.1 rainy days. All the rain recorded was precipitated during the early period. On the 25th of November, there was an unexpected and heavy downpour of 1.18 inches of rain accompanied by strong winds, the velocity of which varied from 15 to 20 miles an hour. This resulted in the complete lodging of the sugarcane crop for the second time. The latter half of the period was dry, and facilitated the harvest and threshing operations of paddy.

4. *Hot weather.*—Extreme hot winds prevailed during the summer months of April and May. A total precipitation of 7.17 inches of rain was recorded on 7 rainy days during the period as against a normal rainfall of 4.59 inches on 7.9 rainy days. The whole of the precipitation was recorded during the third and fourth weeks of May and the first week of June. The rainfall during May was the result of a cyclonic storm in the Bay of Bengal. It started as a deep depression on the 19th May and developed into a severe cyclone on the morning of 21st.

5. The rainfall recorded at the station was 2.88 inches of rain on 3 rainy days during the cyclonic period. Earlier, the hot weather affected the growth and yields of the second-crop paddy adversely. The supply of irrigation water in the Godavari canal was cut off from the second week of March. With all the available water from the farm pond and the Yeleru drain it was just possible to maintain moisture at the root zone of the important experimental plots in paddy. The bulk crops were a complete failure. The crop had to be cut and fed to cattle.

The particulars of rainfall received during the year under report are furnished in Table I.

TABLE I.—Rainfall data—1951-52.

Month.	Week.	1951-52.		Normal rainfall.	
		Rain in inches.	Rainy days.	Rain in inches.	Rainy days.
South-west monsoon.					
June	7-13	0.34	1	0.61	1.7
	14-20	0.14	1	0.87	1.1
	21-27	2.21	3	1.15	1.7
June-July	28-4	..	..	2.22	3.0
	5-11	0.85	2	1.26	2.3
	12-18	1.75	2	1.49	2.8
July-August	19-25	6.18	4	1.12	2.3
	26-1	1.46	3	1.50	2.6
	2-8	1.22	5	0.53	1.4
August-September	9-15	1.30	3	1.51	2.5
	16-22	1.60	5	0.96	1.7
	23-29	1.01	4	1.78	3.1
.. .. .	30-5	1.01	2	1.70	2.9
	6-12	0.61	2	0.93	1.9
	13-19	0.25	1	0.73	1.2
.. .. .	20-26	..	..	2.45	2.7
	Total ..	20.51	38	21.51	35.4
North-east monsoon.					
September-October	27-3	4.47	6	0.89	1.5
	4-10	0.93	1	1.09	1.9
	11-17	1.96	4	2.48	2.1
November	18-24	..	..	1.60	1.9
	25-31	0.01	..	2.90	1.6
	1-7	0.56	3	1.38	1.6
November-December	8-14	..	..	1.41	0.7
	15-21	..	..	1.64	1.0
	22-28	1.18	1	1.36	0.2
December-January	29-5	..	..	0.05	0.3
	6-12	..	..	..	..
	13-19	..	..	0.23	0.3
.. .. .	20-26	..	..	..	..
	27-3	..	..	0.02	0.1
	4-10	..	..	..	..
.. .. .	11-17	..	..	0.01	0.1
	18-24	..	..	..	..
	25-31	..	..	..	..
.. .. .	Total ..	9.11	15	15.02	13.1
	Hot weather period.				
February	1-7	..	..	0.19	0.2
	8-14	..	..	0.16	0.2
	15-21	..	..	0.14	0.3
March	22-29	..	..	0.24	0.2
	1-7	0.01	..	..	..
	8-14	..	..	0.01	0.1
March-April	15-21	..	..	..	..
	22-28	..	..	0.16	0.2
	29-4	..	..	0.32	0.5
April-May	5-11	..	..	0.64	0.8
	12-18	..	..	0.32	0.3
	19-25	..	..	0.39	0.7
May-June	26-2	0.10	1	0.15	0.5
	3-9	..	..	0.20	0.4
	10-16	..	..	0.12	0.3
.. .. .	17-23	2.25	2	0.41	1.1
	24-30	0.63	1	0.53	0.8
	31-6	4.18	3	0.61	1.0
.. .. .	Total ..	7.17	7	4.59	7.9
	Grand total ..	36.79	69	41.12	56.4

N.B.—Normal rainfall is the average for the past ten years.

SECTION II—CROPS.

A. Paddy—Sarwa.

June-December.

6. Paddy was planted in an area of 26.00 acres during the year as against 24.05 acres during the previous year. Of this, an area of 6.68 acres was utilized for experimental work and the rest for the multiplication of the different strains for supply of seed to the districts. An average yield of 2,500 lb. of grain per acre was obtained during the year as against 2,450 lb. of the previous year. The season was favourable for crop growth. The continuous rainy weather and humid atmosphere that immediately followed the planting, helped in the quick establishment of the transplants. Again the dry weather from November onwards facilitated the post harvest operations. The short duration bulks however were caught in the rains during the flowering period as a result of which, the yields were affected. The long duration paddies especially SLO. 17, SLO. 18 and MTU. 19 were heavily infested with stem borer with the onset of the easterly winds from October onwards. The grain setting was consequently affected and low yields were recorded.

The general manuring of the crop consisted in the application of a basal dressing of green leaf at 3,000 lb. and super phosphate at 100 lb. per acre at puddling time and groundnut cake at 320 lb. per acre after the crop has established. A top dressing of sulphate of ammonia at 50 lb. per acre was also given to the crop wherever required. Green leaf was applied in the shape of pillipesara, sunnhemp and sesbania grown on the station for the purpose.

The quinquennial average acre yields of paddy grown on the station from the year 1910-11 are furnished in Table II below :—

TABLE II.—Statement of quinquennial average acre yields.

Years.	Yield in lb. per acre.
From 1910-11 to 1914-15	2,315
1915-16 to 1919-20	2,365
1920-21 to 1924-25	2,967
1925-26 to 1929-30	2,945
1930-31 to 1934-35	2,937
1935-36 to 1939-40	2,683
1940-41 to 1944-45	3,271
1945-46 to 1949-50	2,784
1950-51	2,450
1951-52	2,500

7. Seed multiplication.—The station strains that were in demand with the ryots were grown on a bulk scale along with the strains of other stations for the supply of seed to the districts. An area of 19.32 acres was devoted for this purpose. A total quantity of 56,639 lb. of paddy seed was multiplied for distribution of the major strains raised in bulk. The following are the yields recorded :

TABLE III.—Statement of yields.

Strain number.	Popular name.	Yield in lb. per acre.	Area planted in acres.
SLO. 1	Punasakonamani	2,910	0.12
SLO. 2	Sannakonamani	3,189	1.80
SLO. 9	Gorti Rasangi	2,892	1.31
SLO. 12	Garikasannavari	2,400	0.60
SLO. 13	Akkulu	3,248	3.93
SLO. 15	Sanna Konamani	3,811	4.50
SLO. 17	Gutti Kichili	2,944	1.00
SLO. 18	Peddakichili	2,852	0.40
MTU. 3	Potti Basangi	3,756	0.35
MTU. 5	Bontha krishnakatukalu	2,313	0.35
MTU. 10	Sanna krishnakatukalu	2,104	0.78
MTU. 19	Sanna kusuma	3,227	1.00
GEB. 24	Kichili samba	3,110	2.60
	Minor bulks like NX 60 dry paddy, etc.	..	0.58
Total ..			19.32

8. *Types*.—All the eighteen paddy strains of the station along with several others were grown on a small area, for purposes of observation and securing the nucleus seed material for next year's sowings.

Ninety-six types comprising mostly strains belonging to other stations were kept under observation. The material has been grouped as early, medium and long duration types in the order of flowering and duration as determined by the observations made in the previous years. Besides providing basic breeding material for several breeding problems, the types have been furnishing valuable information regarding their performance from season to season in comparison with those of local strains. For instance MTU. 1 and MTU. 6 were found to be very poor in tillering and stunted in growth. MTU 8, MTU 4 mutant, MTU 2 and MTU 15 were impressive in regard to tillering and height. Among the station strains SLO. 2, SLO. 6, SLO. 11, SLO. 15 and SLO. 17 were promising with rank growth and high yields. Among the second-crop season types grown during the first-crop period, MTU. 15 was outstanding in tillering, growth and yield of grain. The performance of all the ADT strains was satisfactory. 'Calaro' the Australian paddy was a misfit for the tract. This variety was being tried since 1950-51 second-crop season. It has not recorded more than 800 lb. per acre in any season. The crop was very much stunted in growth in this season also, with 4.4 tillers per clump on the average and flowered a month after planting. The acre-yields of ADT strains in comparison with the local strains are given hereunder:—

	LB.
SLO. 12	2,512
SLO. 16	2,991
MTU. 15	3,321
NX. 60	2,818
ADT. 4	3,312
ADT. 8	2,910
ADT. 18	2,932
ADT. 19	2,889

9. *Types suitable for cultivation in saline soil*.—Among the thirty-five types, reputed to be resistant to saline conditions, grown on the station, the cultures T. 8920, T. 8245, SR. 24, Pokkal 6903, Urvakundan, Mancomper, Kuthakar and Orkayama were outstanding in yield over the rest. As the performance of the types in general was not up to the mark, the study as well the maintenance of the basic material will be discontinued from next year.

In addition to the above, cultures of MTU. 1 × SR. 26 B cross progenies were grown in single plots. These were kept for observations for comparing the performance with those arranged in the district trials in the different saline tracts. The culture Nos. 10022 and 10034 were outstanding with an acre yield of 2,711 lb. and 3,008 lb. of grain respectively. The cultures were also found to be pure. Only eight cultures were carried forward for the next year.

10. *Deep water paddy types*.—Fifty-five cultures reported to be suitable to deep water conditions were kept under observation. The performance of the cultures in general was poor. The cultures were also observed to be susceptible to stem borer infestation. However the seed of the three promising cultures DWP. 1311, DWP. 1315 and DWP. 1316 was multiplied with the idea of conducting district trials under typical deep water and low lying conditions. Only eight cultures were carried forward.

11. *Study of types with improved grain and rice characters*.—Out of thirty-six crosses between MTU. 1 and SLO. 11 under study last year, thirty-four were grown in single plots during the year. Through this cross it is sought to improve the quality of rice in MTU. 1 as the rice of Bikkirisaannam is fine and flinty. All the lots were pure for flowering and height. Seed of the promising cultures was multiplied for trial in saline areas of the coastal districts, where Akkullā and Atragadas are being grown.

12. *Evolution of types resistant to stem borer*.—Besides the basic material carried forward to the yield trial stage, several cross progenies of MTU. 19 × SLO. 17 and MTU. 19 × SLO. 18 paddies were grown as types for observation of the morphological characters, resistance to stem borer and yield of grain.

Of the twenty-six cultures of MTU. 19 × SLO. 17 cross progenies carried forward from the previous year's trials, only five were observed to be resistant to stem borer to a slight degree. The rest were rejected as being very heavily infested and poor yielders. The five promising cultures were No. 9990, 9991, 9974, 9967 and 9964.

Among the twenty-nine cultures of MTU. 19 × SLO. 18 cross progenies grown as type plots, the culture Nos. 10223, 10234, 10258 and 10259 were noted to be pure for flowering and height. These were also noted to be promising with fairly good yields. All the cultures were susceptible to stem borer infestation. Only five cultures were carried forward.

13. *Atragada paddy types*.—The desirable qualities, viz., the complete emergence of panicle and high yield of the two high-yielding strains of Maruteru were sought to be combined by crossing the parents MTU. 6 and MTU. 14. Twenty-two such promising cultures were under observation in single plots. The defective emergence commonly noticed in the Atragada strains was got rid of in the cross progenies. This was a very desirable character. All the cultures except culture No. 10799 were found to be susceptible for stem borer attack. Seven promising cultures were carried forward for further observation in the next season.

14. *Krishnakatukalu cultures (MTU. 5 × MTU. 10)*.—Twenty-three cross progenies of the two high yielding Krishnakatukalu strains (MTU. 5 × MTU. 10) of the Maruteru station were kept under observation in single plots. The culture have exhibited varying degrees of susceptibility to the stem borer attack. Culture No. 10191/1 was noticed to be resistant to the infestation. Culture Nos. 10195, 10198 and 10200 exhibited slight susceptibility to the borer attack. The culture No. 10200 was outstanding with 2,832 lb. of grain per acre. Four promising cultures were carried forward for the next year's material. These cultures were resistant to false smut as it is seen in the parents, MTU. 10.

15. *Basangi Krishnakatukalu cultures*.—The single plant selections from the ryots bulk of Basangi Krishnakatukalu, widely grown in the West Godavari district were grouped as per the duration and morphological character and grown as types for purpose of observation. Thirty-six cultures were kept under observation during the year. Seven promising cultures were carried forward for the next year's sowings.

16. *Miscellaneous collection of paddy*.—Besides the above cultures, the study of performance of the stray varieties like the *Bandiputilu*, *Pittupaddy* and SLO. 1 mutant was taken up. The first two varieties were received from the District Agricultural Officer, Kakinada, and SLO. 1 mutant from the Agricultural Demonstrator, Peddapuram. Single plants were selected from Pittu paddy for further study. The variety Bandiputilu was observed to be splitting with varying sizes of grain. Purification work will be taken up in the next season. The variety SLO. 1 mutant was erect with good tillering and vigour.

17. *Purification and further selections in NX. 60*.—In the last of the series of types, the single earhead selections from the NX. 60 cross progenies were grown for further purification. Among the 124 such lots grown for observation 121 were observed to breed pure for tillering height, while the rest of the three, segregated for the colour of the leaf sheath. Cultures with reduced awns were selected for comparison in the yield trials during the second crop season. Another selection was made in NX. 60 with a grain size resembling that of Krishnakatukalu with a purple pigment on the leaf sheath and grain. Further study on this culture will be taken up next year.

18. *Dry paddy*.—The two promising single plant selections BC. 130 and JC. 459 were sown in single plots with the corresponding strains of MTU. 17 (Kodibudama) and MTU. 18 (Kodijilama). Once again the two single plant

selections recorded increased yields over the MTU. strains under comparison. The uniformly good performance of these cultures was a noteworthy feature. The following are the yields recorded by the strains.

TABLE IV.—Results of dry paddy trials.

Date of sowing	.. .. .	9th June 1951	..	All varieties.
Date of flowering	.. .. .	3rd September 1951	..	MTU. 18 and JC. 459.
		19th August 1951	..	BC. 130.
		21st August 1951	..	MTU. 17.
Date of harvest	.. .. .	17th September 1951	..	BC. 130 and MTU. 17.
		25th September 1951	..	JC. 459 and MTU. 18.

Particulars.	BC. 130.	MTU. 17.	J.C. 459.	MTU. 18.
Mean tillers per clump	7.3	8.1	9.1	6.5
Height of crop in inches	36.9	38.3	41.5	41.8
Duration in flowering, in days	100	100	108	108
Yield in lb. per acre	2,343	2,032	2,192	1,765

19. *Experiments—Comparative yield trial of Rasangi duration varieties.*—With a view to fix up a high yielding Rasangi strain for the high-level areas of the district, the two promising single plant selections, RSG. 7868 and RSG. 262 were compared for yield with MTU. 3 and SLO. 9 in a randomized and replicated trial. Out of the seven single plant selections from the Rasangi ryot's bulk, compared during the previous year these two have consistently recorded higher yields than the rest. Hence these are carried forward for further comparison.

MTU. 3 was earlier by three days in flowering than the rest of the varieties. The strain has also recorded high yields and the differences in the yields between the strains under comparison were statistically significant. RSG. 7868 and 262 were not better than control MTU. 3. The yield data are tabulated below :—

The particulars of plan and layout are as follows :—

Field number—8 c.
Area—0.23 acres.
Size of plot—10 × 50 sq. links. (1 cent).
System of layout—4 × 6 randomized blocks.
Spacing—One link either way.
Varieties—MTU. 3, SLO. 9, RSG. 262 and RSG. 7868.
Manures—Basal dressing of 4,000 lb. green leaf in the shape of Sesbania plus 100 lb. of super phosphate per acre at puddling and top dressing of 50 lb. per acre of sulphate of ammonia, a month after planting.
Previous crop—Pillipesara.
Date of sowing in nursery—25th May 1951.
Date of transplanting—4th July 1951.
Date of flowering—20th September 1951—MTU. 3; 24th September 1951—Rest of the varieties.
Date of harvest—25th October 1951.

TABLE V.—Statement of yields.

Particulars.	MTU. 3.	RSG. 7868.	SLO. 9.	RSG. 262.	General mean.	Standard error.	'Z' test, satisfied or not.	Critical difference P=0.05.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Yield in lb. per acre	4,516	4,025	3,766	3,400	3,926	..	Yes.	534
Percentage over general mean.	115.03	102.52	95.92	86.60	100.00	3.543	Yes.	10.69
Percentage over control.	100.00	89.13	83.39	75.29	86.94	..	..	..

Conclusions—MTU. 3, RSG. 7868, SLO. 9, RSG. 262.

20. *Comparative yield trial of Basangi duration Krishnakatukalu cultures.*—These cultures were the result of single plant selection work in the ryots bulk of Basangi Krishnakatukalu paddy grown in the West Godavari district. Eighty-five such promising cultures were grown for study during the previous year to fix up a high yielding medium duration strain for the delta taluks. Out of the material under study, twenty-seven promising cultures were grouped into four series according to their morphological characters and duration in growth and compared for yield. The first three series comprising twenty-two cultures were compared for yield with SLO. 1 and SLO. 2 and the remaining five cultures, being of longer duration, were compared with SLO. 15 in randomized and replicated trials. Among the first three series, the standards recorded decidedly higher yields than the cultures. But these were of longer duration than the cultures under comparison and it is contemplated to pursue the trials with a change in the control to MTU. 3 which will be of the same duration as the cultures. In the fourth of the

series of trial some of the cultures were found to be promising over the control. The conduct of the trials in the different series during the year under report is enumerated below :—

(a) *Series I.*—Eight Basangi Krishnakatukalu cultures, GPT. 2, 8, 12, 17, 19, 22, 25 and 28 were compared for yield with SLO. 1 and SLO. 2. All the cultures were earlier by nearly eighteen days in duration than the standard. None of the cultures under comparison have recorded higher yields than the controls, and the differences in the yields were statistically significant. The particulars of layout in respect of the trial are recorded below :—

Field number—9 B.
Area—0.36 acre.
Size of the plot—10 × 35 sq. links. 0.35 cent.
System of layout—10 × 4 randomized block.
Spacing—One link either way.
Varieties—SLO. 1, SLO. 2, GPT. 2, GPT. 8, GPT. 12, GPT. 17, GPT. 19, GPT. 22, GPT. 25, and GPT. 28.
Manures—Basal dressing of 3,000 lb. per acre of green leaf plus 100 lb. per acre of super phosphate at puddling and 50 lb. per acre of ammonium sulphate a month after planting.
Previous crop—Pillipesara.
Date of sowing in nurseries—25th May 1951.
Date of transplanting—5th July 1951.
Date of flowering—25th September 1951—GPT. 22.
27th September 1951—GPT. 19 and GPT. 23.
28th September 1951—GPT. 2.
29th September 1951—GPT. 8 and GPT. 12.
30th September 1951—GPT. 17.
5th October 1951—GPT. 25.
15th October 1951—SLO. 1 and SLO. 2.
Dates of harvest—31st October 1951—Rest of the strains.
17th November 1951—SLO. 1 and SLO. 2.

The statement of yields recorded by the different varieties and the conclusions drawn are tabulated below :—

TABLE VI.—Statement of yields.

Particulars.	GPT. 2.	GPT. 8.	GPT. 12.	GPT. 17.	GPT. 19.	GPT. 22.	GPT. 25.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Yield in lb. per acre	3,732	3,732	3,678	3,794	3,718	2,857	3,241
Percentage over control.	84.53	84.53	82.63	85.90	79.73	64.74	73.41
Percentage over general mean.	102.47	102.47	100.99	104.17	96.60	78.45	83.99

Particulars.	GPT. 28.	SLO. 1.	SLO. 2.	General mean.	Standard error.	"Z" test	Critical difference. P = 0.05
(9)	(10)	(11)	(12)	(13)	(14)	(15)	
Yield in lb. per acre	3,250	42.14	44.10	3,642	..	..	1,082
Percentage over control.	73.65	95.48	100.00	82.58	..	..	..
Percentage of general mean.	89.24	115.71	221.09	100.00	5.238	Yes.	15.15

Conclusions—SLO. 2, SLO. 1, GPT. 17, GPT. 2, GPT. 8, GPT. 12, GPT. 19, GPT. 28, GPT. 25, GPT. 22

(b) *Series II.*—Seven Basangi Krishnakatukalu cultures GPT. 32, 36, 37, 38, 39, 40 and GPT. 41 which were slightly longer in duration by a week than those in series I, were compared for yield with SLO. 1 and SLO. 2 for the first year. The standards were outstanding in growth and yield over the cultures under comparison. The details of layout and yields are furnished below :—

TABLE VII.—Statement of yields.

Field number—9 A.
Area—0.41 Acres.
Size of plot—10 × 50 sp. links. (0.5 cent)
System of layout—9 × 4 randomized block.
Spacing—One link either way.
Varieties—GPT. 32, 36, GPT. 37, GPT. 38, GPT. 39,
GPT. 40, GPT. 41, SLO. 1 and SLO. 2.
Manures—Basal dressing of 3,000 lb. per acre of green-
leaf as Sesbania plus 100 lb. per acre of super phos-
phate and 50 lb. per acre of sulphate of ammonia a
month after planting.

Previous crop—Pillipesara.
Date of sowing in nursery—25th May 1951.
Date of transplanting—5th July 1951.
Date of flowering—22nd September 1951 GPT. 37.
26th September 1951 GPT. 36.
29th September 1951 GPT. 38 and GPT. 41.
30th September 1951 GPT. 32 and GPT. 39.
15th October 1951 SLO. 1 and SLO. 2.
Date of harvest—7th November 1951 Cut nos—
GPT. 37, 36, 38, 41, 32 and 39.
17th November 1951 SLO. 1 and 2.

Particulars.	GPT. 32.	GPT. 36.	GPT. 37.	GPT. 38.	GPT. 39.	GPT. 40.	GPT. 41.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Yield in lb. per acre	3,496	3,184	3,350	3,238	2,941	3,334	3,219
Percentage over control	92.26	83.26	88.63	84.50	78.91	87.22	84.16
Percentage of general mean	104.9	94.64	106.8	96.07	87.44	99.15	95.68

Particulars.	SLO. 1.	SLO. 2.	General mean.	Standard error.	'Z' test satisfied or not.	Critical difference (P = 0.05).
(9)	(10)	(11)	(12)	(13)	(14)	
Yield in lb. per acre	3,609	3,825	3,355	..	Yes	619
Percentage over control	94.50	100.0	87.68	..	..	..
Percentage on general mean	107.4	103.7	100.0	3.558	Yes	10.39

Conclusions—SLO. 2, SLO. 1, GPT. 32, GPT. 37, GPT. 40, GPT. 38, GPT. 41, GPT. 36, GPT. 39.

(c) *Series III.*—In the third of the series, seven cultures of Basangi duration Krishnakatukalu were compared for yield with SLO. 1 and SLO. 2 for the first time. The standards under comparison were later in duration than the cultures and remained on the field long after the cultures were harvested. The growth in general, of all the varieties was uniformly good. SLO. 1 and SLO. 2 have tillered profusely. G.T. 44 alone could compare equally with the standards in respect of growth tillering and yield. The cultures GT. 11 and GPT. 47 were robust in growth and lodged at the grain setting stage. As such the yields were affected.

The particulars of the conduct of the experiment and yields are recorded below :—

Field number—9 A.	Previous crop—Pillipesara and self-grown Sesbania.
Area—0.41 Acres.	Date of sowing in nursery—25th May 1951.
Size of plot—10×50 sq. links. (0.5 cent).	Date of transplanting—6th July 1951.
System of layout—9×4 randomized blocks arrangement.	Date of flowering—
Spacing—One link either way.	22nd September 1951 GT. 11.
Varieties—SLO. 1, SLO. 2, GT. 11, GPT. 42, GPT. 43.	24th September 1951 GPT. 42.
GPT. 44, GPT. 45, GPT. 47 and GPT. 49.	30th September 1951 GPT. 49.
Manures—Basal dressing of 3,000 lb. per acre of green leaf as Sesbania and Pillipesara plus 100 lb. per acre of super phosphate at puddling time and 50 lb. of Sulphate of ammonium per acre one month after planting.	2nd October 1951 GPT's 44, 45, and 47.
	8th October 1951 GPT. 43.
	15th October 1951 SLO. 1 and SLO. 2.
	Date of harvest—8th November 1951—SLO. 1 and SLO. 2, 27th November 1951—Rest of the cultures.

TABLE VIII.—Statement of yields.

Particulars.	GPT. 42.	GPT. 43.	GPT. 44.	GPT. 45.	GPT. 47.	GPT. 49.	GT. 11.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Yield in lb. per acre	2,812	3,140	3,281	3,200	3,062	3,062	2,837
Percentage over control	75.67	84.31	88.28	86.08	82.39	82.39	76.35
Percentage over general mean ..	88.94	99.10	103.8	101.2	98.85	98.85	89.74

Particulars.	SLO. 1.	SLO. 2.	General mean.	Standard error.	'Z' test satisfied or not.	Critical difference (P=0.05.)
(9)	(10)	(11)	(12)	(13)	(14)	
Yield in lb. per acre	3,387	3,725	3,167	..	Yes	512
Percentage over control	91.20	100.0	95.04	..	..	..
Percentage over general mean ..	107.2	117.8	100.00	3.514	Yes	10.25

Conclusions—SLO. 2, SLO. 1, GPT. 44, GPT. 45, GPT. 43, GPT. 47, GPT. 49, GT. 11, GPT. 42.

(d) *Series IV.*—In the fourth and the last of the series, five cultures G.Ts. 5, 8, 9, 10 and 11 were compared for yield for the first time with SLO. 15 and MTU. 10. These were of longer duration than the rest of the cultures in the other series. Rank growth and profuse tillering was observed in G.Ts. 5 and 9. These cultures also recorded increased yields over the standards and the differences in the yield were statistically significant. The particulars of layout and conduct of trial are furnished below :—

Field number—10 A.	Previous crop—Paddy.
Area—0.57 Acres.	Date of sowing in nursery—25 May 1951.
Size of plot—10×50 sq. links (0.5 cents).	Date of transplanting—6th July 1951.
System of layout—7×4 randomized block arrangement.	Date of flowering—
Spacing—One link either way.	23rd October 1951 MTU. 10.
Varieties—SLO. 15, MTU. 10, GT. 5, GT. 8, GT. 9, GT. 10 and GT. 11.	25th October 1951 SLO. 15, GT. 8 and GT. 9.
Manures—Basal dressing of 3,000 lb. per acre of green leaf as Sesbania plus 100 lb. per acre of Super Phosphate at puddling and 50 lb. per acre of Sulphate of Ammonia a month after planting.	26th October 1951 GT. 10.
	28th October 1951 GM. 11.
	31st October 1951 GT. 5.
	Date of harvest—7th December 1951.

TABLE IX.—Statement of yields.

Particulars.	MTU. 10.	SLO. 15.	GT. 5.	GT. 8.	GT. 9.	GT. 10.	GT. 11.	General mean.	Standard error.	'Z' test satisfied or not.	Critical difference (P=0.05.)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Yield in lb. per acre.	4,465	4,850	5,068	4,718	5,087	4,850	4,612	4,809	..	Yes	315
Percentage over control.	91.43	100.00	104.80	95.61	105.3	100.4	95.68	99.15	..	..	..
Percentage on general mean.	93.22	100.9	105.8	96.42	106.2	101.3	96.49	100.00	2.125	Yes	6.308

Conclusions—GT. 9, GT. 5, SLO. 15, GT. 10, GT. 8, GT. 11, MTU. 10.

21. *Comparative yield trial of MTU. 5 × MTU. 10 cross progenies.*—In this trial it was sought to evolve a high yielding, fine grained paddy that is resistant to stem borer and false smut. Five promising and heavy yielding cross progenies among the lots which were under bulk observation during the previous year, were compared for yield during the year under report with SLO. 15 and parents MTU. 5 and MTU. 10. This was the first year of regular comparative yield trial. The control SLO. 15 was outstanding in initial vigour, tillering and growth. The cross No. 10199 was observed to be resistant to stem borer. The remaining cultures were comparatively resistant over parents, viz., MTU. 5 and 10. MTU. 5 is more susceptible to stem-borer than MTU. 10. About 10 to 15 per cent attack was noticed in MTU. 5. All the cultures under comparison were resistant to false smut over MTU. 5 and 10. False smut was observed only in MTU. 10. All the lots were erect and were found to flower within a short range. The standard SLO. 15 recorded the highest yield but the differences in the yield were not statistically significant. The details of layout are noted below :—

Field number—10 A.	Previous crop—Paddy.
Area—0.57 acre.	Date of sowing in nurseries—25th May 1951.
Size of plot—10 × 50 Square links (0.5 cent)	Date of transplanting—6th July 1951.
System of layout—8 × 4 randomized block.	Dates of flowering—Cross Nos. 10188, and 10189.
Spacing—One link either way.	23rd October 1951—MTU. 10.
Varieties—SLO. 15, MTU. 5, MTU. 10, Cross Nos. 10175, 10188, 10189 and 10184/2.	24th October 1951—MTU. 5 and Cross No. 10175.
Manures—Basal dressing of 3,000 lb. per acre of green leaf plus 100 lb. per acre of super phosphate and 50 lb. per acre of sulphate of ammonia a month after planting.	25th October 1951—SLO. 15 and Cross No. 10199.
	26th October 1951—Cross No. 10184/2.
	Date of harvest—7th December 1951.

The yield data are recorded in the accompanying table :—

TABLE X.—Statement of yields.

Particulars.	MTU. 10	MTU. 5	CR. 10175	CR. 10188	CR. 10186	CR. 10199	CR. 10184/2	SLO. 15	General mean.	Standard error.	'Z' test.
Yield in lb. per acre.	4,343	4,412	4,606	4,393	4,766	4,450	4,281	4,825	4,809	..	No.
Percentage over control.	89.82	91.22	95.19	90.82	98.47	92.00	93.69	100.0	91.7	..	..
Percentage over general mean.	95.66	97.16	101.40	96.74	104.90	98.00	99.79	106.3	100.0	3.785	No.

Conclusions—'Z' test not satisfied.

22. *Comparative yield trial of MTU. 19 × SLO. 17 and SLO. 18 cross progenies.*—MTU. 19, SLO. 17 and SLO. 18 are strains of similar characters and yield potentialities. Crosses were effected between MTU. 19 and the remaining two varieties with a view to improve the yield and the quality of the grain by the intensification of the yield attributes, which occasionally happens while crossing strains of similar characters. The resultant crosses were kept under close scrutiny for tillering, growth resistance to stem-borer and yield. Promising cultures were carried forward for further intensive study during the year in regular randomized blocks. The details of which are furnished below :—

(a) *Series I.*—In the first of the series, out of the twenty-seven cross progenies, four of them which were observed to be high yielding with fine grain quality and culture No. 9990 was compared for yield during the year against the controls MTU. 19, SLO. 17 and SLO. 18. Culture No. 9990 is a cross between MTU. 19 and SLO. 17 and the remaining four, namely culture Nos. 10232, 10231, 10235 and 9992 between MTU. 19 and SLO. 18. Very heavy infestation of stem-borer was noticed in all the cultures without exception. The culture No. 9990 was the worst affected. The yields were greatly vitiated and as such no definite conclusions could be drawn. However it was noticed that culture No. 9952 was slightly resistant to stem-borer. This culture recorded the highest yield of 2016 lb. of grain per acre closely followed by SLO. 18 and culture No. 9990 with 1,856 lb. and 1,819 lb. of grain per acre respectively. 'Z' test not satisfied.

The particulars of layout are noted below :—

Field number—21 b.
Area—0.27 acre.
Size of plot—10 × 50 square links (0.5 cent).
System of layout—8 × 4 randomized block arrangement.
Spacing—One link either way.
Varieties—SLO. 17, SLO. 18, MTU. 19, Culture Nos. 10232, 10231, 10235, 9992 and 9990.
Manures—Basal dressing of green leaf supply 3,000 lb. per acre and super phosphate to supply 100 lb. per acre at puddling time and 50 lb. per acre of ammonium sulphate a month after transplanting.

Previous crop—Groundnut.
Date of sowing in nursery—12th June 1951.
Date of transplanting—23rd July 1951.
Dates of flowering—
1st November 1951—Cl. No. 9990 and 9952.
2nd November 1951—Cl. No. 10235.
3rd November 1951—Rest of the cultures and strains.
Date of harvest—7th December 1951.

The yields recorded by the different varieties are tabulated below :—

TABLE XI.—Statement of yields.

Particulars.	MTU. 19.	SLO. 17.	SLO. 18.	CR. 10232.	CR. 10231.	CR. 10235
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Yield in lb. per acre	1,647	1,450	1,856	1,362	1,236	1,637
Percentage over control	83.63	78.11	100.00	73.40	68.19	88.12
Percentage over general mean ..	100.90	88.88	113.80	83.52	77.59	100.3

Particulars.	CR. 9952.	CR. 9990.	General mean.	Standard error.	'Z' test.
(8)	(9)	(10)	(11)	(12)	
Yield in lb. per acre	2,016	1,819	1,623	..	..
Percentage over control	108.60	97.97	112.30	..	..
Percentage over general mean ..	123.60	111.50	100.00	15.72	No.

(b) Series II.—In the second of the series five cultures were compared for yield against MTU. 19, SLO. 17 and SLO. 18 of the five cultures under study. Culture No. 10271 is a cross between MTU. 19 and SLO. 18 and the rest between MTU. 19 and SLO. 17. Very heavy infestation of stem-borer was observed in all the strains without exception as a result of which the yields were vitiated. MTU. 19 was outstanding in tillering and growth. 'Z' test not satisfied. The following are the details of layout of the experiment :—

Field number—20 b.
Area—0.33 acre.
Size of plot—10 × 50 square links (0.5 cent).
System of layout—8 × 4 randomized block arrangement.
Spacing—One link either way.
Varieties—MTU. 19, SLO. 17, SLO. 18. Culture Nos. 9942, 10255, 10247, 10243, 10271.
Manures—Basal dressing 3,000 lb. per acre of green leaf plus 100 lb. per acre of superphosphate at puddling and 50 lb. sulphate of ammonia per acre a month after planting.

Previous crop—Sesbania.
Date of sowing in nurseries—12th June 1951.
Date of transplanting—24th July 1951
Dates of flowering—
2nd November 1951—Culture No. 9942.
4th November 1951—SLO. 18.
3rd November 1951—The rest of the varieties.
Date of harvest—7th December 1951.

TABLE XII.—Statement of yield.

Particulars.	MTU. 19.	SLO. 17.	SLO. 18.	CR. 10255.	CR. 10247.	CR. 10243
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Yield in lb. per acre	1,294	1,250	1,587	1,259	1,156	1,066
Percentage over control	102.1	100.0	109.5	100.8	92.26	85.27
Percentage over general mean ..	100.15	98.03	124.6	98.77	90.42	83.58

Particulars.	CR. 10271.	CR. 9942.	General mean.	Standard error.	'Z' test.
(8)	(9)	(10)	(11)	(12)	
Yield in lb. per acre	1,159	1,437	1,278	..	..
Percentage over control	92.76	114.9	80.39	..	..
Percentage over general mean ..	90.93	112.70	100.00	10.96	No.

Conclusions—'Z' test not satisfied.

23. Utilization of Godavari water to the best advantage.—These trials were first started during 1946-47 under the caption "Intensive cropping trials" with the object of successfully raising two crops in the main crop season in the single crop wet lands and three crops in the double crop wet lands to step up food production. During the first two years of trial it was observed that—

(i) a long duration paddy in the Sarwa season followed by a pulse crop is more profitable than two crops of paddy, viz., a short duration transplanted and a medium duration broadcasted crop of paddy, and

(ii) a long duration paddy alone in the Sarwa season did best from the standpoint of monetary results as well as from the view-point of the quantity of grain produced per acre instead of two crops grown in the Sarwa season.

Based on the experience gained from the trials conducted during the past twenty-five years and from the results obtained during the last two years, more extensive trials were taken up during 1950-51 under the caption "Utilization of Godavari water to the best advantage." This was the second year of trial. The findings in the several experiments under trial are described in detail in the following paragraphs :—

From the experience gained from the previous year's trials an experiment was laid out with (1) a short duration paddy during the main crop season followed by (2) a medium to long-duration paddy in the intermediate crop season and finally (3) a short duration paddy in the second-crop season. In order to advance the planting of the intermediate season varieties, a short duration Dalwa paddy was grown in the main-crop season. The nursery was sown on 25th May 1951 and the crop was transplanted on 18th June 1951. The manuring of the transplanted crop consisted of the basal dressing of 4,000 lb. of green leaf per acre plus 50 lb. per acre of superphosphate at puddling time and 50 lb. of sulphate of ammonia three weeks after planting. The crop was ready for harvest by 24th September 1951 and recorded an acre yield of 2,400 lb. of grain.

Following, Iswarikora was planted (on 4th October 1951) after the field was puddled twice. The nursery for this was sown earlier, i.e., on 29th August 1951. The plot was heavily manured with 4,000 lb. per acre of green leaf in the form of Sesbania plus 20 cart-loads of farmyard manure per acre at puddling and 300 lb. of groundnut cake per acre a month after planting. The crop also received a dressing of 50 lb. sulphate of ammonia per acre during the last fortnight of November. The crop was harvested during the third week of February and it recorded an acre yield of 1,850 lb. of grain. The performance of Iswarikora was quite noteworthy. Immediately after the planting, there was a sudden fall in general atmospheric temperature and the establishment of all the varieties except Iswarikora was very bad. Again there was a very heavy infestation of stem-borer which persisted right throughout the intermediate season. Under these adverse conditions of crop growth Iswarikora alone withstood and the results are very encouraging.

The third crop was planted towards the end of February, after the harvest of the intermediate crop of Iswarikora. The plot received manure consisting of 2,000 lb. of green manure plus 50 lb. of superphosphate per acre and sulphate of ammonia to cover 50 lb. per acre three weeks after planting. The popular second crop (third crop) strains SLO. 16, NX. 60 and a few single plant selections from Nallarlur were grown in single plots. Good initial vigour was noticed in all the varieties in spite of the heavy stem-borer attack. But the fields could not be irrigated from the second week of March on account of the unexpected cut in the supply of water in the Godavari canal. The soils cracked badly. The third crop was therefore a complete failure. The crop had to be cut and fed to cattle.

During the intermediate season, in addition to Iswarikora, the performance of certain promising strains of other stations was separately studied, with a view to find out a suitable strain which comes up well in the intermediate season resisting the stem-borer attack. The strains PLR. 1, ASD. 5, Co. 2, Co. 15, Co. 25, Co. 26, PTB. 15 and PTB. 16 were compared in a regular yield trial. The details of layout and yields are furnished hereunder :—

Field number—4 cde.
Area—0.65 acre.
Size of plot—30 × 15 square links. (0.45 cent).
System of layout—9 × 6 randomized block.
Spacing—Bulk planting.
Varieties—PLR. 1, ASD. 5, Co. 2, Co. 15, Co. 25, Co. 26, PTB. 15, PTB. 16 and Iswarikora.
Manures—4,000 lb. of green leaf per acre plus 20 cart-loads or farmyard manure at puddling and 300 lb. of groundnut cake per acre one month after planting.
Previous crop—Paddy.
Date of sowing in nurseries—29th August 1951.
Date of transplanting—2nd October 1951.

Dates of flowering—
15th December 1951—PTB. 16, 20th December 1951—Co. 26.
24th December 1951—ASD. 5.
25th December 1951—PLR. 1.
27th December 1951—PTB. 16.
29th December 1951—Iswarikora.
1st January 1952—Co. 2.
8th January 1952—Co. 25.
8th January 1952—Co. 15.
Dates of harvest—
2nd March 1952—PLR. 1, ASD. 5, Co. 2, Iswarikora.
3rd March 1952—Co. 25, PTB. 15, PTB. 16.
15th March 1952—Co. 15, Co. 26.

TABLE XIII.—Statement of yields.

Particulars.	PLR. 1.	ASD. 5.	Iswarikorra.	Co. 2.	Co. 15.	Co. 25.	Co. 26.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Yield in lb. per acre ..	1,659	1,861	1,861	1,260	1,625	1,555	1,514
Percentage over control ..	89.2	100.0	100.0	67.7	87.3	83.5	81.3
Percentage over general mean.	110.86	123.49	123.49	83.61	107.83	103.18	100.46

Particulars.	PTB. 15.	PTB. 16.	General mean.	Standard error.	'Z' test.	Critical difference, (P = 0.05).
(9)	(10)	(11)	(12)	(13)	(14)	
Yield in lb. per acre ..	1,225	778	1,507	..	Yes.	123
Percentage over control ..	65.8	41.8	80.98	..	..	..
Percentage over general mean.	81.29	57.62	100.00	0.088	Yes.	26.55

Conclusions—Iswarikora; ASD. 5; PLR. 1; Co. 15; Co. 25; Co. 26; Co. 2; PTB. 15; PTB. 16.

The stand of the crop in all the varieties except Iswarikora was very poor. There was an outbreak of stem-borer with the onset of the easterly winds in November. The crop suffered badly and gave a withered appearance. The top dressing, as a special case, 50 lb. per acre of sulphate of ammonia did not improve the stand of the varieties except in Iswarikora and ASD. 5. The flowering was irregular and prolonged over a considerable period. As such the harvest of the varieties had to be taken up long after flowering. The varieties Co. 15 and Co. 26 were longer in duration by about ten days than the rest and were harvested during the middle of March. From the yields recorded by the varieties under comparison, Iswarikora was observed to be consistently recording higher yields during all the years of trial.

From the above data it was noticed that Iswarikora alone withstood the adverse effects of fall in the temperatures and infestation of stem-borer. But Iswarikora had the disadvantage of dirty colour and coarseness of the grain with red rice. To overcome these defects, crosses were effected between Iswarikora and Sannavadlu at the Agricultural Research Station, Buchireddipalem. Thirty-two cultures from the crosses mentioned above received during November were sown immediately in nurseries. They were transplanted in the first week of December.

The performance of the cross progenies was good. All the cultures were observed to be resistant to stem-borer attack. There was good initial vigour in growth. Tillering was profuse. But the cultures were noticed to be splitting badly. The flowering was also irregular and erratic. They have to be further purified, and this work will be taken up in the next cropping season. Some of the cultures were found to be earlier in duration as well as high yielding than Iswarikora, the standard. The cultures 1717 and 1724 recorded the highest yield of 4,799 lb. of grain followed by culture 1711 with 4,464 lb. of grain per acre. Fairly high yields were recorded by all the cultures under trial except culture 1710. The yields recorded by the different cultures under observation are tabulated below.

The harvest of the crop was completed by the third week of April. The second crop paddy could not therefore be cultivated in this block. The cultivation of these cultures will be taken up earlier during the next season, so that it may be possible to grow the second crop of paddy from February to May.

TABLE XIV.—Statement of yields.

Culture number.	Date of flowering.	Date of harvest.	Yield in lb. per acre.
(1)	(2)	(3)	(4)
1678	28th February 1952.	9th April 1952.	3,069
1711	29th February 1952.	Do.	4,464
1720	Do.	Do.	4,252
1722	Do.	Do.	3,739

Culture number.	Date of flowering.	Date of harvest.	Yield in lb. per acre.
(1)	(2)	(3)	(4)
1723	1st March 1952.	9th April 1952.	4,113
1724	Do.	Do.	4,799
Iswarikora	2nd March 1952.	Do.	3,627
1716	3rd March 1952.	Do.	4,018
1717	Do.	Do.	4,799
1715	5th March 1952.	Do.	3,571
1714	6th March 1952.	21st April 1952.	3,242
1727	Do.	14th April 1952.	3,290
1728	Do.	Do.	3,627
1708	7th March 1952.	21st April 1952.	3,069
1713	10th March 1952.	Do.	4,231
1021	12th March 1952.	Do.	3,692
1709	13th March 1952.	Do.	3,902
1707	14th March 1952.	Do.	5,236
1676	15th March 1952.	Do.	3,800
1697	21st March 1952.	Do.	3,013

24. Co-ordinated crop weather study.—A detailed report of work done in this connexion during the year under report is appended.

25. Paddy—Immediate second crop.—The cultivation of paddy during the second-crop season in the tail end region of the Godavari Eastern Delta is attended with several problems. Very often the crop suffers from the scarcity of water during the flowering and grain setting stages. Also the earliness in maturity is associated with low yield. As all the areas growing the second crop paddy do not grow a pulse or a sunnhemp crop, there it is considered that an advancement in the time of planting of the early second crop paddy, might solve many problems especially that of uncertain water-supply towards the later stages of crop growth, and incidentally that of fixing up a suitable strain that can be resistant to the adverse effects of 'Turupu Gali' and the resulting heavy infestation of stem-borer.

Accordingly seven strains, viz., MTU. 9, MTU. 15, MTU. 20, SLO. 12, Red Kesari, Co. 20 and Co. 23, were kept under observation in single plots. This was the third year of such intensive study. The crop was planted after the harvest of the medium duration paddy. Except MTU. 20 all the varieties were found to be resistant to stem-borer. SLO. 12 was the highest yielder among the lots and recorded an acre yield of 2,313 lb. of grain followed by MTU. 9 and Co. 23 with 2,277 and 2,210 lb. of grain respectively per acre.

Separately six second-crop strains, viz. SLO. 12, MTU. 15, MTU. 20, GSV. 6863/1 and GSV. 6784/1 were compared for yield of grain and resistance to stem-borer in a regular randomized and replicated trial. This was the first year of trial. The particulars of layout are furnished below :—

Field number—6 cde.	Dates of flowering—
Area—0.76 acre	1st March 1952—SLO. 12.
Size of plot—10 × 20 sq. links.	3rd March 1952—MTU. 15.
System of layout—6 × 6 randomized block.	6th March 1952—GSV. 6784/1.
Spacing—Four inches either way.	8th March 1952—MTU. 9.
Varieties—SLO. 12, MTU. 9, MTU. 15, MTU. 20,	10th March 1952—GSV. 6863/1.
GSV. 6863/1 and GSV. 6784/1.	27th March 1952—MTU. 20.
Manures—3,000 lb. of green leaf plus 100 lb. of super phosphate per acre at puddling and 50 lb. of sulphate of ammonia per acre a month after planting.	Dates of harvest—
Previous crop—Paddy.	10th April 1952—MTU. 9, SLO. 12.
Date of sowing in nursery—14th Nov 1951.	14th April 1952—MTU. 15, GSV. 6784/1, GSV. 6863/1.
Date of transplanting—27th December 1951.	29th April 1952—MTU. 20.

TABLE XV.—Statement of yields.

Particulars.	MTU. 9.	MTU. 15.	MTU. 20.	SLO. 12.	GSV. 6784/1.
(1)	(2)	(3)	(4)	(5)	(6)
Yield in lb. per acre	3,042	3,651	1,229	2,729	1,718
Percentage over general mean ..	131.23	157.51	53.02	117.73	74.12
Percentage over control	111.40	133.70	45.00	100.00	62.90

Particulars.	GSV. 6863/1.	General mean.	Standard error.	'Z' test satisfied or not.	Critical difference. (P = 0.05.)
(7)	(8)	(9)	(10)	(11)	
Yield in lb. per acre	1,531	2,831	..	Yes.	209
Percentage over general mean ..	66.05	100.00	4.298	..	..
Percentage over control	56.10	84.94	..	..	12.52

Conclusion—MTU. 15, MTU. 9, SLO. 12, GSV. 6784/1, GSV. 6863/1, MTU. 20.

The crop established well at the beginning. The two Garikasannavari cultures and MTU. 20 succumbed to the stem-borer attack and recorded very low yields. The remaining three strains were free from the pest and recorded high yields. MTU. 15 is the highest yielder with 3,651 lb. of grain per acre followed by MTU. 9 and SLO. 12 with 3,042 lb. and 2,729 lb. of grain respectively per acre.

26. *Paddy—Dalwa.*—(February-May) Second-crop paddy was cultivated on an area of 7.5 acres as against 5.38 acres of the previous year. An average acre yield of 560 lb. of grain per acre was recorded as against 2,065 lb. of grain per acre during the previous year. This very low yield was in main due to the unexpected failure of the supply of water in the Godavari irrigation canal, commencing from the second week of March.

The general manuring of the crop consisted in the application of a basal dressing of 2,000 lb. of green leaf and 50 lb. of superphosphate per acre at puddling and 50 lb. per acre of sulphate of ammonia three weeks after planting. The crop established well in the initial stages and put forth luxuriant growth. But on account of the continuous drought that prevailed right from the grand period of growth, up to the time of harvest, the growth, flowering and consequent yields were greatly affected. Every effort was made to provide irrigation. All the available water from the farm pond and the run off water from Yeleru drain running close by was pumped up by means of petrol and oil engine pump sets but it was possible to maintain slight moisture at the root zone in a few experimental plots. The rest of the bulk area dried up and hence cut and fed to cattle. Flowering was irregular, erratic and protracted over a considerable period in all the experimental area. Grain setting was affected and miserably low yields were recorded. The following are the yields recorded by the varieties grown on a bulk scale during the year :—

Variety.	Yield in lb. per acre.
NX. 60	392
SLO. 12	365
MTU. 15	1,130
SLO. 16	575
Nallarlu	500
MTU. 20	240

Though the second crop was virtually a failure, the results have indicated some interesting findings. MTU. 15 was able to withstand the continuous drought period. Flowering was also comparatively more uniform than in the rest of the varieties, and fairly good yields were recorded in this strain alone, thus indicating its suitability in the tail end areas with uncertain supply of irrigation water.

27. *Seed multiplication.*—The popular and promising second crop paddy varieties were multiplied on an area of 4.67 acres for the supply of seed to the districts and for maintaining the nucleus seed material for the farm sowings during the next season.

28. *Observation types and study material.*—Several cultures and strains, mostly those received from other stations in the Madras State were kept under observation for drought resistance, earliness and yield. The primary consideration in growing these types is to spot out an early maturing high yielding type that escapes the drought period during the flowering and grain setting stages.

The study material included the several single plant selections from Nallarlu and ten cross progenies of Nallarlu and MTU. 20. These were grown in single plots. The crosses Nos. 1850, 1853, 1927, 1932, 1948 and 1949 were earlier in flowering than the rest of the material under comparison. Despite the adverse conditions for crop growth, No. 1850 recorded the highest yield of 875 lb. of grain per acre followed by No. 1932 with an acre yield of 750 lb. of grain. The study of this material will be pursued.

Among the eight short duration cultures received from the Paddy Breeding Station, Coimbatore, culture Nos. 3060, 3064, 3066 and 3070 were observed to be earlier in duration than the rest by ten days. The flowering in all the cultures was vitiated on account of the continued drought period.

29. *Experiments.*—These were grouped into (1) varietal, (2) cultural and (3) manurial. The particulars of experiments conducted under the various items are described in detail in the following pages :—

Varietal—(a) Comparative yield trial of fine varieties.—The trial was continued during the year under report with only three strains SLO. 16, NX. 60 and NX. 60 with the reduced awns, with a view to fix up a fine grained high yielding paddy for the tract during the second crop season. Eight out of the ten strains under comparison during the last year were discarded and the strain NX. 60 with the reduced awns was added on to the two remaining strains under comparison.

NX. 60 was more vigorous in growth than the rest. NX. 60 with the reduced awns was later in duration than NX. 60 by about a week. The particulars of layout are recorded below :—

Field number—8 b.
Area—0.45 acre.
Size of plot—10 × 20 square feet.
System of layout—3 × 6 randomized blocks.
Spacing—Six inches either way.
Varieties—NX. 60, NX. 60 with the reduced awns and SLO. 16.
Manures—2,000 lb. of green leaf plus 50 lb. of super phosphate per acre at puddling and 50 lb. of sulphate of ammonia three weeks after planting.

Previous crop—Paddy.
Date of sowing in nursery—29th January 1952.
Date of planting—19th February 1952.
Dates of flowering—
16th April 1952—SLO. 16.
18th April 1952—NX. 60.
26th April 1952—NX. with reduced awns.
Date of harvest—16th May 1952—All varieties.

TABLE XVI.—Statement of yields.

Particulars.	NX. 60.	SLO. 16.	NX. 60 with reduced awns.	General Mean.	Standard error.	'Z' test satisfied or not.	Critical difference P = 0.05
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Yield in lb. per acre ..	1,371	1,193	785	1,116	..	..	424
Percentage on control ..	115.0	100.0	65.00	83.55	..	..	..
Percentage on general mean ..	123.0	107.0	100.00	100.00	7.3	Yes	23.36

Conclusions—
NX. 60, SLO. 16, NX. 60 with reduced awns.

(b) *Yield trial of Nallarlu series.*—Four single plant selections from Nallarlu were compared for yield with NX. 60 and Nallarlu for the second year. The stand and establishment of the crop in all the varieties were good. The growth of NX. 60 in all the plots was outstanding with good growth and light green foliage. This culture was the earliest to flower followed by Nallarlu, and

recorded the highest yield of 1,393 lb. of grain per acre. The details of layout of the experiment are furnished below :—

Field number—7 b.
Area—0.50 acre.
Size of plot—10 × 20 square feet.
System of layout—6 × 6 randomized blocks.
Spacing—six inches either way.
Varieties—Nx 60; Nallariu; SPS. 60; SPS. 61; SPS 65 and SPS. 70.
Manures—2,000 lb. of green manure plus 100 lb. superphosphate per acre at puddling and 50 lb. per acre of ammonium sulphate three weeks after planting.
Previous crop—Paddy.
Date of sowing in nurseries—29th January 1952.
Date of transplanting—19th February 1952.

TABLE XVII.—Statement of yields.

Particulars.	Nx. 60.	Nallariu.	SPS. 60.	SPS. 61.	SPS. 65.	SPS. 70.	General mean.	'Z' test satisfied or not.	Standard error.
Yield in lb. per acre	1,393	1,234	901	901	864	1,111	1,076	..	..
Percentage over control	108.5	100.0	70.2	70.2	67.3	88.2	84.1	..	..
Percentage over general mean.	129.0	119.0	83.4	83.4	80.0	104.8	100.0	No	20.48

(c) *Yield trial of long duration varieties.*—The three second crop paddy strains of Maruteru, viz., MTU. 9, MTU. 15 and MTU. 20 were compared for yield and duration with SLO. 12. As the long duration varieties were a common failure due to the uncertainty in the supply of water at the peak period of growth and flowering, it was sought to study the performance of these varieties in response to conditions of uncertain supply of water during the final stages of crop growth. This was the second year of trial conducted on the same lines as in the previous year but eliminating the three Garikasannavari culture Nos. 6863/1, 6811/2 and 6784/1 on account of the low yields they have recorded during the previous year.

The crop has established well. The growth and stand in all the varieties were promising at the beginning but the continued drought from the mid-week of March, adversely affected crop growth. The crop could not be saved in spite of baling out water from the farm pond and the Yeleru drain. The soils cracked badly and the trial was a complete failure.

(d) *Comparative yield trial of the popular second crop strains.*—The performance of the three popular strains of SLO. 12, MTU. 9 and MTU. 15 was varying in the different localities. In order to find out the exact duration and the yielding capacities of the strains under similar conditions, these three strains were compared for yield for the second year in continuation. The details of layout are as follows :—

Field number—11 b.
Area—0.67 acre.
Size of plot—10 × 30 square links (0.3 cent.)
System of layout—3 × 8 randomized block.
Spacing—Six inches either way.
Varieties—MTU. 9; MTU. 15 and SLO. 12.
Manures—Green leaf to supply 2,000 lbs. per acre plus superphosphate to cover 100 lb. per acre at puddling.
Previous crop—Paddy.
Date of sowing in nursery—11th January 1952.
Date of transplanting—13th February 1952.
Dates of flowering—
10th April 1952 MTU. 9.
12th April 1952 MTU. 15.
15th April 1952 SLO. 12.
Date of harvest—
20th May 1952 MTU. 9 and 15.
31st May 1952 SLO. 12.

As in the previous year it was observed that MTU. 9 was the earliest to flower closely followed by MTU. 15. SLO. 12 was later in flowering by eight days than MTU. 9. There was a difference of two days in flowering of the varieties MTU. 9 and MTU. 15. But in spite of the extreme drought conditions that existed during the year, the flowering of MTU 15 was more uniform and the flowering was completed earlier than that of MTU. 9.

MTU. 15 recorded the highest yield closely followed by MTU. 9 and SLO. 12.

30. *Cultural—Comparative study of the performance of the seedlings raised from dry and wet nurseries.*—The performance of the seedlings of MTU. 15 and SLO. 12 raised in nurseries under dry and wet conditions was compared for the second year in succession. It was observed that the seedlings raised from the dry nursery established quicker and exhibited more initial vigour in growth, whereas the yields recorded by the strains, the seedlings of which are raised from wet nursery, were higher but the differences in the yields were not statistically significant. Though the yields are erratic, it was noticed that the wet nursery seedlings are preferable

to secure good performance and yields. Flowering was earlier in the case of seedlings raised in wet nurseries. The details of layout are given below :—

Field number—11-b.
Area—0.45 acre.
Size of plot—10 × 50 sq. links (0.5 cents).
System of layout—4 × 3 randomized block.
Spacing—Four inches either way.
Varieties—MTU. 15; SLO. 12.
Treatments—Seedlings from wet nursery and seedlings from dry nursery.
Manures—Green leaf to supply 2,000 lb. per acre as basal dressing plus 50 lb. of superphosphate and 50 lb. of sulphate of ammonia three weeks after planting.
Date of sowing in nursery—11th January 1952.
Date of transplanting—13th February 1952.
Date of flowering—
12th April 1952 MTU. 15 wet nursery.
14th April 1952 MTU. 15 dry nursery.
15th April 1952 SLO. 12 wet nursery.
18th April 1952 SLO. 12 dry nursery.
Date of harvest—
20th May 1952 MTU. 15 wet and dry nursery.
30th May 1952 SLO. 12 do.

31. *Manurial.*—To examine the relative effects of application of phosphates to the paddy crop through the preceding green manure crop and of direct application to paddy crop, an experiment was designed with the following treatments and the trial was started for the first time during the second-crop season with SLO. 12 as the variety :—

The treatments were—

- No manure.
- Green manure to be grown in situ without phosphates.
- Super to supply 30 lb. P₂O₅ per acre to the green manure crop before it is sown.
- Green manure to be grown without super but the succeeding paddy crop is to receive super to supply 30 lb. P₂O₅ per acre.
- Superphosphate to supply 45 lb. P₂O₅ to the green manure crop before sowing.
- Green manure to be grown without phosphates but paddy to receive before planting super to supply 45 lb. P₂O₅ per acre.
- Super to supply 60 lb. P₂O₅ per acre to the green manure crop before sowing.
- Green manure to be grown without super but paddy to receive before planting super to supply 60 lb. P₂O₅ per acre.

Dhaincha was grown as green manure. The crop was raised late as the necessary directions for the conduct of trial were received late in the season. The crop was stunted in growth and the young seedlings had to be incorporated into the plots.

The following are particulars of plan and layout :—

Field number—12-b.
Area—0.75 acre.
Size of plot—25 × 80 sq. links (2.0 cents).
System of layout—8 × 4 randomized and replicated block.
Spacing—One link either way.
Varieties—SLO. 12.
Treatments—As stated in the earlier paragraph.
Manures—Green manure grown in situ plus super as stated in the earlier paragraph. Dhaincha was grown as green manure on 6th December 1951. Super was applied to the green manure crop on 5th December 1951. Super was applied to paddy on 21st February 1952.
Previous crop—Paddy.
Date of sowing in nurseries—20th January 1952.
Date of transplanting—22nd February 1952.

The crop suffered from acute water shortage from the second week of March right up to the stage of harvest. The crop was stunted, withered and dried up and as such cut and fed to cattle.

32. *Study of incidence of pests on paddy.*—In order to investigate the effect of the insecticides, D.D.T. and B.H.C. on the control of the stem borer, mealy bug and silver shoot on paddy, a series of experiments were drawn up by the Government Entomologist in consultation with the Paddy Specialist. The trials were commenced during the second-crop season.

The seedlings in the nursery area were sprayed with the insecticides in the different concentrations and compared with the plot in which the seedlings were not sprayed with the insecticides. The strength of the solutions of the insecticides adopted were different in the different experiments which are narrated below in detail.

33. *Study of the effect of spraying insecticides against stem borer and mealy bug on paddy.*—Solutions of two strengths of insecticides were sprayed on the seedlings in the nursery and their effect on the resistance to stem borer and mealy bug was studied. The solutions were—

- (a) D.D.T., 0.1 per cent and 0.05 per cent.
- (b) B.H.C., 0.1 per cent and 0.2 per cent.

As for the study of incidence of mealy bug, it was intended to spray the chemicals as soon as the infestation was noticed. There was no infestation. The crop established well with the steady blowing of the 'Pyrugali' (southerly winds) but succumbed to the drought. The crop was dried up and hence cut and fed to cattle.

34. *Study of the effect of spraying of insecticides against 'Silver shoot' on paddy.*—It was intended to dust the seedlings of SLO. 12 paddy with B.H.C and D.D.T. of different concentrations as soon as infestation is noticed. The treatments were—

- (a) D.D.T., 5 per cent and 10 per cent.
- (b) B.H.C., 5 per cent and 10 per cent.
- (c) No treatment.

As no infestation of silver shoot was noticed, dusting was not done. Before any infestation was noticed, the crop succumbed to the severe drought that prevailed from the second week of March 1952.

These trials will be taken up during the coming intermediate season when these pests will be very active.

35. *Co-ordinated crop weather study.*—A detailed report of work done in this connexion is furnished in Appendix No. 1.

B. Sugarcane.

36. Sugarcane was grown on an area of 1.13 acres as against 0.89 acre of the previous year. A detailed report of work done in connexion with the Co-ordinated Crop Weather Study on sugarcane is furnished in Appendix No. 1.

C. Bananas.

37. Banana was grown on an area of 1.59 acres, comprising 0.44 acre of ratoon and the rest of the area under plant crop in both the Tholakari and Seethakattu seasons during the year as against 0.79 acre of the previous year. The cultivation was mainly restricted to the maintenance of varieties and for the supply of suckers to the interested banana growers. An area of 0.44 acre was under the nightsoil compost experiment, the particulars of which are described below in detail. The standing crop was affected by the cyclonic weather in July and November and the crop was damaged at a stage when it had thrown out tender bunches.

38. *Nightsoil compost experiment.*—The experiment was first started during 1949 to study the effect of nightsoil compost on the yield and size of the bunches in banana as compared to farmyard manure on equal nitrogen basis. This was the third year of trial. During the first year of trial, the results were vitiated by the cyclonic weather during October 1949. The experiment was repeated for the second time during the years 1951-52. The harvest of the crop was continued beyond November 1951 by which date the discontinuance of the trials was ordered with a view to commence afresh these manurial experiments on a more comprehensive and co-ordinated basis.

Though the harvest was not completed before the actual discontinuance of the experiment, the data recorded will be of interest to note. The following are the details of layout of the trial under report:—

Field number—8ab.
Area—0.44 acre.
Size of plot—30 x 70 links. (0.21 cents)
System of layout—3 x 6 randomized blocks.
Spacing—Ten links either way.
Varieties—Karpurachekrakelli.
Treatments—
No manure.

Nightsoil compost at 16,000 lb. per acre ten days after planting and a second dose of 29,000 lb. per acre seven months after planting.
Farmyard manure at 16,000 lb. per acre ten days after planting and a second dose of 29,000 lb. per acre six months after planting.
Previous crop—Paddy nursery.
Date of planting—25th February 1950.

The growth of the crop was satisfactory throughout. From the growth measurements recorded, it was noted that there was no appreciable difference in growth of the crop in the different treatments.

Flowering was earlier in the farmyard manure treated plot by about ten days. The first flowering was noticed during the last week of October. Flowering was still more delayed in the plot with no manure treatment. The harvest of the bunches commenced from the second fortnight of February. The yields were adversely affected due to heavy gales in April, July and November in spite of the crop being properly propped. The data recorded in respect of growth, flowering and yield in the different treatments are furnished below:—

TABLE XVIII.—Statement of data recorded.

Particulars.	Treatments.		
	No-manure.	Farm yard manure.	Night soil compost.
Average number of leaves ..	20.13	19.9	20.0
Average height of plant ..	5'-10"	6'-10"	5'-8"
Percentage of flowering on—			
31st December 1950 ..	10.3	42.8	27.8
15th February 1951 ..	21.4	56.3	41.8
28th February 1951 ..	35.0	73.8	56.3
30th November 1951 ..	81.7	100.0	77.7
Number of bunches harvested ..	83	116	83
Average weight of bunches ..	17.2	22.2	19.1
Total yield in lb. ..	1,433	2,573	1,586

From the above it may be noted that (1) the flowering was earlier in the plot treated with farm yard manure and this also reflected in the early maturity and harvest of the bunches. Out of the 126 plants in each of the treatments, 124 ripe bunches were harvested in the farm yard manure treatment by 30th November 1951 while in the nightsoil compost and no manure treated plots only 93 and 97 bunches respectively were harvested and (2) the average weight of the bunches in the farmyard manure treated plot was the highest followed by the nightsoil compost and no-manure treated plots.

D. Pulses.

39. The work on pulses comprised of trials of (1) five greengram cultures in a regular randomized experiment and (2) thirty-six blackgram cultures compared in a lattice design.

Due to the receipt of a heavy down pour of rain immediately after sowing, the germination was affected. Filling up of gaps in the plots was done a month later but the crop did not germinate. The failure of the crop to germinate was also due to the non-prevalence of southerly winds or 'Pyrugali' which is supposed to be congenial to the growth of the pulses. As such it was not possible to collect even a few pods to maintain the nucleus seed material for further studies.

Seeds of perennial mung received from the Pulses Specialist, Coimbatore, were sown on the Yeleru high bund in August. The growth of the plants was fair. The plants commenced flowering in November. There was a heavy infestation of plant lice in November. The pods were damaged by monkeys.

E. Wheat.

40. Previous experience in the cultivation of wheat on the station suggested the possibility of growing this crop in the rice fallows after the harvest of the paddy crop in November. Encouraged from the results obtained during the previous years, eight cultures from New Pusa, two received from the Director, Tobacco Research Institute, Rajahmundry, two from the Head of Department of Agriculture, Hyderabad, and the glumed wheat of Bellary were grown in single plots in two batches at an interval of nearly 1½ months. The first sowing was done during the first week of November. All the varieties were sown broadcast. The following are the cultures grown:—

NP. 4; NP. 52; NP. 111; NP. 710; NP. 718;	} New Pusa.
NP. 745; NP. 761; NP. 771	
P.W. 5; P.W. 12	Hyderabad.
Jaya; Niphad-4	Tobacco Research Institute, Rajahmundry.

Glumed Wheat of Bellary.

The germination of the crop sown during the first week of November was sparse compared to that of the second batch of sowings during the third week of December. The two varieties received from Hyderabad were extremely susceptible to rust and they were badly infested in both the series. The glumed wheat of Bellary was the highest yielder with 578 lb. and 508 lb. of grain per acre, respectively, in both the series. The rest of the cultures recorded very low yields. The following are the yields recorded by the cultures in the different sowings:—

TABLE XIX.—Statement of yields in wheat varieties.

Culture number.	Yield in lb. per acre.	
	I Batch (7th November 1951).	II Batch (28th December 1951).
(1)	(2)	(3)
NP. 4	41	347
NP. 111	28	88
NP. 710	55	222
NP. 718	69	97
NP. 745	41	277
NP. 761	13	388
NP. 771	13	222
Bellary glumed wheat	578	506
NP. 52	..	97
PW. 5	..	138
PW. 12	..	111

(a) *Seasonal sowings.*—In order to find out the optimum time for the sowing of wheat, in the tract, periodical sowings were taken up at intervals of 20 to 25 days. Being the highest yielder, the glumed wheat of Bellary was selected for comparison. The plots received a top dressing of 50 lb. of sulphate of ammonia per acre, a month after sowing.

The germination of the crop in the second batch of sowings was very poor and recorded the lowest yield. November sown crop was the best. The trial will be continued during the next year.

Date of sowing.	Yield in lb. per acre.
I Batch 11th Nov. 1951.	231
II Batch 1st Dec. 1951.	138
III Batch 27th Dec. 1951.	213

(b) *Broadcasting v. Transplanting.*—Generally the crop is sown broadcast. To find out whether it will be possible to successfully raise a crop of wheat in this tract by transplanting, the trial was taken up. The transplanting of the crop could be done very late in January and hence the growth of the crop was stunted. In spite of the top dressing of sulphate of ammonia at 100 lb. and super at 50 lb. per acre, the crop presented a stunted growth. November and December were considered to be the optimum periods for the cultivation of this crop. An acre yield of 650 lb. of grain was obtained from the broadcasted field while the transplanted plot recorded a very low yield of 40 lb. of grain per acre. The trial will be pursued next year.

F. Oil seeds.

41. Gingelly and groundnut were the two crops grown on the station during the year.

(a) *Gingelly.*—The two strains, TMV. 1 and TMV. 3 of Tindivanam were compared for yield with the local variety in single plots during the Pyru season (January-April). The plot was given three ploughings and farmyard manure to supply 10 tons per acre was applied. The varieties were sown broadcast on the 25th January 1952. The germination was good in all the three plots. The strain TMV. 3 recorded the highest yield of 223 lb. per acre over the rest. The following are the particulars of yields recorded:—

Strain.	Yield in lb. per acre.
TMV. 3	223
TMV. 1	155
Local	145

(b) *Groundnut.*—Next to wheat, this crop received the priority of cultivation in the rice fallows after the harvest of the first crop paddy. TMV. 2 was grown on a bulk scale in an area of 2.5 acres for seed production. A seed rate of 200 lb. of shelled seed per acre was adopted. The germination was satisfactory but the crop could not be irrigated at flowering period. As such pod development was very much affected and low yields were recorded. An acre yield of 416 lb. of pods was recorded. To explore the possibilities of successfully raising a crop of groundnut trials were taken up on the station. TMV. 2, the bunch variety of groundnut was obtained from Tindivanam. The conduct of the experiment in the different aspects of cultivation is described below.

(c) *Periodical sowings.*—To fix up the optimum time of sowing this crop, fortnightly sowings were taken up commencing from the last fortnight of December and ending with the first fortnight of February. A seed rate of 160 lb. per acre was adopted. The germination in all the sowings was sparse. The crop was damaged by monkeys in the later stages. The crop was a failure.

(d) *Seed rate trials.*—To find out the optimum seed rate for groundnut for the tract, a trial was taken up with seed rate of 75 lb., 100 lb., 150 lb., 200 lb. and 250 lb. of shelled seed per acre in single plots. The crop was sown broadcast during the first fortnight of January. The germination was sparse in all the treatments. The crop suffered badly due to want of sufficient irrigations and finally the crop was damaged by monkeys. The crop was in flower a month after sowing. Towards the later stages, the crop could not be irrigated owing to the premature cut off of water-supply from Godavari irrigation canal. The soils became very hard and cracked badly and the pod development was very poor. The trial was therefore a failure.

G. Cotton.

42. At the instance of the Cotton Specialist, the cultivation of several types of cotton taken up to find out the suitability of raising a successful crop of cotton in the rice fallows after the harvest of main crop paddy in November-December.

Side by side, a series of experiments were also started to fix up the proper time for sowing this crop and the optimum dose of manures to be applied. The conduct of the several experiments are described in detail in the following paragraphs:—

(a) *Varietal study.*—Six strains, Madras Uganda-1, 7682 (Madras Uganda-2), Coker, Sealand, Kampala and Busoga reputed to be early in duration were kept under observation against P. 216-F, the standard. The crop was sown at a distance of 6 inches along rows 2 feet apart. The seeds were dibbled in the paddy stubbles after the harvest of the paddy crop. Dibbling was done on 20th November 1951.

The germination in all the varieties was not up to the mark. Germination was comparatively good in Sealand followed by Kampala and Madras Uganda-2.

The progress of the crop up to the second week of March was good. The crop suffered afterwards on account of the scarcity of water for irrigation. The varieties P. 216-F, Coker and Sealand presented an almost withered appearance by the last week of April.

The crop received a dressing of sulphate of ammonia to supply 40 lb. of nitrogen per acre in two equal doses. The first dose was applied two months after sowing and the second dose at the commencement of flowering.

Sealand was the earliest to flower. Flowering was noted very late in Madras Uganda-1 and Madras Uganda-2. All the varieties were ready for the first picking of kapas by the end of April, i.e., five months after sowing. Nine pickings were done in all. Madras Uganda-1 recorded the highest yield of 653 lb. of kapas per acre followed by the standard P. 216-F. The data recorded in the different varieties are recorded below:—

TABLE XX—Statement of data recorded.

Varieties.	Date of sowing.	Date of flowering.	Date of boll dehiscence.	Yield of kapas in lb. per acre.
Madras Uganda-1	20 Nov. 1952.	19 Feb. 1952.	14 Apr. 1952.	653
Madras Uganda-2 or No. 7682	20 Nov. 1952.	28 Feb. 1952.	11 Apr. 1952.	520
Coker	20 Nov. 1952.	18 Feb. 1952.	20 Apr. 1952.	581
Sealand	20 Nov. 1952.	12 Feb. 1952.	5 Apr. 1952.	472
Kampala	20 Nov. 1952.	14 Feb. 1952.	8 Apr. 1952.	461
Busoga	20 Nov. 1952.	18 Feb. 1952.	16 Apr. 1952.	516
P. 216-F	20 Nov. 1952.	15 Feb. 1952.	7 Apr. 1952.	634

(b) *Types.*—Seventy promising cultures selected from sixteen varieties were sown in single plots in seven series with P. 216-F as standard. None of the cultures under comparison could compare favourably with the standard.

(c) *Experiments—Time of sowing cum manurial experiment on cotton.*—To find out the optimum time of sowing cotton in the rice fallows after the harvest of the paddy crop and to assess the response to manuring, an experiment was designed with P. 216-F as the variety. The particulars of layout of the experiment are given below:—

Field number—14.
Area—0.56 acre.
Size of plot—14' × 15'—6" (5.0 cents).
System of layout—2 × 4 × 4 split plot design.
Spacing—Two feet between rows and six inches along rows. Two seeds were dibbled per hole.
Variety.—P. 216-F.

Treatments—(a) Manure—2.
MO: No manure.
M-1: Sulphate of ammonia to supply 40 lb. of nitrogen per acre in two equal doses—first dose to be applied at the time of first irrigation and the second to be applied at the time of flowering.

(b) Treatments—4.
T-1 sown on 20th November 1951.
T-2 sown on 6th December 1951.
T-3 sown on 21st December 1951.
T-4 sown on 6th January 1952.

Previous crop.—Paddy.

The first sowing was done in the paddy stubbles soon after the harvest of the paddy crop of SLO. 13. The germination in this treatment was very poor. The

seeds in the second treatment were also sown in the paddy stubbles. The germination was affected in this treatment as well. The plots of the remaining two treatments were ploughed before sowing. The germination in these plots, though not satisfactory, was better than that of the first two treatments.

The plot under M-1 in all the four treatments were given the first dose of manure on 21st January 1952. The second dose of manure to the plot in T. 1 was given on 17th February, while the remaining three treatments received the manure on 16th March 1952. The plants in the manured plots appeared more impressive than those in the unmanured plots. There was no appreciable earliness of flowering of the no manure plot over the manured one.

The stand of the crop was good in the last-sown crop.

The crop was ready for the first picking by the end of April. In all nine pickings were done. From the yields recorded it would appear that crop sown in the paddy stubbles soon after the harvest of the paddy crop fared better than the crop in the rest of the treatments. Manuring has got conspicuous influence in increasing the yields up to 20 per cent over the no manure plot. But the crop suffered from the abundant weed growth in the plots thus involving high cost of cultivation. Experience shows that ploughing the land two or three times before sowing will reduce the cost of cultivation to the minimum.

The statement of yields recorded are given below:—

TABLE XXI.—Statement of yields.

Particulars.	Yield of kapas per acre in lb.
T. 1 MO	680
M-1	844
T. 2 MO	405
M-1	489
T. 3 MO	527
M-1	586
T. 4 MO	500
M-1	623

(d) *Experiment to study the residual effect on the succeeding paddy crop.*—The experiment was designed to study the after-effects of growing cotton on the succeeding paddy crop and the results are sought to be compared with the yields in plots raised with local green manure and fallow. The variety P. 216-F was grown in the plot intended for growing cotton. Pillipesara was raised in the plot intended for growing the local green manures.

The cotton seed was dibbled 6 inches along the rows 2 feet apart in paddy stubbles. The germination was very poor. The crop was manured, as usual, with sulphate of ammonia to supply 40 lb. of nitrogen in two equal doses.

The growth of the crop was impressive with rich green foliage. An acre yield of 556 lb. of kapas was realized from the plot.

Paddy will be cultivated in all the three plots mentioned above and the residual effect if any noticed.

43. *Perennial cottons.*—The study of perennial cottons was confined to Moco, Caramura and Quebrandinho. Moco and Quibrandinho were sown on 11th July 1950 out of which the second was removed subsequently. Growth and flowering were profuse in Moco. Out of the ten seeds of Moco sown only five plants survived and yielded 1 lb. 4 oz. of kapas in May 1951 and 1 lb. 5 oz. of kapas in January 1952. The plants suffered severe attack of leaf roller.

Fresh batch of Moco and Caramura seeds were sown on 31st August 1951 and 1st September 1951, respectively and 20 seedlings in each were transplanted on 25th October 1951 and 30th October 1951, respectively. Growth of the plants was fair in both the varieties and stray flowering was noticed in January 1952 but no pickings were obtained.

H. Vegetables.

44. With the receipt of Tholakari rains, the Indian vegetables comprising of brinjals, amaranthus, bendai, spinach, chukkakura, gogu, gourds, pumpkins, beans and cluster beans were grown for the supply of vegetables and for multiplication of seed in the next season. The vegetables comprising of amaranthus, spinach and chukkakura were grown on the Godavari high bund on either side of the road leading into the farm. Cluster beans, bendai and brinjals were grown on Yeleru high bund near the rest-house, whereas all the gourds and beans were raised along the Burrayya channel. The pumpkins were raised near the cattle-shed and the engine-shed. The school garden was used for cultivating brinjals, bendai and leafy vegetables like chukkakura and amaranthus. As in the previous years, seedlings of amaranthus were transplanted on a similar area near the school garden. The growth of the seedlings was very good and robust plants were harvested.

Among the exotic vegetables grown during the winter season, the cultivation of tomatoes, cabbage, cauliflower, lettuce, knolkhol and French dwarf-beans was a success. These were raised on the Yeleru high bund area and on a field scale near the orchard. Good sized heads were obtained in cabbage and the production of leaf in lettuce was abundant. Among the several varieties of tomatoes grown, ponderosa outyielded the rest. The yield was very low in ox-heart. The size of fruit was attractive in bonny best. As for the cauliflower varieties, the size of heads in both the varieties 'Patna late' and 'early snow ball' was very poor. The size of the tuber in the 'early white Vienna' variety of knolkhol was very big. The growth of the French dwarf-beans was fair. The growth and stand of the cucumber and water-melon, introduced from Chicago, were stunted. Flowering was profuse but there was no fruit setting.

The cultivation of vegetables on the station during the year was not a success as the crop in the bearing stage was subjected to heavy damage by the monkeys.

I. Fodders.

45. All the varieties of fodder grasses, viz., Napier grass, water grass, thin Napier grass, Guinea grass, elephant grass, Australian drought resistant grass and buffaloe grass were grown on the Godavari canal high bund for fodder and multiplication and supply of grass slips to interested ryots. The particulars of grasses cultivated, the extent and the produce obtained are furnished in the table below:—

TABLE XXII.—Statement of yields of fodder grass.

Name of grass.	Area grown.	Quantity of grass cut.	Number of slips supplied.
	CENTS.		
1 Buffalo grass	2.85	885	2,950
2 Australian drought resistant grass	3	780	250
3 Guinea grass	2	584	100
4 Napier grass	1	278	..
5 Elephant grass	$\frac{1}{2}$	94	..
6 Kolukattai grass	$\frac{1}{2}$	76	..

J. Green manures.

46. The green leaf obtained by growing *Sesbania*, dhaincha, sunnhemp and pillipesara *in situ* was supplemented with the pruning from gliricidia, Pungam and Rain trees on the station, to supply 3,000 lb. per acre for manuring paddy.

Seedlings of *Sesbania speciosa* and *Sesbania aculata* were transplanted alongside the field bunds for the production of seed and green manure. The seedlings of *Sesbania speciosa* have established without any mortality and grow luxuriantly to a height of 10 feet. The crop was in flower during November. The harvest of the pods commenced from December and extended up to the end of January. A total quantity of 35 to 40 lb. of seed was obtained from *Sesbania* planted 3 feet apart alongside the field bunds during July. The study of the growth and production of green matter from seedlings of *Sesbania speciosa* of different ages was taken up. It was noted that 45 days old seedlings of *Sesbania* established better and grew quickly than the 30 days old seedlings and again among the seedlings of the same age the earlier planted ones established quicker and grew more vigorously than the late-planted ones. It was also observed that the prevailing swamp conditions had an adverse effect on the quick growth of the seedlings. Consequently the growth was stunted in the area planted with the younger seedlings. The cultivation of this green manure crop alongside the field bunds during the main crop season was mainly for purpose of seed production as the crop growth ceases from November onwards and there will not be further production of green matter. Seedlings of *Sesbania* were also planted alongside field bunds in the intermediate, the immediate second crop as well as the second-crop paddy area, giving a closer spacing of 3 inches. The growth of the seedlings was stunted due to the low temperature prevailing in the winter months, but with the rise in temperature during January-February, the growth of the seedlings was also vigorous and by the end of June yielded sumptuous quantity of green leaf. The cultivation of *Sesbania speciosa* for the production of green leaf during the second-crop season was therefore a grand success and almost all the first-crop paddy area of 1952-53 season was manured with the green leaf raised in this manner alone.

Sesbania speciosa was raised as a field crop with the receipt of rains in February. The crop grew very vigorously. An acre yield of 29,500 lb. of green matter was obtained from a four-month crop raised with 30 lb. seed rate per acre.

Seedlings of *Sesbania aculata* were also planted alongside the field bunds side by side with *Sesbania speciosa*. The seedlings established well and grew as vigorously as the latter.

Sunnhemp and Pillipesara were grown on field scale for the supply of fodder for the cattle and green leaf manure to the paddy crop. An acre yield of 16,000 lb. and 10,000 lb. of green leaf respectively was obtained from the two crops.

Seedlings of *Gliricidia* were planted 3 feet apart alongside roads, canal bunds and boundaries of the station during the year under report. Rooted stumps of *Gliricidia* were also planted on the field bunds during the summer months of April and May. The seedlings as well as the rooted cuttings have established well. The gaps were filled up promptly and much care was taken to water them regularly with the result all the seedlings and cuttings have established quickly.

The two species of *Crotalaria*, viz., *Crotalaria striata* and *Crotalaria acutifolia* received from the Oil Seed Specialist, Coimbatore, were grown on the Godavari canal high bund. The growth was very much gappy and stunted and prolonged over a very considerable period.

In addition to these, the self-sown crops of *Sesbania speciosa* was utilized for green manuring the paddy crops.

K. Fruits.

47. Additions to the existing fruit-trees were made by planting Malta Lemon layers, Gajanimma layers and Sapota grafts during the year. No flowering and fruit formation was noticed in the Singapore variety of jack though the plants were 5 years old. The Lichi and the seedless grape vines have not flowered during the year. The mango crop was very poor on account of the severe attack of mango hopper and poor flowering. The Malta lemons have commenced bearing during the year. Pine-apples planted around the observatory area have yielded good-sized fruits.

L. Miscellaneous crops.

48. (a) *Kapok*.—A total yield of 81 lb. of floss was obtained from 43 trees recording an average yield of 1.14 oz. of floss per tree.

(b) *Indigofera teysmanii*.—The crop received from Peradenia of Ceylon and reported to be a quick growing shrub was grown for the production of green leaf. The seedlings were very slow in growth even in the nursery.

(c) *Strychnos innocua*.—This has been introduced from South Africa where it was good source of edible oil. The pulp of the fruit is reported to be edible and oil is extracted from the seeds. The seeds have not germinated. The same were kept under observation, as it was reported that they take nearly an year to germinate. This was sown on 20th July 1951.

(d) *Economic plants*.—In connexion with the National Tree-Planting Week and the Independence Day celebrations, coconut, Kapok and Gliricidia seedlings were planted on the station. Seedlings of Pungam, Gliricidia, Sesbania, Kapok, *Bauhinia malabarica* and tamarind were supplied to the Agricultural Demonstrators of the neighbouring taluk and the particulars are given in the accompanying Table.

TABLE XXIII.—Statement showing supply of economic plants.

Name of variety.	Number of seedlings planted on the station.	Number of seedlings distributed.
Gliricidia	2,000	3,000
Kapok	300	50,000
Bauhinia	..	1,000
Pungam	..	1,000
Coconut	230	..
Leucenea glauca	..	25,000
Agathy	..	5,000

SECTION III—PISCICULTURE.

49. A total quantity of 71 lb. of fish was obtained from the fish pond on the station.

SECTION IV—LIVESTOCK.

50. (a) The condition of the cattle though satisfactory was not up to the mark in view of the continued work they were put to. The strength of the livestock was raised to six pairs during the fag end of the year.

(b) *Poultry*.—The rearing of poultry on the station was revived during the year and a dozen birds of R.I.R. breed were obtained from the Poultry Development Officer, Teynampet, during March. The condition of the birds was satisfactory.

SECTION V—JUVENILE LABOUR SCHOOL.

51. The Juvenile Labour School on the Agricultural Research Station, Samalkot, was closed with the close of financial year of 1951-52 and the services of the teachers were dispensed with. The school was originally intended to be transferred to the management of the district board but as the latter were reluctant to take over the school without the furniture, the school was closed.

ANNEXURE I.

CO-ORDINATED CROP WEATHER DATA.

The scheme was started to find out the effect of the weather on the growth and yield and the incidence of pests and diseases on crops. The two principal crops of paddy and sugarcane were the crops selected for the study.

Paddy.—The study was taken up on the crop during the two seasons.

In the first-crop season the nurseries were raised during M. y. Transplanting was done in June. The two popular varieties SLO. 15 and SLO. 13 were grown for comparison. The manuring for the crop consisted in the application of 4,000 lb. of green leaf and 100 lb. of superphosphate per acre at the time of puddling and 2 bags of groundnut cake as top dressing, a month after transplanting.

The continuous rainy weather and the humid atmosphere immediately following the transplanting, helped in the quick establishment of the transplants. The growth of the crop in both the varieties was good. The following observations were made:—

(1) Both the varieties exhibited signs of active tillering till the end of July 1951. The late formed tillers died subsequently and the mortality was recorded as 23 per cent in the case of SLO. 15 and 33.3 per cent in the case of SLO. 13.

(2) Being earlier in duration, SLO. 13 exhibited early vigour in growth which was maintained throughout.

(3) There was a difference of 10 days in the flowering of both the varieties, SLO. 13 being the first to flower. The bright weather that prevailed during the flowering period was responsible for good grain setting.

The following are the data recorded:—

TABLE XXIV.

Date.	SLO. 12.		NTU. 15.	
	Tillers per clump.	Height in cms.	Tillers per clump.	Height in cms.
(1)	(2)	(3)	(4)	(5)
8th March 1952	6.1	11.8	5.5	10.8
14th March 1952	7.5	14.0	7.1	13.4
21st March 1952	7.3	15.1	7.2	14.9
28th March 1952	7.3	21.2	6.8	19.6
4th April 1952	5.8	28.6	5.9	27.1
11th April 1952	5.8	41.5	5.3	36.3
18th April 1952	6.3	67.0	5.5	67.3
28th April 1952	4.7	70.2	5.2	72.7
12th May 1952	5.2	72.2	4.8	66.8

The crop sustained heavy damage by rats during the final stages of crop growth. SLO 15 in the bulk yield plot was the worst affected, and hence the low yield of grain. But for this, SLO. 15 recorded in general higher yield than SLO. 13.

The yields are furnished below:—

TABLE XXV.—Statement of yields.

Serial number and yield data.	SLO. 15.	SLO. 13.
(1)	(2)	(3)
1 Height of crop in cms.	148.54	155.22 per clump.
2 Number of shoots per bunch	4.3	3.7 do.
3 Number of panicles per bunch	3.8	3.3 do.
4 Percentage of effective tillering	88.4	89.2 do.

Serial number and yield data.					S.L.O. 15.	S.L.O. 13.
(1)					(2)	(3)
5	Weight of sheaves in oz.	..	..	..	26.8	28.2 per clump.
6	Weight of grain in oz.	..	..	..	7.5	6.57 do.
7	Weight of straw in oz.	..	..	..	18.8	21.0 do.
Serial number and harvest data					S.L.O. 15.	S.L.O. 13.
(1)					(2)	(3)
8	Weight of grain from PGO. plot	..	..	..	262.5	241.8 per acre.
9	Weight of grain from pests and diseases plots	..	..	..	302.0	216.0 do.
10	Weight of grain from bulk yield plot	..	..	..	253.0	320.0 do.
11	Yield of grain per acre in lb. in—					
	Periodical growth observation plot	..	..	..	2,923	2403 per acre.
	Pests and diseases plot	..	..	..	3,677	2650 do.
	Bulk yield plot	..	..	..	2,940	3717 do.
12	Yield of straw in lb. per acre	..	..	..	4,440	5500 do.

There was considerable damage to the crop by rats during the final stages of crop growth. The variety SLO. 15 in the bulk yield plot was worst affected. Hence the reduction in the yield of grain per acre. SLO. 15 recorded in general increased yields over SLO. 13. This was in conformity with the results obtained during the previous year's trial. The yield of straw was however more in the case of SLO. 13.

Paddy.

Second crop.—The study was continued during the second-crop season, but with the two popular second-crop strains, viz., SLO. 12 and MTU. 15. The nurseries were sown during the first week of January. The transplanting was done a month after.

The manuring of the transplanted field consisted in the application of 2,000 lb. of green leaf and 100 lb. of superphosphate per acre at the time of puddling. Top dressing with sulphate of ammonia to supply 100 lb. per acre was done three weeks after planting.

The cloudy weather that immediately followed transplanting helped in the quick establishment of transplants. A single weeding was given to the crop at the time of top-dressing with sulphate of ammonia.

Active tillering was noticed till the end of March 1952 after which the late-formed tillers perished. The rate of mortality among tillers was 37 per cent in SLO. 12 and 33 per cent in MTU 15. Due to the dry weather that prevailed and lack of supply of irrigation water in the canal, the growth was very stunted. There was no conspicuous difference in the growth of the two strains.

The supply of water for irrigation was cut off from the middle of March till the first week of May. The soils cracked deeply. Consequently the growth, flowering and the grain-setting were adversely affected.

MTU. 15 was earlier to flower by two days than SLO. 12. It was noticed that even under adverse seasonal conditions MTU. 15 fared better. The flowering was more uniform than in SLO. 12. MTU. 15 recorded higher yields than the other strain SLO. 12 under comparison. The yield data are furnished below:—

TABLE XXVI.

Serial number and yield data.					SLO. 12.	MTU. 15.
1	Number of shoots per clump	..	..	..	5.1	5.2
2	Height of crop in cm.	..	..	..	71.9	67.1
3	Number of panicles per clump	..	..	..	4.7	4.6
4	Number of chaff earheads	..	..	..	1.2	0.9
5	Percentage of effective tillering	..	..	..	95	88
6	Percentage of chaffiness	..	..	..	28.5	19.6
7	Weight of sheaves in oz.	..	..	..	9.8	8.6
8	Weight of grain in oz.	..	..	..	2.3	1.7
9	Weight of straw in oz.	..	..	..	7.3	1.7
10	Yield of grain from PGO. plot	..	..	..	..	..
11	Yield of grain from pests and diseases plot in lb.	..	..	..	54	76
12	Yield of grain from bulk yield plot in lb.	..	..	..	57	81
13	Yield of grain from PGO. plot in lb.	..	..	..	..	..
14	Yield of grain from pests and diseases plot in lb.	..	..	..	626	882
15	Yield of grain from bulk yield plot in lb.	..	..	..	661	940
16	Yield of straw in lb. per acre	..	..	..	721	628

In general very low yields were recorded by both the varieties. The yield of straw was however higher in the case of SLO. 12.

Sugarcane.

Sugarcane was grown on an area of 1.13 acres. Once again space was the limiting factor in restricting the study to one and only one variety, i.e., Co. 419.

Germination was very poor and prolonged over a considerable period. The first hoeing was done on the 26th and 27th and the field was given an irrigation on 2nd March 1951. Subsequent hoeings and irrigations were given at convenient intervals. Gap filling was done during the first week of April.

Trenching was done during the last week of April before the closure of the Godavari irrigation canal and the crop was given a copious irrigation.

With the reopening of canals in June, manuring of the crop was taken up. The first wrapping called the "Bodichuttu" was done to the crop during mid June. The season was in general favourable for crop growth. The cyclonic weather accompanied by heavy rainfall during the second fortnight of July and the last week of November caused the lodging of the crop in the several experimental plots.

Rapid marked growth was recorded from June, after the application of the fertilizers. The period from June to December was conducive to quick growth. The crop attained maturity by the end of February and the cane was carted to the factory during March. Low yields were recorded. An acre yield of 39.47 tons of cane was obtained from the plot intended for the study of growth observations. The bulk yield plot sustained greater damage by the monkeys and recorded an acre yield of 23.06 tons of cane. The following data were recorded at the time of harvest:—

Mean number of canes per clump..	..	..	..	1.7
Mean number of leaves in the tallest cane in the end clump.	..	..	..	2.8
Mean height of the cane	..	..	..	409.4 cms.
Mean girth of cane at 1/4 height	..	..	..	91.4 mms.
Mean girth of cane at 1/2 height	..	..	..	88.2 mms.
Mean girth of cane at 3/4 height	..	..	..	71.1 mms.
Yield of cane from a plot 30' x 60'	..	..	..	3,654 lb. or 1 ton 1,414 lb.
Yield of cane in tons per acre as calculated from the growth observations plots.	..	..	..	39.47 tons.
Yield of cane in tons per acre obtained from the whole plot.	..	..	..	28.32
Yield of cane in tons per acre as calculated from the yield obtained from the bulk yield plot.	..	..	..	23.06

Sugarcane (1951-52).

Sugarcane was planted afresh in an area of 1.40 acres in F. Nos. 18-A, 19-A and 20-A with only one variety as usual. The germination of the crop was satisfactory. The crop experienced extreme drought conditions during the summer months of April and May and as such the gap filled sets have not germinated. The crop received as usual a basal dressing of 10 tons of farm yard manure at the time of ploughing and super to cover 100 lb. per acre at the time of planting. The details of lay out will be furnished in the next report.

Study of pests and diseases.

The incidence of pests and diseases was studied on the two crops of paddy and sugarcane. The first crop paddy was free from any pest or disease attack. Heavy infestation of stem-borer was noticed on the Intermediate crop and the Immediate second crop-paddy during the Intermediate crop season from October to January. Light traps were set up to control the pests. Innumerable moths were trapped every day regularly from October right up to the end of January. The second-crop paddy following in February was free from any such attack.

In the crop of sugarcane, the incidence of stem-borer was studied. The borer attack was noticed from the early stages. At each observation canes were selected at random by the random sampling method and the canes falling within the sampling unit were split up and examined for the borer. The infestation was observed to be severe during the last stages of crop growth.

Estimation of soil moisture.

The estimation of soil moisture from the observatory area and the crop field of sugarcane was taken up during the year at regular intervals. Samples were drawn as per the procedure laid down below:—

In the observatory area, four places were selected, at random, each time soil samples were drawn. The samples were taken from depths of 3 inches, 6 inches, 12 inches, 18 inches, and 24 inches. The samples from the four places concerning each depth are mixed together

and a composite sample of not less than 20 grs. obtained. This was subjected to thorough drying in the hot oven till it attained a constant weight. The loss in weight is thus estimated and the moisture content calculated.

In the crop field of sugarcane samples were drawn from only one place earmarked for recording the micro climatic readings.

ANNEXURE II.

COST OF CULTIVATION OF IMPORTANT BULK CROPS, 1951-52.

Serial number and crop.	Area grown.	Total cost of cultivation.			Cost of cultivation per acre.		
		(3)			(4)		
(1)	(2)	ACS.			RS. A. P.		
1 First-crop paddy	20.00	2,823	8	6	141	3	0
2 Second-crop paddy	2.89	317	1	0	145	8	0
3 Inter-season paddy	0.34	68	0	0	200	0	0
4 Sugarcane	1.34	893	11	6	791	2	0
5 Bananas	0.49	399	4	0	814	9	0
6 Wheat	0.25	14	3	0	56	12	0
7 Groundnut	2.38	255	13	0	107	8	0
8 Cotton	0.42	227	4	0	541	11	0
9 Gingelly	0.50	16	8	0	33	0	0

Serial number and crop.	Area grown.	Total receipts.			Receipts per acre.			Profit or loss [Col. (7) — (4)].		
	(5)	(6)			(7)			(8)		
	ACS.	RS.	A.	P.	RS.	A.	P.	RS.	A.	P.
1 First-crop paddy	20 00	8,787	10	6	444	0	0	302	13	0
2 Second-crop paddy	2 89	226	0	0	78	4	0	67	4	0*
3 Inter-season paddy	0.34	91	0	0	216	8	0	16	8	0
4 Sugar-cane	1.13	1,872	0	0	1,657	0	0	865	13	0
5 Bananas	0.49	585	0	0	1,193	12	0	379	3	0
6 Wheat	9.25	19	9	0	78	4	0	21	8	0
7 Groundnut	2.38	119	0	0	50	0	0	57	8	0
8 Cotton	0.42	116	15	0	557	0	0	15	5	0
9 Gingelly	0.50	21	12	0	43	8	0	10	8	0

* The loss in this year is due to failure of crop for want of water from shot blade stage.

ANNEXURE III.

FINANCIAL STATEMENT, 1951-52.

(1) Statements of Receipts for 1951-52—

	RS.	A.	P.
1 Actual receipts	6,703	12	6
2 Transfers	6,601	3	0
3 Value of stock on hand	5,501	0	6
Total	18,806	0	0

(2) Statement of expenditure for 1951-52—

	RS.	A.	P.
1 Charges under 40. C. Agricultural farms	48,518	1	0
2 Do. 40. G. Agricultural Meteorology	3,608	12	0
3 Do. 40. E. Agricultural Education	1,626	11	3
4 Do. 50. D. Civil Works	506	2	0
Total	54,259	0	0

ANNEXURE IV.

STEPS TAKEN TO INCREASE THE REVENUES OF THE STATION.

The following attempts were made to increase the revenues of the Station during the year under report:—

(1) *Improving the irrigational facilities.*—Though the station is irrigated by the Godavari canal running on the northern side of the station, the being the tail end of the delta and a high level canal, failure of water supply especially during the summer months, is very common. During the year, the water supply in the canal was cut off from the mid week of March. The second-crop paddy commencing from February was in the danger of complete failure. Attempts were made to bail out water from the existing tank and the Yoleru drain running along the eastern side of the station. All the drainage water from the Samalkota area collected in the Yeleru drain was utilized for irrigating the second-crop paddy. Besides, the water from the well belonging to the Railway authorities was bailed out. For these purposes, the petrol pumpset available on the Station for irrigating the coconut nursery and another petrol pumpset loaned from the District Agricultural Officer, Eluru, were in use day and night for about a month. Later on an oil engine pumpset was brought on loan from the District Agricultural Officer, Eluru, and this was used. Yet it was only possible to provide sufficient moisture at the root zone of the crop. It was thus possible to save the crop which would have been otherwise a failure, virtually.

The station lies in a bed of artesian springs. There were about half-a-dozen such artesian springs in the neighbourhood. It is therefore attempted to tap the underground water supply to supplement the already existing irrigation facilities and ensure abundant and continuous water supply throughout the year. A site was spotted out by the Director of Agriculture, Madras, and sanction was accorded for digging a bore well. But for want of a timely supply of a power drill the work could not be taken up.

(2) *Adjusting the cropping to reduce the fallow periods.*—The cultivation of cotton, wheat, groundnut, pulses and gingelly was taken up with a view to increase the revenues of the station. Wheat and groundnut were a complete failure on account of the acute water shortage during the growth period. An acre yield of 500 lb. kapas was recorded in cotton which fetched a net profit of Rs. 15-5-0 per acre. The cultivation of gingelly was also attended with profits.

(3) *Intermediate season paddy.*—With a view to raise three crops of paddy in the double-crop wet lands, the cultivation of Iswarakorra and Iswarakorra and Sannavadlu cross progenies was attempted after the harvest of the short duration paddy in the first-crop season. The trial was encouraging. An acre yield of 4,000 lb. of grain per acre was recorded by the cross progenies and on the average an income of Rs. 216 per acre was realized.

(4) *Raising of poultry.*—A dozen R.I.R. chicks were obtained from the Poultry Research Station, Teynampet. The same were reared with great care. The birds have not commenced laying eggs towards the end of the period under report. Attempts will be made to increase the strength before the sale is effected.

(5) *Raising a live fence.*—*Prosopis juliflora* was raised along the eastern boundary of the station for the coconut nursery area and on the northern side. A double row of *Gliricidia maculata* was raised on the western boundary of the station. *Gliricidia* was also raised along the northern and southern boundaries. All the plants have come up well.

(6) The cultivation sheets and field register were posted up to date. The financial statement of profit and loss account is enclosed.

ANNEXURE V.

LIST OF THE GLOSSARY OF SCIENTIFIC NAMES.

Serial number and common names.	Scientific names.
1 Acid lime	Citrus aurentifolia, Swingle.
2 Amaranthus	Amaranthus spp.
3 Banana	Musa paradisiaca, L.
4 Beet root	Beta vulgaris, L.
5 Bendekai (Tel.)	Hibiscus esculentus, L.
6 Bengalgram	Cicer arietinum, L.
7 Bilimbi	Averrhoa bilimbi, L.
8 Bitter gourd	Momordica charantia, L.

Serial number and common names.				Scientific names.
9	Blackgram	..	..	Phaseolus mungo, L.
10	Blast on paddy	..	..	Piricularia oryzae, Br. and Cav.
11	Bread fruit	..	..	Artocarpus incisa, L.
12	Bullock's heart	..	..	Anona reticulata, L.
13	Cabbage	..	..	Brassica oleracea, L. Var. botryta, DC.
14	Carrot	..	..	Daucus carota, L.
15	Cashewnut	..	..	Anacardium occidentale, L.
16	Cauliflower	..	..	Brassica oleracea, L., var. botrytis, L.
17	Chillies	..	..	Capsicum annum, L.
18	Cluster beans	..	..	Cyamopsis tetragonoloba, Taub.
19	Coconut	..	..	Cocos nucifera, L.
20	Coriander	..	..	Coriandrum sativum, L.
21	Cotton	..	..	Gossypium spp.
22	Cowpea	..	..	Vigna unguiculata, Walp.
23	Custard apple	..	..	Annona Squamosa, D.
24	Dhaincha	..	..	Sesbania bispinosa Fawcett and Rendle, Pers.
25	Elephant grass	..	..	Pennisetum purpureum, Schum.
26	Fig	..	..	Ficus Carica, L.
27	Foot rot of paddy	..	..	Fusarium moniliforme Sheld.
28	Gajanimma (Tel.)	..	..	Citrus pennivesiculata, Tanaka.
29	Gingelly	..	..	Sesamum orientale, L.
30	Ginger	..	..	Zingiber officinale Bosc.
31	Napier grass	..	..	Pennisetum Polystachyos, Schum.
32	Neem	..	..	Azadirachta indica.
33	Nendram (Mal.)	..	..	Musa paradisiaca, L. var. Nendran.
34	Onion	..	..	Allium cepa, L.
35	Orange	..	..	Citrus sinensis, Osbeck.
36	Paddy	..	..	Oryza sativa, L.
37	Paddy silver shoot	..	..	Pachytiplosis oryzae, M.
38	Paddy stem borer	..	..	Schoenobius incertellus, W.
39	Pamparapanas (Tel.)	..	..	Citrus paradisi, Macf.
40	Papayya	..	..	Carica papaya, L.
41	Peas	..	..	Pisum sativum, L.
42	Phillipesara (Tel.)	..	..	Phaseolus trilobus, Ait.
43	Pine apple	..	..	Ananas Sativus, Merr.
44	Plantain	..	..	Musa paradisiaca, L.
45	Pomegranate	..	..	Punica = granatum, L.
46	Pomelo	..	..	Citrus paradisi, Macf.
47	Pumpkin	..	..	Cucurbita pepo, L.
48	Pungam (Tam.)	..	..	Pongamia glabra, Vent.
49	Radish	..	..	Raphanus = sativus, L.
50	Redgram	..	..	Cajanus cajan.
51	Rice bug	..	..	Leptocoris acuta, Th.

SAMALKOT,
29th July 1952.

SYED IBRAHIM,
Superintendent.

ANNUAL REPORT OF THE RICE RESEARCH STATION, BUCHIREDDI-PALEM, NELLORE DISTRICT, FOR 1951-52 (FASLI 1361).

Season and rainfall.—The year was a droughty year and a total of only 29.73 inches of rain was received on 30 rainy days during the fasli year as against a decennial average of 38.00 inches on 40.1 rainy days.

In the south-west monsoon period 5.05 inches of rain was received on 11 rainy days while the decennial average for the corresponding period was 9.26 inches.

The north-east monsoon was almost a complete failure and a total precipitation of only 12.99 inches were received on 12 rainy days as against a decennial average of 25.84 inches on 20.6 days. Of this, 6.22 inches were received in the third week of November. There was difficulty for water even from the beginning of the season as Kaligiri Reservoir did not get its full supply from the Pennar after May 1951. More than a third of the area under the southern channel could not be planted and even those rice crops that were 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. Nurseries had to be maintained by baling water from a low-level channel that runs just north of the farm boundary.

In the hot-weather period though there were no rains practically 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 on 3 rainy days was received during this period, out of 11.69 inches on 7 rainy days for the hot-weather period.

The May rains 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 by the cyclone.

The rainfall data are furnished in Table I.

TABLE I.—Statement of rainfall.

Month.	Week.	Fasli 1361.		Fasli 1360.		Average for the past ten years 1941-42 to 1950-51.	
		7th June 1951 to 6th June 1952.		7th June 1950 to 6th June 1951.			
		Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
South-west monsoon.							
June	7-13	0.28	1	..	..	0.50	0.4
	14-20	..	..	0.18	1	0.18	0.6
	21-27	0.33	2	0.11	1	0.44	0.9
June-July	28-4	..	..	2.24	2	0.44	0.9
	5-11	..	..	0.25	1	0.55	1.1
	12-18	1.94	1	0.19	1	0.60	0.8
July-August	19-25	0.36	2	0.27	1	0.82	1.6
	26-1	..	..	0.41	1	0.45	1.2
	2-8	0.52	1	0.91	1	0.64	1.0
	9-15	..	..	..	..	0.59	1.1
	16-22	..	..	1.45	2	0.33	0.9
August-September	23-29	0.49	2	0.96	1	0.54	1.1
	30-5	1.13	2	1.40	2	0.57	1.2
	6-12	..	..	4.64	4	0.93	1.3
	13-19	..	..	..	..	0.61	0.8
	20-26	..	..	1.11	2	1.07	1.3
Total	..	5.05	11	14.21	20	9.26	16.2

Month,	Week.	Fasli 1361.		Fasli 1360.		Average for the past ten years 1941-42 to 1950-51.	
		7th June 1951 to 6th June 1952.		7th June 1950 to 6th June 1951.			
		Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
North-east monsoon.							
September-October	27- 3	4.72	4	..	..	0.68	1.2
	4-10	..	..	1.55	1	2.71	1.9
	11-17	0.25	1	7.01	1	2.62	2.0
	18-24	..	..	7.94	2	1.91	1.7
	25-31	0.59	2	2.94	1	1.94	1.7
November	1- 7	0.48	1	1.15	3	1.58	2.1
	8-14	0.73	1	3.29	2	4.52	2.0
	15-21	0.22	3	..	..	3.56	2.7
	22-28	..	..	..	..	2.61	1.8
November-December	29- 5	..	..	..	..	1.21	0.9
	6-12	..	..	..	..	1.10	0.5
	13-19	..	..	..	..	0.62	1.0
	20-26	..	..	..	..	0.49	0.6
December-January	27- 3	..	..	..	..	0.14	0.2
	4-10	..	..	..	..	0.05	0.1
	11-17	..	..	..	..	..	..
	18-24	..	..	..	..	0.03	0.1
	25-31	..	..	..	..	0.07	0.1
Total ..		12.99	12	23.88	10	25.84	20.6
Hot weather.							
February	1- 7	..	..	..	..	0.06	0.1
	8-14	..	..	..	..	..	..
	15-21	..	..	..	..	..	..
	22-29	0.08	..	..	..	0.10	0.3
March	1- 7	..	..	..	..	0.23	0.2
	8-14	..	..	..	..	0.06	0.2
	15-21	..	..	..	..	..	..
	22-28	..	..	..	..	..	..
March-April	29- 4	..	..	0.49	1	0.17	0.3
	5-11	..	..	..	..	..	..
	12-18	..	..	..	..	..	..
	19-25	..	..	0.55	2	0.26	0.3
April-May	26- 2	..	..	0.07	..	0.03	0.1
	3- 9	..	..	0.40	1	0.05	0.1
	10-16	..	..	..	..	0.09	0.2
	17-23	10.47	3	..	..	1.24	0.8
	24-30	0.58	3	..	..	0.24	0.3
May-June	31- 6	0.56	1	1.15	1	0.37	0.5
	Total ..	11.69	7	2.66	5	2.90	3.3
Grand total ..		29.73	30	40.75	35	38.00	40.1

2. *Cultivation routine.*—Sowings for planting in the normal season commenced on 9th July 1951 and were completed by 29th July 1951. Further sowings had to be postponed till 25th October 1951 which came to a close by 15th November 1951. The entire sowings comprised 1,189 beds and covered an area of 1.16 acres. The water-supply was inadequate from the beginning of August and transplanting was taken up on 7th August 1951 and continued till 13th December 1951. In all 1,884 strips were planted in an area of only 8.11 acres as detailed in Table II. Even the planted crop could not be irrigated properly as there was no adequate supply in the southern channel. Irrigation was also done by pumping water from the lower level Rebala channel which also dried up from the beginning of January. On the whole, this year was very bad

year and the water-supply from the reservoir was inadequate. Some experiments could not be planted and some of those planted had to be abandoned as the crops had failed for want of water.

TABLE II.—Details of area planted during the year.

Item number and particulars.	Number of strips.	Area covered in acres.
1 Comparative yield trials	461	1.82
3 Blast trials	482	1.63
4 Study materials and seed multiplications	781	1.15
5 Bults	49	3.17
6 Pure lines	111	0.34
Total ..	1,884	8.11

3. *Manuring and harvest.*—The general manurial regimen for the transplanted fields consisted of a basal application of 10 cart-loads of cattle manure or 4,000 lb. of green leaf followed by 112 lb. of bone meal and 150 lb. of groundnut cake per acre. Some of the plots could not be given groundnut cake as there was no sufficient water. The harvest commenced from 1st December 1951 and continued up to 7th March 1952.

The acre yields of strains obtained during the year are poor due to inadequate water-supply. They are given in Table III.

TABLE III.—Acre yields of strains obtained during the year.

Item number and variety.	Yield in pounds per acre.
1 BCP. 1. Sanna Molakolukulu	1,325
2 BCP. 2. Potti Molakolukulu	1,742
3 BCP. 3. Atragadda	2,563
4 BCP. 4. Pishanam	1,679
5 BCP. 5. Sannavadlu	1,189
6 G.E.B. 24	1,618

4. *Paddy improvement work*—A. *Pure line selection*—(a) *Molakolukulu*.—(i) Two strains BCP. 1 (Sanna Molakolukulu) and BCP. 2 (Potti Molakolukulu) evolved from the local molakolukulu were multiplied for the supply of nucleus seed for growing in seed farms.

(ii) Four promising cultures belonging to the sixth batch of selections in Molakolukulu underwent yield trials for the fourth year. Results are given in Table IV.

TABLE IV.—Results of comparative yield trials of sixth batch selections in Molakolukulu.

Particulars.	42	62	151	257	Molakolukulu Bulk Cherlopalem.	BCP. 1.	BCP. 2.	Molakolukulu local.	General mean.	Standard error.	F. Value satis- fied or not. P. = 0.05	Critical differ- ence.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Acre yield of grain in lb.	2,270	1,567	1,742	1,816	1,599	1,717	1,865	1,560	..	81.7	Yes.	235
Percentage control.	177.6	100.3	111.7	116.4	102.5	110.1	119.6	100.0	..	5.24	..	15.0
Flowering dura- tion.	159	159	158	159	155	160	158	155	..	..	..	..

Conclusion—42, BCP. 2, 257, 151, BCP. 1, Bulk Cherlopalem. 62, Moku. Std.

'Z' test was not satisfied in one year (1950-51). The following are the results for the remaining three years. Though 42 gave higher yields than others in two years, its yield was poor in one year. Culture 257 has given consecutively better yields in all the three years.

TABLE IV (a).—Yields of grain as percentage on local.

Culture number.	1948-49.	1949-50.	1951-52.
42	142.6	98.7	177.6
62	130.4	132.4	100.3
151	124.0	104.1	111.7
257	133.0	111.2	116.4
Local	100.0	100.0	100.0
'Z' Test	Yes.	Yes.	Yes.
C.D.	..	..	..

(iii) *Secondary selection in BCP. 1.*—Sixteen selections from the secondary selections in BCP. 1 were under yield trials against BCP. 1 and Molakolukulu local in three series. All of them except BCP. 1/176 were poorer than Molakolukulu local. BCP. 1/76 was nearly equal to Molakolukulu local. Hence only these two cultures will be carried forward for further comparison.

(b) *Pishanam.*—(i) Culture 1283 of the first batch of selections in Pishanam which was released as BCP. 4 was multiplied in a small area for supply of seed.

(ii) Culture 1439 of the third batch of selections which appeared to be promising during last year underwent yield trial with Pishanam 1283 and local. This was found to be no better than BCP. 4. The results are furnished in Table V.

TABLE V.—Results of comparative yield trials of Pishanam cultures.

Date of sowing—11th July 1951. Lay out—3 × 9 randomized block.
 Date of planting—9th August 1951. Treatments—P. 1439, P. 1283 and local.
 Date of harvest—25th January 1952. Size of strip—4' × 25'.
 Field number—H. 1 a. Spacing—6" × 6" doubles.

Particulars.	P. 1439.	P. 1283.	Local.	Standard error.	F. Value satisfied or not. P = 0.05.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Acre yield in lb.	1,808	1,845	1,090	67.8	..	203.4
Percentage on control	185.9	189.2	100.0	6.224	Yes.	18.66
Flowering duration	153	157	158	..	..	..

Conclusion—P. 1283, P. 1439, P. Local.

(c) *Sannavadlu.*—Nine cultures of the third batch of selections were under second year yield trials against Sannavadlu local and Sannavadlu 1435 in two series. The results are furnished in Table VI (a) and (b). Six of the promising cultures will be taken for further trial. The results of the previous year are given in Table VI (a) and VI (b).

TABLE VI (a).—Results of comparative yield trials of Sannavadlu.

Date of sowing—11th July 1951. Treatments—1662, 1652, 1672, 1647, BCP 5 and S.V. local.
 Date of planting—1st and 16th August 1952. Size of strip—4' × 20'.
 Date of harvest—19th January 1952. Spacing—6" × 6" doubles.
 Field number—F. 2 B. Layout—6 × 6 randomized block.

Particulars.	1662.	1652.	1672.	1647.	BCP. 5.	S.V. local.	Standard error.	F. Value satisfied or not. P = 0.05.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Acre yield in lb.	1,943	1,801	1,525	1,806	1,289	1,269	100.8	Yes.	293.5
Percentage on local.	153.1	141.9	120.2	142.3	101.6	100.0	7.941	..	23.13
Flowering duration.	156	156	156	156	153	153	..	..	..

Conclusion—1662, 1647, 1652, 1672, BCP. 5 S.V. Local.

Culture number.	Percentage of grain yield.	
	1950-51.	1951-52.
(1)	(2)	(3)
1662	117.3	153.1
1652	150.9	141.9
1672	112.1	120.2
1647	145.1	142.3
BCP. 5	135.3	101.6
SV. Local	100.0	100.0

TABLE VI (b).—Results of comparative yield trials of Sannavadlu.

Date of sowing—11th July 1951. Treatments—1634, 1635, 1639, 1663, 1664, SV. 1435 and SV. Local.
 Date of planting—14th and 15th August 1952. Size of strip—4' × 20'.
 Date of harvest—31st January 1952. Spacing—6" × 6" (doubles).
 Field number—F. 2 a. Layout—7 × 6 randomized block.

Particulars.	1634.	1635.	1639.	1663.	1664.	SV. 1435.	S.V. local.	Standard error.	F. Value satisfied or not. P = 0.05.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Acre yield in lb.	2,755	2,431	2,746	2,578	2,342	1,986	1,929	58.9	Yes.	179.0
Percentage on local.	142.9	126.0	142.3	133.7	121.4	103.1	100.0	3.051	..	8.810
Flowering duration.	157	158	158	155	155	159	155	..	..	..

Conclusion—1634, 1639, 1663, 1635, 1664, SV. 1435, SV. Local.

Culture number.	Percentage of grain yield.	
	1950-51.	1951-52.
(1)	(2)	(3)
1634	132.2	142.9
1635	81.8	126.0
1639	141.1	142.3
1663	115.0	133.7
1664	127.6	121.4
BCP. 5	127.6	103.1
SV. Local	100.0	100.0

(d) *Masipishanam.*—Four cultures of the first batch of selections in Masipishanam, a variety sown drilled in the upland areas were compared for the third year along with Masipishanam local and Pishanam 1283. Three cultures 1480, 1455 and 1485 gave higher yields than the local. The differences in yield being significant, while culture 1467 was on par with local. The results are furnished in Table VII.

TABLE VII.—Results of comparative yield trials of Masipishanam cultures.

Date of sowing—11th July 1951. Layout—6 × 6 randomized block.
 Date of planting—16th and 17th August 1951. Treatments—1455, 1467, 1480, 1485, P. 1283 and Masipishanam local.
 Date of harvest—4th February 1952. Field number—F. 1 a.

Particulars.	1455.	1467.	1480.	1485.	P. 1283.	Masipishanam local.	Standard error.	F. Value satisfied or not. P = 0.05.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Acre yield in lb.	2,761	2,518	2,780	2,741	1,630	2,271	103.2	Yes.	300.7
Percentage on control.	121.5	109.8	122.4	120.7	71.8	100.0	4.546	..	13.24
Flowering duration.	151	151	150	151	148	150	..	..	..

Conclusion—1480, 1455, 1485, 1467, Local, Pish 1283.

The results of the previous years are given in Table VII (a).

TABLE VII (a).—Results of comparative yield trials of Masipishanam cultures.

Culture number.	Percentage of grain yield.		
	1949-50.	1950-51.	1951-52.
(1)	(2)	(3)	(4)
1455	107.7	103.4	121.5
1467	119.1	119.0	109.8
1480	105.0	103.1	122.4
1485	124.5	153.6	120.7
P. 1283	90.8	139.7	71.8
M.P. Local	100.0	100.0	100.0

(e) *Atragadda*.—Culture 409 in Atragadda which was released as a strain BCP. 3 was multiplied in a small area for supply of seed. The crop was good and gave an acre yield of 2,563 lb. in spite of irrigation difficulties.

(f) *Deep water paddy*.—Tiruvavanga 1075 was grown in a small area to meet occasional demand.

(g) *Short duration varieties*.—Fifty-nine promising cultures isolated in local short duration varieties were kept going for trials when better water facilities would be available.

(h) *Iswarikora*.—Sixty-one single plant selections were planted under observation plots in Iswarikora season. These were badly affected by the unprecedented drought. Hence no observation could be made. The clumps were replanted for collection of seed.

B. *Hybridization*.—(a) *Evolution of better quality Jada Molakolukulu*.—(i) Two Kamban samba cross progenies, viz., 6993/4 and 6994/1 were compared with BCP. 1, BCP. 2 and Molakolukulu local for the third year. The results were not significant in 1950-51 and 1951-52. In one year (1949-50) the results were significant. Culture 6994/1 besides remaining on par with 6993/4 gave significantly higher grain yield than BCP. 1 or Molakolukulu local. The trial was concluded as the results were not significant in 1950-51 and 1951-52. The results are given in Table VIII.

TABLE VIII.—Results of comparative yield trials of Kamban Samba Cross Progenies.

Date of sowing—25th July 1951.
Date of planting—22nd September 1951.
Date of harvest—8th February 1952.
Field number—E. 1. b.

Layout—5 × 8 randomized block.

Treatments—6994/1, 6993/4, BCP. 1, BCP. 2 and Molakolukulu standard.

Particulars.	6994/1.	6993/4.	BCP. 1.	BCP. 2.	Molakolukulu standard.	Standard error.	F. Value satisfied or not P = 0.05.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Acre yield in lb.	1,957	2,097	1,798	2,091	2,091	90	No.
Percentage on control	93.4	93.5	83.0	100.0	100.0	4.32	No.
Flowering duration	146	138	149	149	144	..	..

(ii) One hundred and eight secondary selections in Kamban samba cross progenies were under study. The crop was affected by drought. One hundred and fifty-eight promising single plant selections were carried forward.

(b) *Evolution of Molakolukulu useful for semi-wet conditions*.—One hundred and seventy-six F. 4 progenies of the cross BCP. 2 × Mkl. 1834 were under study and 32 single plant selections from the best lots were taken for further study.

(c) *Evolution of blast resistant strains for the tract*.—(i) One hundred and fifty-nine F. 3 progenies of crosses with Co. 4 and long duration strains and Co. 15 with Pishanam were under study for blast resistance during the year. One hundred and eighty-nine apparently blast free selections were made for isolation of high yielding blast resistant types.

(ii) Crosses were made between BCP. 1 and Co. 4 for evolution of a blast resistant quality Molakolukulu. F. 1 of the cross was under study and F. 2 will be raised for further study next year.

(d) *Improvement of quality of Iswarikora*.—Iswarikora a red riced course variety but suitable for late planting was crossed with 1283 Pishanam and thirty-one hybrid progenies were planted for yield trials in the Iswarikora season. The crop failed due to drought. The clumps were again planted for seed collection for next year sowing.

5. *Blast experiments*.—Blast (*Piricularia oryzae*) is a very serious disease of the tract on paddy. The following experiments are designed to study the incidence of blast on paddy:—

(a) *Study of incidence of blast on blast resistant strains when manured with graded doses of ammonium sulphate*.—To study the incidence of blast by taking counts of neck infection on Co. 25, Co. 26, BCP. 1, BCP. 2 and Molakolukulu local when ammonium sulphate was applied at 0, 112, 224 and 336 lb. per acre under normal planted conditions, an experiment was laid out. The field was ploughed dry. After the receipt of water, it was let in and weeds were removed. Then plots were formed. Ammonium sulphate was applied as per the schedule. Counts could not be taken as the crop failed for want of water.

(b) *The incidence of blast on paddy crop planted with seedlings raised under semi-dry and wet conditions*.—The field was ploughed dry and it was puddled after the receipt of water. Bone meal was applied at 112 lb. per acre at the time of planting and ammonium sulphate was applied as top dressing at 100 lb. per acre. The seedlings sown on the same day in semi-dry and wet beds were planted in AB, BA layout. No conclusive results could be obtained as the incidence of blast was negligible during the year.

(c) *Study of incidence of blast with different systems of planting*.—An experiment to study the incidence of blast with the following systems of planting was laid out:—

- (1) Planting on plain level land.
- (2) Planting on top of ridges 1 foot apart.
- (3) Planting on both sides of ridges 1 foot apart.

Sunn hemp raised in the field was puddled in at 4,000 lb. per acre and the field was prepared. Groundnut cake at 150 lb. per acre and bone meal at 112 lb. were also applied. Ridges were formed and planting was done.

The incidence of blast was negligible during the crop season.

(d) *Study of incidence of blast under the different irrigational treatments*.—The field was ploughed dry. Water was let in after it was received in the channel. Then the plots were laid out and the planting was done. Groundnut cake at 150 lb. and bone meal at 112 lb. per acre were applied to all the plots.

As the incidence of blast was negligible during the year, no conclusive results could be obtained with the following treatments:—

- (1) Application of water as and when required.
- (2) Application of water as in (1) up to shot-blade stage and then intermittent irrigations with one week intervals.
- (3) Application of water as in (1) up to flowering and then intermittent irrigations with one week intervals.
- (4) Application of water as in (1) up to milk stage and then intermittent irrigations with one week intervals.

(e) *Introduction of varieties*.—Ninnidhan a paddy variety from Araku Valley reported to be resistant to blast was grown in the normal planted conditions. Blast was not noticed as the season was not favourable for blast.

(f) *Trials of blast resistant material sent by the Government Mycologist*.—The field was ploughed dry and it was puddled after the receipt of water. Bone meal was applied at 112 lb. per acre at the time of planting and ammonium sulphate was applied as top dressing at 100 lb. per acre.

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Trials with 80 cultures, 3 strains and 1 Molakolukulu local from the Government Mycologist were laid out in two series both under normal and late planted conditions. Late planted crop failed before flowering. Observation on normal planted crop showed that the incidence of blast was negligible during the season.

6. *Other crops*—(1) *Cotton*.—P. 216-F cotton was sown on 23rd April 1952 after paddy in an area of 12½ cents during the year. This was affected by the heavy rains received during May 1952. The crop is on the field.

(2) *Perennial cottons*.—Moco cotton was sown on 23rd July 1947 and 23rd September 1951 in the A Block high piece and 3 lb. 12 oz. of kapas were collected during the year.

(3) *Vegetables*.—Indigenous vegetables like snake gourd, ribbed gourd and bitter gourds were grown in small areas in odd places from which 26 lb. 5½ oz. of seeds were collected.

(4) *Pulses*.—Horsegram and greengram were sown as pyru crops. They gave average acre yields of 316 lb. and 169 lb. respectively.

(5) *Fruit plants—Lemons*.—Four in each of Villa Franca, Lisbon, and Rajahmundry lemons were planted during the year. Two Rajahmundry and one Lisbon are surviving.

(6) *Papaya*.—Forty-one seedlings planted during the year were damaged by the cyclone that occurred during May 1952.

(7) *Fodder grasses*.—Guinea, thin Napier and Panicum antidotale grasses were grown in small areas for supply of slips.

(8) *Green manures*—(i) *Glyricidia*.—One thousand one hundred and fifty-one seedlings were planted on the field bunds and along the fence and 532 are surviving. Eight pounds of seeds were collected from the old plants.

(ii) Seedlings were planted along the field bunds and irrigation channels and 536 lb. of seed were collected from these during the year.

Trial of other plants.—Indigofera teysmani and Kudzu vine tried on the farm during the year did not establish.

Seed distribution.—The following quantity of seed materials were distributed during the year under report :—

	LB.	OZ.
Paddy	2,081	8
Vegetables	12	14
Pillipesara	50	0
Sesbania speciosa seed	452	0
Glyricidia maculata seed	5	0
Guinea grass slips	14,750	0
Panicum Antidotale slips	1,000	0
Economic plant seedlings	400	0

RICE RESEARCH STATION,
BUCHIREDDIPALEM,
26th July 1952.

V. RAJAGOPALA REDDI,
Senior Science Assistant in-charge.

GUNTUR,
20th August 1952.

T. RANGABRAHMA RAO,
Deputy Director of Agriculture, III Division.

APPENDIX I.

STATEMENT EXHIBITING THE EXPENDITURE AND RECEIPTS OF THE AREAS IN WHICH BULK CROPS HAVE BEEN GROWN IN 1951-52.

	Expenditure		Paddy.		Pulses.	
	Per 3'16 acres.	Per acre.	Per 3'16 acres.	Per acre.	Per 3'62 acres.	Per acre.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
	RS.	A.	P.	RS.	A.	P.
Preparatory cultivation	80	13	3	25	9	3
Manures and manuring	91	8	0	28	15	0
Seeds and sowings	52	8	6	16	10	0
After cultivation	22	11	0	7	3	0
Irrigation	12	13	6	4	1	0
Harvesting, threshing, cleaning, etc.	59	7	0	18	13	0
Total	319	13	3	101	3	3
				127	15	7
				38	1	10

	Receipts.		Paddy.		Pulses.	
	Per 3'16 acres.	Per acre.	Per 3'16 acres.	Per acre.	Per 3'62 acres.	Per acre.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Lb.					
1. Grain	1,201½	380	922	255		
Value	Rs. 162-6-1	51-6-0	181-12-10	50-3-7		
2. Straw or bhoosa	2,737	866	1,674	462		
Value	Rs. 23-1-0	7-4-9	33-15-6	9-6-0		
Total	185-7-1	58-10-9	215-12-4	59-9-7		

	RS.	A.	P.
Total, Receipts for bulk crops	401	3	5
Total, Expenditure for bulk crops	447	12	10
Balance (Loss)	46	9	5

Note.—The paddy crop was a failure due to drought and non-receipt of water from the reservoir. Hence there was loss.

APPENDIX II.

EFFORTS MADE TO INCREASE THE REVENUE OF THE STATIONS.

(1) Filter points are being tried for assured supply of water for main crop and to raise cotton, groundnut, etc., in the fallow period.

(2) Horsegram and greengram were grown to reduce the fallow period.

(3) Vegetables in odd places were grown, green manure plants for seed and manure to reduce the manure bill are planted in field bunds, channel bunds and odd places.

APPENDIX III.

FINANCIAL STATEMENT OF THE RICE RESEARCH STATION, BUCHIREDDIPALEM,
FOR THE YEAR 1951-52 (FASLI 1361).(A) Expenditure—40. C. Agriculture—Experimental farms—A.
Agricultural Research Station—Voted—

	RS.	A.	P.
(1) (a) Pay of establishment—Temporary	5,313	4	0
(b) Dearness allowance	1,776	9	0
(c) Travelling allowance	683	14	0
Total, Pay and allowances of establishment ..	7,773	11	0

(2) Contingencies—

(a) Petty construction and repairs	39	13	0
(b) Other contingencies	312	4	3
(c) Purchase of live and deadstock	282	14	5
(d) Working expenses	8,922	1	3
(e) Dearness allowance to menials	1,124	1	3
Total, Contingencies ..	10,681	2	2

(B) Receipts—XXIX. Agriculture—Agricultural Receipts—

(a) Agricultural stations	1,076	0	4
(b) Miscellaneous	49	0	9
(c) Value of seed transferred to District work officers	542	2	7
Total, Receipts ..	1,667	3	8

ANNUAL REPORT OF THE AGRICULTURAL RESEARCH STATION,
NANDYAL, FOR 1951-52 (FASLI 1361).

Season.—There was a total of 32.54 inches rain spread over 62 days during the year as against the normal of 28.17 inches in 65 days. A statement of rainfall for the year in the usual form is furnished in Table I.

TABLE I.—Rainfall statement, 1951-52.

		1951-52.		1950-51.		Average for the past ten years.		Average for the past forty-three years.	
Month.	Week.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.
South-west monsoon.									
June	7-13	..	..	1.45	2	0.65	2.0	0.73	2.0
	14-20	..	..	1.02	2	0.90	2.0	0.89	2.18
	21-27	0.61	5	1.02	2	1.00	1.80	0.86	2.35
	28-4	0.03	1	1.93	3	1.03	2.80	0.86	2.35
July	5-11	3.68	6	2.15	6	1.45	3.50	1.14	6.95
	12-18	1.61	3	1.12	2	0.95	2.00	1.23	2.90
	19-25	0.99	7	1.46	4	1.45	3.80	1.37	3.49
	24-1	0.47	2	2.23	4	1.14	2.60	1.16	2.86
August	2-8	0.95	4	0.59	4	1.44	3.10	1.33	3.05
	9-15	0.35	3	..	..	1.14	2.40	0.82	2.53
	16-22	..	..	..	..	0.66	1.60	1.34	2.95
	23-29	1.64	3	0.34	5	1.11	2.80	1.23	2.84
	30-5	1.57	4	1.53	3	1.00	2.40	1.21	2.53
September	6-12	0.66	2	4.67	6	1.84	3.40	1.39	2.95
	13-19	..	..	0.21	2	1.35	2.40	1.81	3.07
	20-26	..	..	0.09	1	2.16	3.10	1.76	2.93
Total ..		12.56	40	13.70	44	19.27	41.70	19.23	41.98
North-east monsoon.									
October	27-3	1.06	4	0.59	1	0.77	1.80	1.29	2.67
	4-10	0.12	3	2.59	2	0.86	2.00	0.91	2.16
	11-17	0.13	1	0.90	3	0.97	2.40	0.83	2.14
	18-24	0.19	1	0.14	2	0.62	1.80	0.82	1.86
	25-31	..	..	..	..	0.31	1.00	0.53	1.00
November	1-7	..	..	0.24	2	0.23	0.90	0.56	1.44
	8-14	..	..	..	..	0.43	1.40	0.25	1.05
	15-21	..	..	..	..	0.34	0.60	0.26	0.56
	22-28	..	..	..	..	0.23	0.50	0.13	0.53
	29-5	..	..	..	..	0.11	0.10	0.10	0.23
December	6-12	..	..	..	..	0.02	0.20	0.08	0.20
	13-19	..	..	..	..	0.07	0.30	0.03	0.19
	20-26	..	..	..	..	0.01	0.10	0.01	0.11
January	27-3	..	..	..	..	..	..	0.01	0.09
	4-10	..	..	..	..	..	..	0.01	0.09
	11-17	..	..	..	..	..	..	..	..
	18-24	..	..	..	..	..	..	0.01	0.09
	25-31	..	..	..	..	..	..	0.01	0.11
Total ..		1.50	9	4.46	10	5.07	13.10	5.84	14.57
Hot weather.									
February	1-7	..	..	..	..	0.06	0.20	0.91	0.23
	8-14	..	..	..	..	..	..	0.20	0.11
	15-21	..	..	..	..	0.90	0.40	0.05	0.19
	22-28	..	..	..	..	..	0.10	0.01	0.11
	29-7	..	..	..	..	0.01	0.20	0.07	0.14
March	8-14	..	..	..	..	0.07	0.10	0.02	0.01
	15-21	..	..	..	..	0.03	0.10	0.02	0.01
	22-28	..	..	..	..	0.24	0.40	0.03	0.20
	29-4	..	..	1.40	2	0.20	0.40	0.16	0.43
	5-11	..	..	..	..	0.33	0.8	0.14	0.35
April	12-18	..	..	0.09	1	0.24	0.7	0.14	0.49
	19-25	0.60	1	0.03	1	0.08	0.2	0.20	0.68
	26-2	0.40	2	..	..	0.10	0.9	0.12	0.58
	3-9	..	..	..	..	..	..	..	..

Month.	Week.	1951-52.		1950-51.		Average for the past ten years.		Average for the past forty-three years.	
		Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.
Hot weather—cont.									
May	3-9	0.12	2	0.22	1	0.07	0.4	0.86	0.85
	10-16		..		..	0.28	1.4	0.20	0.95
	17-23	12.43	3	2.20	1	0.79	1.3	0.59	1.37
	24-30	46.7	3	0.71	4	0.35	0.9	0.37	1.26
	31-6	0.26	2	4.36	4	0.89	2.1	0.78	1.74
	Total	18.48	13	9.01	14	3.83	10.40	4.92	9.65
	Grand total	32.54	62	32.26	68	28.17	65.20	29.86	66.20

2. It may be seen that in both south-west and north-east monsoon periods the rains were in deficit by 6.71 inches and 3.57 inches respectively, compared to the normal. The total precipitation however exceeded the average annual rainfall due to the heavy and unprecedented fall of about 18 inches towards the end of the hot weather period. The useful precipitation for the cropping of 1951-52 was therefore defective. Most of the rains received were light and saturation of the soil could not be reached. This, coupled with the long drought caused by the failure of the north-east monsoon, contributed to low yields. However the Pyrugali commenced early and helped much in promoting the growth of the crops and averted complete failure of the crops.

3. The south-west monsoon commenced well. Adequate rains were received for sowing of the early crops like groundnut, redgram and Korra in proper season. Groundnut had severe aphid attack and by the time the pest got controlled by its natural enemy, the predatory ladybird beetle, drought set in. So the crop could not make much progress. Severe sun and absence of showers were experienced from early in August. With the help of the rains received in the last week of August and first week of September cotton and jonna sowings were done. Cotton sowings were late by about ten days as in the previous year. After sowing there was hardly 1.50 inches of rain. The droughty weather had a very adverse effect on all crops. However, with the commencement of Pyrugali by the last week of November all the standing crops, specially jonna, pulled up considerably. Jonna and bengalgram were benefited by these favourable conditions and jonna gave exceptionally good yields. The long duration crops like cotton, redgram and spreading groundnut could not however sustain and hence yielded low. The maturity of the crops was hastened in all cases by about ten days. Due to the failure of the north-east monsoon water in the channel was also less. There was rotational letting in water in the channel and paddy crop had semi-swamp conditions. In spite of these adverse conditions, due to the good manuring and start given to it, it yielded well. The season, on the whole, was very unfavourable to all crops except jonna.

PART I.—MILLETS.

4. *Sorghum*.—An area of 28.8 acres was under jonna. The crop, both in the experimental as well as in bulk areas, received ammonium sulphate at 80 lb. per acre at the time of sowing in addition to the basal application of farm-yard manure or town compost at 5 cart-loads per acre. The sowing was done in the proper season and the germination was excellent. Due to the application of the ammonium sulphate the seedlings had a good start. The high yields obtained during the season are mainly attributable to the good fillip the crop had in the early stages.

5. The crop improvement in jonna consisted of work on (a) Mungari Patcha jonna, (b) Pithy stemmed patcha jonna.

(a) *Mungari Patcha Jonna*.—(i) *District trials*.—The three strains N.J. 6; N.J. 16 and N.J. 20 which have been found suitable to Dhona and Pattikonda taluks of this district were tried in Giddalore-Markapur areas and in Anantapur and Bellary districts in the various taluks where mungari patcha jonna is grown. No conclusive

results could be obtained from Bellary district. In Anantapur N.J. 6 was found to be late. In Giddalore-Markapur areas also similar behaviour was noticed. They however continued to be popular in Pattikonda and Dhona taluks. They have been given station numbers this year. N.J. 6 in future will be known as N. 10, N.J. 16 as N. 11 and N.J. 20 as N. 12. N. 41, a single plant selection from Sandur area of Bellary district, was given out for trial in its place of origin. It is reported to be yielding about 10 per cent more than the local bulk for the last two seasons.

(ii) As mentioned in the last report, pending the opening of a separate sub-station at Dhona; mungari selections are being tried in the station itself in the late season. N.J. 6, 16 and 20 (N. 10, N. 11 and N. 12) were raised for maintenance of pure nucleus seed and multiplication.

Following are their yields :—

Selection.	Area sown.		Yield per acre
	ACS.	LB.	
N.J. 6 (N. 10)	1.75	789	
N.J. 16 (N. 11)	1.00	932	
N.J. 20 (N. 12)	1.00	722	

(iii) *Preliminary yield trials*.—N. J. 45 and N.J. 119 from Adoni and Kudligi of Bellary district, N.J. 93, 110 and 146 from Hindupur, Uravakonda and Anantapur taluks respectively of Anantapur district (five selections in all) were compared with N.J. 6 in a randomized layout with six replications for the first time during this season. A summary of results is presented below in Table II.

TABLE II.—Preliminary comparative trials with the mungari jonna selections.

Field number—6.	Spacing—101"
Layout—Randomized blocks.	Manuring—Ammonium sulphate at 100 lb. per acre.
Replications—Six.	Sown on—17th September 1951.
Varieties—Six.	Flowered—3rd November 1951.
Area of each plot—	Ripened—1st January 1952.
Gross—100 1 × 12 1: 1.20 cents.	Harvested—4th January 1952.
Nett—83 1/31 × 12 1: 1.00 cents.	

Summary of results.

Serial number and strain number.	Grain.		Straw.	
	Acre yield in pounds.	Percentage on control.	Acre yield in pounds.	Percentage on control.
1 N.J. 6 (control)	1,111	100	2,346	100
2 N.J. 45	917	83	3,446	147
3 N.J. 93	932	84	2,758	117
4 N.J. 110	924	83	2,517	107
5 N.J. 119	695	63	3,829	163
6 N.J. 146	917	83	2,179	93
Whether 'Z' test is satisfied or not.	Yes.	..	Yes.	..
Standard error	28	3	119	4
Critical difference	83	9	330	12
Conclusions—				
Grain—1, 3, 4, 2, 6, 5.				
Straw—5, 2, 3, 4, 1, 6.				

The yield differences for both grain and straw were statistically significant. In grain yield N.J. 6, the control was superior to all the rest. Except N.J. 119 all others were on par with each other. In straw yields three selections N.J. 119, N.J. 45 and N.J. 93 were better than control; and the remaining two on a par. Pure cultures of seven selections of Bellary district and eight of Anantapur district were raised and these include the selections in preliminary yield trial also. Twelve of them that were desirable were selected for trial during 1952-53 in their respective places of origin, as their trial on the station does not represent

Selection number. (1)	A.S. 4003. (2)	N. 1. (3)	14. (4)	17. (5)	19. (6)	23. (7)	34. (8)
Percentage of striga attack	3.3	21.7	6.7	11.2	16.8	29.0	25.2
	35.	39.	43.	Whether significant by 'Z' test.	Standard error.	Critical difference.	
Percentage of striga attack	(9) 18.7	(10) 34.3	(11) 13.0	(12) Yes.	(13) 5.11	(14) 14.4	
Conclusions— A.S. 4003, 14, 17, 43, 19, 35, N. 1, 23, 39.							

No selection was better than control in striga resistance. Seventeen selections showed as low a percentage of striga infection as A.S. No. 4003 and they were selected for further trials in the next season.

(b) *Hybridization*.—Two hybrid strains, 8194/1 and A.S. 8196/4, derivatives of N. 1 X A.S. 4003 in F7 generation, were sown in bulk yield trials with A.S. 4003 and N. 1 as controls in a randomized layout, replicated six times. The data is presented in Table IV.

TABLE IV.—Trial of hybrids—Percentage of striga infection, grain and straw yields.

Layout—Randomized blocks.
Variants—Four.
Replications—Six.
Size of the plot—62.5 × 12 S.Q. Links.
(0.75 cents).

Field number—2. B. East.
Sown on—12th September 1951.
Harvested—11th January 1952.

Summary of results.

Selection numbers and details.	Mean per cent of striga infection per plot.	Percentage over Control A.S. 4003.	Grain yield in lb. per acre.	Per cent over control.	Straw per acre in lb.	Percentage over control.	Average number of Jonna plants per plot.	Percentage over control.
	(a)		(b)		(c)		(d)	
A.S. 8196/4 ..	43.8	319	119	305	1,311	63.4	327	80.1
A.S. 8194/1 ..	52.5	383	188	482	1,755	84.9	402	98.5
N. 1	50.0	431	136	348	1,133	54.8	471	115.4
A.S. 4003 ..	13.7	100	39	100	2,006	100	408	100
Whether significant by 'Z' test.	Yes.	..	Yes.	..	Yes.	..	Yes.	..
Critical difference.	16.5	120.4	12.3	31.5	139	6.7	65	..

Conclusions—

(a) N. 1, 8194/1, 8196/4, A.S. 4003
(b) 8194/1, N. 1, 8196/4, A.S. 4003.
(c) A.S. 4003, 8194/1, 8196/4, N. 1.
(d) N. 1, A.S. 4003, 8194/1, 8196/4.

In the matter of striga resistance both were poor than A.S. 4003. A.S. 8194/1 was better than the rest in grain yield. It was proposed to repeat the trial. Twenty-eight crosses effected last year on N. 1, N. 2 and 3 with the striga resistant type A.S. 4003, were all sown to pick out the F₁ plants. Sixty F₁ plants free from striga were collected. Some more fresh crosses were made in N. 1, N. 2 and N. 3 using A.S. 4003 as male parent. Reciprocal crosses were not made due to non-availability of sufficient number of plants in flower in A.S. 4003 at the time the other parents came to flowering. The Mungari types N. 10, N. 11 and N. 12 were also crossed with A.S. 4003.

(ii) *Agronomic experiments for control of striga*—(a) *Trap cropping*.—The object of the experiment is to find out the number of jonna trap crops required to exterminate or control striga in heavily striga infected field.

The treatments of this experiment are trap cropping versus control. In the trap plots jonna will be sown thick to give scope for a large number of striga seeds to germinate and could be removed along with jonna before it sets seed. Two crops were raised in a year. In the control plots jonna is sown in the usual season for grain crop as per normal practice. The layout was in randomized plots with twelve replications. During the year under report two trap crops were raised. The first was sown on 9th June 1951 and removed on

23rd August 1951. In this crop germination and stand were not satisfactory. The striga infection was also sparse. The number of striga plants per plot was given in Table V.

TABLE V.—Trap-Cropping experiment.—First trap-crop.

Treatments—Two. Replications—Twelve. Layout—Randomized. Size of plot—One cent (62.5 x 16) sq. links.	Field No.—2. B. East. Sown on—9th June 1951. Pulled out whole plants—23rd August 1951.
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Density of striga infection in trap-crop plots.			
Plot numbers.	Number of striga plants per plot.	Plot numbers.	Number of striga plants per plot.
2	24	14	85
4	23	15	136
5	15	18	63
8	27	19	95
9	57	21	28
11	76	23	60

The second was sown on 15th September 1951, along with the regular jonna crop. Striga infection was seen in both the plots by about the middle of November. The data is presented in Table VI.

TABLE VI.—Trap-cropping experiment—1951-52—Second Trap-crop.

Layout—Randomized blocks. Replications—Twelve. Treatments—Two. Area of plot—One cent (52.5 x 16 sq. links).	Sown—25th September 1951. Harvested—Trap crop plots—29th November 1951 Control plots—7th January 1952.
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Percentage of striga infection.			
	Trap crop	Control.	Whether significant by 'Z' Test.
Percentage of striga infection	14.7	50.0	Yes.
Conclusion—Trap crop > control.			Critical difference. 21.96

The incidence of striga was significantly low in the trap cropped plots than in control.

(b) *Hand weeding and spraying experiment*.—Spraying with weedicides like 2, 4-D and agroxone (Imperial Chemical Industries Patent Products) to exterminate the striga during the crop growth and pulling out all striga shoots before they set seed were compared with no treatment as control in another experiment. It is proposed to find out the progress of decrease in the intensity of striga infection by hand weeding or spraying and to find out the number of years required for eradicating striga in an infected field. Spraying with 2, 4-D (at 1½ lb. of powder dissolved in 100 gallons of water) and agroxone (one gallon of 10 per cent liquid dissolved in 100 gallons of water) were done three times and the data given in Table VII. These treatments were effective in preventing the striga shoots that emerged out from setting seed and thus preventing fresh infection. But the parasite seems to do more harm to the host plant even before it emerges above the ground. The removal or annihilation of the emerged shoots of striga by spraying with weedicides did not reflect in any increase in the yield of jonna crop this year. The data of grain and straw yields are presented in Table VII.

TABLE VII.—Hand weeding and spraying experiment, 1951-52.

Layout—Randomized blocks. Treatments—Four. Replications—Six. Field number—2 B. East. Sown—15th September 1951, (N. 1 Jonna) Flowered—20th November 1951	Ripened—30th December 1951. Harvested—9th January 1952. Sprayed—20th November 1951, 30th November 1951 and 17th December 1951. Harvested—14th November 1951, 30th November 1951 and 20th December 1951.
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Treatments and details.	Summary of results.					
	Acre yield of grain in pounds.	Percentage over control.	Acre yield of straw in pounds.	Percentage over control.	Money value of produce per acre.	Cost of treatment per acre.
1 Control	207	100	1,116	100	43	RS. A. P.
2 Spraying with Gamaxine	242	112	1,300	116	50	NH.
3 Spraying with Agroxone	240	111	1,316	117	50	39 12 0
4 Hand weeding	228	110	1,250	112	48	35 14 0
Whether significant by 'Z' test.	No.	..	No.	..	No.	23 1 0
Standard error of treatment means.	30	14.5	114	10.2	..	..

(c) *Experiment to study the effect of deep cultivation in summer on the control of striga.*—Another experiment was started to see if deep ploughing to a depth of one foot every year or alternate years would reduce the striga incidence. Provision for a rotation of jonna and cotton was made and to obtain all the treatments for comparison in the succeeding years, the experiment was designed with the following twelve variants:—

- I. Deep cultivation every year and sown to jonna-jonna (rotation).
- II. Deep cultivation every year and sown to jonna-cotton (rotation).
- III. Deep cultivation every year and sown to cotton-jonna (rotation).
- IV. Deep cultivation in alternate years and sown to jonna-jonna (rotation).
- V. Deep cultivation in alternate years and sown to jonna-jonna (rotation).
- VI. Deep cultivation in alternate years and sown to jonna-cotton (rotation).
- VII. Deep cultivation in alternate years and sown to cotton-jonna (rotation).
- VIII. Deep cultivation in alternate years and sown to cotton-jonna (rotation).
- IX. Deep cultivation in alternate years and sown to jonna-cotton (rotation).
- X. Normal cultivation and cropping jonna-jonna (rotation).
- XI. Normal cultivation and cropping jonna-cotton (rotation).
- XII. Normal cultivation and cropping cotton-jonna (rotation).

As it is not practicable to have deep ploughing due to the small size of the plot deep ploughing was simulated by digging to a depth of 1 foot. The experiment was laid out in a patch previously infected with striga seed and where the striga infection was fairly uniform on the previous sorghum crop. During this year N. 1 jonna was sown in 16 deep ploughed plots and 16 non-ploughed plots. Counts of striga infection taken in 1 square yard area in each plot revealed that the incidence was less in deep ploughed plots. The reduction in the incidence of striga, however, did not reflect in any increase in yield. The data are presented in Table VIII.

TABLE VIII.—Deep cultivation experiment, 1951-52—Strain and straw yields of jonna.

Field number—2, B. East.		Sown on—15th September 1951.				
Treatments—Two (2).		Harvested—9th January 1952.				
Size of plot—16 x 31.25 square fms.						
Summary of results.						
Treatments and other details.	Acre yield of grain in pounds.	Percentage over control.	Mean acre yield of straw in pounds.	Percentage over control.	Mean percentage of striga attack (average of two sub-plots).	Percentage over control.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Normal cultivation jonna (control).	406	100	1,850	100	29	100
Deep cultivation (jonna)	306	75	2,138	121	3	10
Whether significant by 'Z' test.	No.	No.	No.	No.	Yes.	Yes.
Critical difference						
Standard error treatment means.	121.2	..	440.0	..	15.7	54.0
Conclusions—					5.5	12.0
Mean percentage of striga attack—				mal cultivation > deep cultivation.		

(d) *Experiment on soil treatment with chemicals to kill striga seed.*—It is proposed to conduct soil treatment experiments with Fernoxone (2, 4-D) at 10, 20 and 30 lb. per acre and quicklime at $\frac{1}{2}$ and 1 ton per acre to see if striga seeds are killed in the soil. As the chemical has a deleterious effect on the germination of sorghum a preliminary experiment was conducted during the year to determine the safe period of interval to be left between the date of soil treatment and the date of jonna sowing. It was observed that in the case of Fernoxone treatment of the soil an interval of three months is required between the treatment of the soil and the sowing of jonna. Application of quicklime had no adverse effect on the germination and progress of growth of jonna. The data are presented in Table IX.

TABLE IX.—Soil treatment with chemicals—Percentage of jonna seedlings 4-5 weeks old after sowing on the basis of 200 seeds sown.

Date of treatment.	Rainfall during the month in inches.	Average of three replications.			Control number treatments.			Lime rate per acre.		
		Fernoxone rate pound per acre.						20	10	5
		30	20	10	1	2	3	(9)	(10)	(11)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	CWT.	CWT.	CWT.
1st March 1951	0.43	63	67	78	45	79	63	48	58	78
2nd April 1951	0.97	54	79	87	52	37	74	60	48	49
1st May 1951	3.12	20	38	37	29	52	62	24	50	38
1st June 1951	4.97	40	32	42	57	49	55	56	49	47
1st July 1951	6.40	42	40	43	31	63	46	24	33	25
2nd August 1951	3.36	1.5	..	3	44	32	39	46	41	34
3rd September 1951	3.01	..	..	1.3	47	44	43	42	40	48

PART II.—COTTON.

8. During the season an area of 14 acres was under cotton. Out of this 2.35 acres was under N. 14 for the maintenance of pure nucleus seed and 2.80 acres under American types. The cotton crop was manured with ammonium sulphate at 100 lb. per acre. The sowing rains for cotton were late this year also about 10 days than usual. During the crop growth hardly 1.50 inches of rain was received, and due to the severe drought that followed, the yields were poor. There was more boll worm attack during the season. Similar adverse seasonal conditions prevailed throughout the district and cotton was a failure in most of the taluks. The average yield of N. 14 in the multiplication plots was only 190 lb. per acre as against the normal yield of 300 lb.

9. The crop improvement work is dealt with under the following heads:—

(i) *Improvement of White Northerns cotton.*—The scheme for the improvement of white northerns cotton is financed by the Indian Central Cotton Committee and this is the third year of its working. The object of the scheme is to bring all the 1.2 lakhs of acres of northerns tract under one strain which will have the quality of N. 14 in spinning to 40 warp counts, the yielding capacity of the local varieties and higher ginning of at least 30 per cent thereby increasing the normal lint yield of the tract from 50 to 60 pounds per acre.

(a) *District trial.*—The trial of the five promising strains of last year, 5202, 5001, 5289 and 5975 was repeated in the district in five taluks, Nandyal, Nandikotkur, Allagadda, Koilkuntla and Banganapalle representing the northerns tract. Due to the failure of season the results of only six trials in Nandikotkur and Nandyal taluks were obtained. Their performance is furnished in Table X.

TABLE X.—District trials (Cotton).

System of layout—Scattered blocks.	4 Konedheda.
Number of variants—5.	5 Thatipadu.
Number of localities tested—6.	6 Sripathraopet.
1 Chaprevula.	Area of each plot—
2 Polur.	Gross—5 cents.
3 Parnapalli.	Nett—5 cents.

Summary of results.

Serial number and types.	Average yield of kapas per acre in pounds.			Percentage over control N. 14.	Average staple length, 1951-52.	Average ginning percentage, 1951-52.	Maximum warp counts.	Average lint yield, 1951-52.	Average acre, cash value.
	1949-50.	1950-51.	1951-52.						
1 5202	178	375	84	87	0.91	29	37a	28	25
2 5001	141	288	78	75	0.94	29	41a	28	25
3 5289	141	288	81	84	0.92	28	39a	28	25
4 5975	..	254	73	75	0.95	32	39a	28	25
5 N. 14	185	284	97	100	0.90	25	41a	28	25
6 Local	160	300	90	93	0.86	26	..	28	25
Whether significant by 'Z' test.	..	Yes.	No.	Yes.	..	..	..	No.	..
Standard error	..	9	19.2	1.5	..	..	..	..	..
Critical difference	..	28	..	13	..	..	..	1.3	..
Conclusions—									
1949-50—1, 5, 6, 2, 3.									
1950-51—Not significant.									
1951-52—5, 6, 1, 3, 2, 4.									

The magnitude of yields was low in these trials. All the strains were poorer than N. 14, in the yield of seed cotton this year. In lint yields, however, they were all on the same level as N. 14. In 1949-50 season all the strains were equal to control and in the last season the results were not significant. Considering the performance of these in the past two years further trial is necessary.

(b) *Bulk trials.*—Ten cultures 5202, 5001, 5289, 5975, 5888, 6116, 6224, 6234, 6243-1/3C and 6234 were compared with N. 14 and local Gadag in replicated bulk trials with the object of testing their yields. These include the four strains in district trials, two good yielders of last year's bulk trials and four families found pure in the family block trials of last season. The performance of these is furnished in Table XI.

TABLE XI.—Bulk trial of purified cultures of Cotton.

Field number—7.
System of layout—Randomized blocks (12 × 6).
Number of variants—12.
Size of each plot—
Gross—1·05 cents.
Net—0·50 cent.

Summary of results.

Serial number and culture.	Parentage.	Average acre yield in pounds of kapas.			As percentage over N. 14.	Average lint yield in. lb. per acre.	Mean halo length m.m.	Mean ginning per- centage.	Yarn strength for 40 s counts.
		1949-50.	1950-51.	1951-52.					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1 8246A2C ..	N. 14 × 1523 ..	..	..	204	96	90	23	34	45-2
2 6116 ..	L3 4/4 × N. 14 ..	..	..	250	90	75	23	30	44-8
3 6234 ..	N. 14 × 1523 ..	264	694	245	88	85	23	35	29-5
4 5202 ..	G. 4 × 1523 ..	175	566	229	83	71	24	31	32-4
5 5975 ..	1523 × N. 14 ..	242	582	224	81	76	23	34	37-5
6 6224 ..	Do. ..	392	620	221	80	71	22	32	42-4
7 5377 ..	Do. ..	..	..	221	80	75	23	34	36-6
8 5289 ..	Do. ..	242	626	206	76	64	23	30	35-0
9 5001 ..	Do. ..	203	666	200	73	64	23	32	34-8
10 6234 } 1/30 ..	L3 4/4 × N. 14 ..	..	..	185	67	59	24	32	45-7
11 N. 14 ..	..	..	..	277	100	74	22	27	40-0
12 Gadag ..	..	..	..	282	102	76	20	27	..
Whether significant by 'Z' test ..	..	..	..	Yes.	..	..	..	Yes.	..
Standard error ..	..	..	..	10	..	..	0-4	0-3	..
Critical difference ..	..	..	..	30	11	..	1-0	1-0	..

Yield—12, 11, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10.

Halo length—4, 10, 5, 7, 1, 3, 8, 2, 9, 6, 11, 12.

Ginning percentage—3, 5, 1, 7, 9, 6, 10, 4, 2, 8, 12, 11.

The yield differences were significant and 6246A2C and 6116 were on a par with N. 14 while the rest were poorer in yield of kapas. In ginning outturn all were better and consequently five of them excelled the control in lint yield. The yarn strength figures for 40s counts obtained by micro-spinning tests and presented in Table XI reveal that all the cultures except 6234 were as good as N. 14. In view of the bad season the quality types require further trial.

(c) *Compact family block trials.*—Fifteen families reselected for further purification and eleven selections advanced from progeny rows were sown in two sets of family block trials with N. 14 as control. Corresponding small bulk trials were also sown for preliminary yield test. There was high shedding in the selections advanced from progeny rows. The results are furnished in Table XII and Table XIII separately for the two sets.

TABLE XII.—*Compact family block trial (Set II).*

Field number—7.
System of layout—Randomized blocks.
Number of variants—15 + 1.
Number of replications—Six.

Spacing—1½' between rows. Manuring—20 lb. Nitrogen
in the form of ammonium sulphate.
Sown on—3rd September 1951.
Period of harvest—15th February to 31st March
1952.

Summary of results.

Serial number and family.	Parentage.	Yield of seed cotton per acre.				Mean hale length.		Mean ginning per- centage.		Sib difference.		
		Family blocks.		Small bulk trials.		In F.B.	In S.B.T.	In F.B.	In S.B.T.	Yield.	Length.	Ginning.
		Kapas weight in lb. per acre.	Percentage over control.	Kapas weight in lb. per acre.	Percentage over control.							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1 6246A2D.	N. 14 × 1523	513	149	286	80	23	26	36	35	N	S	S
2 6185	(523R × 522) × 7036.	410	119	160	45	23	26	33	28	N	S	S
3 4996	1523 × N. 14	333	96	286	80	21	25	31	31	N	N	S
4 4527	Do.	326	95	313	88	21	26	21	32	S	N	S
5 5888	Do.	317	92	268	75	21	25	31	31	N	N	N
6 62185/3C.	Do.	291	85	286	80	..	27	..	33			
7 7037	(4714 × 1539) 10.	238	84	277	78	..	26	..	32			
8 5935	1523 × N. 14	280	81	268	75	24	27	35	34	N	S	N
9 6214	Do.	272	79	268	75	..	25	..	33			
10 6322	1523Q11 × 6144	273	79	268	75	..	25	..	33			
11 6199	1523 × N. 14	255	74	257	72	..	26	..	33			
12 6212	1523 × 2514	240	70	235	68	..	24	..	33			
13 5976	1523 × 14	240	70	215	60	..	27	..	33			
14 6243 1/3D.	L3 4/4 × N. 14	239	70	257	72	..	28	..	32			
15 5966	Do.	170	49	259	73	..	26	..	30			
16 N. 14	Control	344	100	343	100	22	24	26	25			
Whether 'A' test is satisfied.		Yes.		Yes.		Yes.	No.	Yes.	Yes.			
Standard error		29		15		0.7		0.4	0.9			
Critical difference		81		41		2.0		1.0	2.0			

Yield—Family blocks—1, > 2, (16), 3, 4, 5, 6, 7, 8, 10, 9, 11, 12, 13, 14, 15.

Small bulk trials—(16) > 4, 1, 3, 6, 7, 5, 8, 9, 10 15, 11, 14, 12, 13; 2.

Lint length—Family blocks—8, 1, 2, (16), 3, 4, 5.

Small bulk trial—Not significant.

Ginning percentage—Family blocks—1, 8, 2, 3, 4, 5, <(10).

Small bulk trials—1, 8, 6, 9, 10, 11, 12, 13, 4, 14, 3, 5, 15, 2, <(16).

It can be seen that among the families tried for further purification one family 6246 A2D was significantly better, nine equal and the rest poorer than control in yield of kapas. The corresponding bulk yields were all lower than N. 14. The better yielder mentioned had higher ginning outturn and good lint length but is not pure for all characters. As per the micro-spinning test conducted all the families compared favourably with N. 14 in quality.

TABLE XIII.—Compact family block trial (Set III).

Field number—7.
System of layout—Randomized blocks.
Number of variants—11 + 1.
Number of replication—Six.
Spacing—1½' between rows.

Manuring—20 lb. of nitrogen in form of ammonium sulphate.
Sown on—3rd September 1951.
Period of harvest—15th February to 31st March 1952.

Summary of results.

Serial number and family.	Parentage.	Yield of seed cotton.				Mean halo length.		Mean ginning percentage.		Stb difference.		
		Family block.		Small bulk trials.		block	bulk	block	bulk	Yield.	Halo length.	Ginning percentage.
		Kapas yield in lb.	Percentage over control.	Kapas yield in lb.	Percentage over control.							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1 46-1 ..	1523 × N. 14 ..	245	79	256	90	20.2	21.0	33.3	35.0	N	N	S
2 5001-1 ..	Do. ..	318	103	214	75	21.7	23.7	29.5	29.0			
3 46-3 ..	Do. ..	191	65	197	69	20.5	20.7	30.3	31.7			
4 6314-1 ..	4714 × 1539 ..	236	76	143	51	21.7	22.8	33.5	35.3			
5 7-2 ..	(4714 × 1539) L3 -10 ..	254	82	270	95	22.7	22.0	33.0	34.1			
6 21 ..	Do. ..	182	59	231	81	20.7	21.3	33.3	35.5			
7 6318 ..	4714 × 1539 ..	218	71	166	58	20.5	21.0	29.0	31.0			
8 6314-2 ..	Do. ..	233	85	159	56	23.3	22.3	31.0	32.5			
9 17 ..	C11-2 × 4829 ..	209	63	123	43	20.3	21.7	36.5	37.1			
10 46-2 ..	1523 × N. 14 ..	200	65	291	102	21.0	21.3	31.3	30.5			
11 7-1 ..	(4714 × 1539) L3-10 ..	218	71	303	107	21.5	21.7	32.3	33.8			
12 N. 14 ..	..	309	100	284	100	21.7	22.5	25.1	27.2			
Whether 'Z' test is satisfied ..	Yes. ..	Yes. ..	Yes. ..	Yes. ..	Yes. ..	Yes. ..	Yes. ..	Yes. ..	Yes. ..			
Standard error ..	24 ..	24 ..	24 ..	24 ..	24 ..	0.5 ..	0.5 ..	0.7 ..	0.6 ..			
Critical difference ..	64 ..	64 ..	64 ..	64 ..	64 ..	1.3 ..	1.4 ..	1.9 ..	1.7 ..			

Conclusions—

Yield of kapas—Family blocks—2, (12), 8, 5, 1, 4, 7, 11, 9, 10, 3, 6.

Small bulk trial—11, 10, (12), 5, 1, 6, 2, 8, 7, 8, 4, 9.

Lint length—Family block—8, 5, 2, 4, (12) 11, 10, 9, 6, 3, 7, 1.

Small bulk trial—2, 4, (12), 8, 5, 9, 11, 6, 10, 7, 1, 3.

Ginning percentage—Family block—9, 4, 6, 1, 5, 11, 10, 8, 3, 2, 7, <(12).

Small bulk trial—9, 6, 4, 1, 5, 11, 8, 3, 7, 10, 2, <(12).

Among the families advanced from progeny rows, it was found that except three selections which were equal to N. 14 all the rest were poorer than N. 14 in yield of seed cotton. In the corresponding bulk trials six were found to be poorer than N. 14 while the rest were equal in yield of seed cotton.

(d) *Progeny rows*.—Two hundred and eleven single plants consisting of reselections from impure progenies of last season and single plant selections from F. 2 and F. 3 generations were raised in three sets of progeny rows. After careful examination in the field, ninety progenies were harvested and examined. Nine were significantly better and 75 equal. The better yielders and 44 of the equal yielders with numerically higher yields of kapas, were examined for lint characters. Twenty-three progenies were better than N. 14 in lint length and ginning percentage.

(e) *Study of crosses*.—F. 2 and F. 3 generations of 30 direct and 14 back cross combinations were raised to study and select single plants for advancing them to progeny rows. The parents involved in these crosses were detailed in Appendix I. Of the crosses tried six direct crosses and eight back crosses were better than N. 14 in vigour. A total of 150 single plants was picked for progeny

row trials. From the fresh crosses made last season 53 direct crosses and six back crosses were raised in F. 1 generation. The parents used in the crosses were furnished in Appendix II. Out of the crosses tried 33 direct and five back crosses were found to be better in vigour though slightly late. During the season 52 direct and 18 back crosses were made afresh to synthesise the qualities of some of the selected arboreums and to correct the defective characters of purified strains.

(f) *Study of Coimbatore and Koilpatti arboreums*.—Twenty, out of the Coimbatore and Koilpatti types of last year, were raised in observation plots. They were poor in vigour and showed high shedding. They, however, maintained good lint characters and were useful as parents for crossing.

(g) *Herbaceum trials*.—This trial was started in the year 1949-50 with the object of studying the suitability of the herbaceum strains of Hagari in this tract. Eight herbaceum strains 2,800, 2,711, 2.3. 6-9, 389, 4136, 3689, 3870 and H. 1 were tried this season and compared with local Gadag. It was observed that they were defective in boll bursting and contained more of immature kapas. Their performance is furnished in Table XIV.

TABLE XIV.—Herbaceum trials.

Field number—7.
Layout—Randomised and replicated.
Number of variants—9.
Number of replication—6.

Date of sowing—10th September 1951.
Period of harvest—15th February to 31st March 1952.

Summary of results:

Serial number and variants.	Yield of seed cotton per acre.			Lint length.	Ginning percentage.
	1949-50.	1950-51.	1951-52.	1950-51.	1951-52.
1 2800 ..	248	639	195	22.2	34.5
2 2711 ..	172	643	206	21.9	33.5
3 2-3-6-9 ..	206	648	190	21.3	30.7
4 3791 ..	198	681	254	21.9	36.3
5 4136 ..	..	556	141	21.7	30.0
6 3689 ..	..	579	231	21.0	33.5
7 3870 ..	..	532	105	22.5	30.7
8 H.1 ..	220	644	304	21.0	30.0
9 Gadag ..	243	648	263	21.2	27.6
Whether 'Z' test satisfied ..	No. ..	No. ..	Yes. ..	No. ..	Yes. ..
Standard Error ..	79 ..	83 ..	12.7 ..	0.5 ..	0.7 ..
Critical difference ..	.. ..	.. ..	37.0 ..	.. ..	1.9 ..

Conclusions—

Yield of kapas 1951-52—8, >9, 4, 6, 2, 1, 7, 3, 5.

Ginning percentage—4, 1, 2, 6, 3, 7, 5, 8, >9.

It was found that all of them except H. 1, 3791 and 3689 yielded lower than control. In ginning percentage they were better than Gadag. Further trial will be discontinued as per the advice of the Cotton Specialist.

(h) *Red cotton trials*.—With the object of testing the yielding capacity and adaptability of the three Narasaraopet red cottons, this experiment was started in 1950-51 season and this is the second year of the trial. The red cotton varieties Cocanada 1, R.H. 25 and 336B received from Narasaraopet were compared with the local red and N. 14 and the results are furnished in Table XV.

TABLE XV.—Red cotton trials.

Field number—7.
Layout—Randomized and replicated.
Number of varieties—3.
Number of replications—Six.

Date of sowing—13th September 1951.
Period of harvest—15th February 1952 to 31st March 1952.

Summary of results.

Variants.	Yield of red cotton in lb. per acre.		Lint length.	Ginning percentage.
	1950-51.	1951-52.	1951-52.	1951-52.
1 336 B ..	600	150	20.6	31.5
2 R.H. 25 ..	723	184	19.6	31.3
3 Cocanada 1 ..	636	185	19.3	31.0
4 Local red ..	498	240	18.5	26.8
5 N. 14 ..	414	173	20.6	27.3
Whether 'Z' test satisfied ..	Yes. ..	Yes. ..	Yes. ..	Yes. ..
Standard error ..	32 ..	17 ..	1.6 ..	0.34 ..
Critical difference ..	98 ..	49 ..	.. ..	0.93 ..

Conclusion—

Yield of seed cotton—1950-51—2, 3, 1, >4, 5.
—1951-52—47, >3, 2, 5, 1.

It can be seen that the local red was poor last year but this year it yielded the highest. This trial will be discontinued as per the views of the Cotton Specialist, that it serves no useful purpose for the White northern area.

(i) *Seed multiplication plots.*—N. 14 the strain of the station under spread was sown in an area of 2.35 acres for maintenance of pure nucleus seed. This was sown with pure selfed seed and the plot was rogued. Selfing of flowers was done. Due to high shedding and bad season very small quality of selfed seed could be obtained.

(j) *Multiplication plots of five promising strains of bulk trial* were sown in plots ranging from 40 to 75 cents. Out of them 5,202 fared well, yielding 295 lb. of kapas per acre.

(ii) *Evolution of types of American cotton suitable to the soils of Ceded Districts under rainfed condition.*—The selections of American types to suit the rainfed areas of the district were sown in 2.8 acres. Due to the abnormal season that prevailed the Cambodia crop suffered very badly and the yields were low.

(a) *Bulk trials.*—Two sets of bulk trials were sown during the season. The results of yields of set I are presented in Table XVI:—

TABLE XVI—Bulk trials—Set I.

Object—Varietal.
Variants—Twelve.
Replications—Four.
System of layout—Randomized and replicated.

Sown on—2nd September 1952.
Period of harvest—February 1952.
Manures applied—Groundnut cake at 20 N level.
Size of each plot—135.3. F Nett.

Summary of results.

Serial number and culture.	Adjusted acre yield in lb. (kaps).	Percentage on control N. 14	Ginning percentage.	Lint length in m.m.	Adjusted yield of lint per acre in lb.	Percentage on control. N. 14.	Crude acre yield per acre in lb.
1 M.A. 2	113	400	32.0	24.0	36	629	117
2 278	100	359	33.0	25.3	33	571	103
3 2694-3	89	318	31.0	24.3	28	488	85
4 320	81	288	33.3	23.5	26	471	93
5 347	75	267	34.5	26.8	26	457	47
6 1635-4/6	69	244	34.8	24.0	22	414	80
7 1821-1-1	65	232	33.5	26.0	22	386	65
8 346	53	188	33.8	26.0	18	314	41
9 2645-1-5	47	168	31.5	25.0	15	257	47
10 2145-1-5	46	164	34.8	24.5	17	271	38
11 1633-4-7	44	156	30.3	25.3	13	229	51
12 N. 14	28	100	22.5	23.5	4.4	100	43
Whether significant by 'F' test.	Yes.		Yes.	Yes.			Yes.
Critical difference ..	31		1.5	1.3			38
Standard error ..	11		0.5	0.45			13
General mean ..	68	240	32.1	24.8	22	381	67

Conclusions—
Yield of kapas—1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11.
Ginning percentage—6, 10, 5, 8, 7, 4, 2, 1, 9, 3, 11, >.
Lint length—5, 7, 8, 2, 11, 9, 10, 3, 1, 6, 4.

It can be seen from the table that seven cultures M.A. 2, 278, 2694-3, 320, 347 and 1635-4/6 were better than N. 14 in yield of kapas. Six of them were better than N. 14 in lint length and all were better in ginning. The results of Sect. II are presented in Table XVII:—

TABLE XVII—Bulk trials—Set II.

Object—Varietal trials.		Period of harvest—17th February to 20th February.	
Variants—Twelve.		Manures applied—Groundnut cake at 20 N. Level per acre.	
System of layout—Randomized and replicated.		Size of experimental plot—90 S.F.	
Sown on—2nd September 1951.			

Summary of results.							
Serial number and culture.	Adjusted acre yield of kapas per acre in lb.	Percentage on control N. 14.	Ginning percentage.	Mean lint length in M.M.	Adjusted yield of lint per acre in lb.	Percentage over N. 14.	Crude acre yield per acre in lb.
1 2730	141	235	29.3	27.0	41	273	136
2 2963	134	223	32.8	28.4	44	297	122
3 M.A. 2	113	183	32.3	28.4	36	240	120
4 2971	113	183	35.8	28.3	41	273	112
5 D.A. 2-6-5/3	86	143	33.3	28.6	28	187	90
6 G. 1XC2-9-3	80	133	34.5	28.6	28	173	86
7 6094C-XVI	74	123	34.3	28.3	23	167	72
8 N. 14	60	100	25.0	28.6	15	100	72
9 2196-4	59	98	34.5	28.6	21	140	51
10 2164-5	52	87	32.0	28.6	17	107	48
11 B.C. 68-7-9-1	41	68	34.8	28.6	14	93	41
12 B.C. 134XC.W	41	68	36.0	28.6	15	100	41
Whether significant by 'Z' test.	Yes.	..	Yes.	Yes.	..	..	Yes.
Critical difference ..	40	..	1.8	1.00	..	..	42
Standard error ..	14	..	0.62	0.34	..	..	14
General mean ..	83	136	32.8	28.3	27	175	83
Conclusions—							
Yield—1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12.							
Ginning per cent—12, 4, 11, 6, 9, 7, 5, 2, 3, 10, 1>8.							
Lint length—11, 12, 1, 7, 6, 9, 10, 2, 3, 4, 5.							

In this set four cultures, M.A. 2, 2730, 2963 and 2971 were better than control, N. 14, in yield of kapas and the rest equal. All were better than N. 14 in ginning percentage. Except 2963, M.A. 2, D.A. 2-6 5/3 and 2971 all were having better lint length than N. 14.

(b) In the compact family block trials out of the 11 families tested 7 NDL, 574, 327, and 518 were equal to M.A. 2 in yield of kapas. In progeny row trials out of 172 progenies sown 62 progenies were examined in the laboratory and all of them were equal to control, M.A. 2, in yield of kapas.

(c) Several promising single plants were selected from F. 2 and F. 3 plants for further study.

10. *Other studies*—(i) *Old versus new seed experiment.*—To test whether there is any difference in the germination, yield and other characters between crops raised with old seed and new seed the trial was started in 1950-51 and this was the second year of trial. The variety of seed used was N. 14. The results are furnished in Table XVIII.

TABLE XVIII.—Old versus new seed trial.

Field number—7.	Spacing—1½ feet between rows.						
Layout—A.B.B.A. Method.	Manuring—100 lb. of ammonium sulphate per acre.						
Number of variants—2.	Sown on—10th September 1951.						
Number of replications—12.	Period of harvest—28th February to 4th March 1952.						
Area of each plot—Nett. 0.66 cents.							
Summary of results.							
Germination percentage.	Yield of seed cotton in lb.	Halo length in m.m.	Ginning percentage.	Lint weight per seed in m. grs.	Seed weight per seed in m. grs.	Boll length in c. ms.	Boll diameter in c. ms.
Old seed	54	207	25	15	42	3.01	1.85
New seed	84	236	25	16	43	3.04	1.86
Whether difference significant.	Yes.	No.	No.	No.	No.	No.	No.
Critical difference ..	2	..	..	..	..	..	..
Conclusions—							
Stand—New seed > Old seed.							

It was found that although there was significant reduction of stand in the plots sown with old seed there was no reduction of yield. In other characters studied also no differences were seen between old and new seed. This is in conformity with last year's results.

(ii) *Study of pre-soaking of seed in nutrient solutions.*—This experiment was conducted to find out whether cotton yield could be increased by presoaking of N. 14 seed in nutrient salts of 1 molar, $\frac{1}{2}$ molar and $\frac{1}{4}$ molar solutions of ammonium sulphate and mono-potassium phosphate. The results are furnished in Table XIX.

TABLE XIX.—*Presoaking of seed in nutrient solutions.*

Field number—3, B. East.
Layout—Randomized block.
Number of treatments—
1. Seed soaked in one molar solution of ammonium sulphate.
2. Seed soaked in $\frac{1}{2}$ molar solution of ammonium sulphate.
3. Seed soaked in $\frac{1}{4}$ molar solution of ammonium sulphate.
4. Seed soaked in 1 molar solution of mono-potassium phosphate.
5. Seed soaked in $\frac{1}{2}$ molar solution of mono-potassium phosphate.
6. Seed soaked in $\frac{1}{4}$ molar solution of mono-potassium phosphate.
7. Seed soaked in distilled water.
8. Seed not soaked (control).
Size of each plot—Net 0.69 cents.
Number of replications—4.
Manuring—Nil.
Spacing—1½ feet between rows.
Sown on—13th September 1951.
Period of harvest—15th February to 31st March 1952.

Summary of results.

Serial number and treatments.	Germination.	Yield of kapas per acre in lb.	Halo length in m.m.	Ginning percentage.	Lint weight per seed in m.grs.	Seed weight per seed in m.grs.
1 Soaked in 1 molar Amonium sulphate solution.	40.5	142	19	24.3	16	55
2 Soaked in $\frac{1}{2}$ molar ammonium sulphate solution.	67.5	148	21	24.8	15	49
3 Soaked in $\frac{1}{4}$ molar ammonium sulphate solution.	85.0	76	19	24.3	15	48
4 Soaked in 1 molar mono-potassium phosphate solution.	68.5	141	21	23.5	16	51
5 Soaked in $\frac{1}{2}$ molar mono-potassium phosphate solution.	83.0	128	20	23.5	16	54
6 Soaked in $\frac{1}{4}$ molar mono-potassium phosphate solution.	91.5	105	20	24.3	17	54
7 Soaked in distilled water ..	89.5	130	21	24.3	16	50
8 Not soaked ..	91.5	105	19	24.8	15	47
Whether 'Z' test satisfied ..	Yes.	Yes.	No.	No.	No.	No.
Standard error ..	2.3	14	1.1	0.4	0.7	1.8
Critical difference ..	5.5	44	..	..	..	..

Conclusions—

Germination percentage—6, 7, 3, 5, 4, 2, 1.

Yield—2, 1, 4, 7, 5, 6, 3.

The soaking of seed even in such dilute solutions affected the germination adversely, the adverse effect being higher in higher concentrations of the salts. In yield of kapas no differences were found. In other characters studied there were no differences for the treatments.

11. *Experiments on cotton extension*—(i) *Cotton and groundnut mixture trials.*—This was the second year of experiment started for exploring the possibilities of introducing cotton as mixture with groundnut. This year two more short duration types Umri and H. 420 were included along with the three types 197-3; 881F and Pratap. The five cottons were sown in 1 : 11 proportion both spreading and bunch types and compared with pure plots. The yields of groundnut and cotton with their economics are furnished in Table XX.

TABLE XX.—*Cotton and groundnut mixture trials.*

Field number—7.
Layout—Randomized blocks (12 × 6).
Area of each plot—
Gross—32 × 70 = 2.24 cents.
Net—32 × 62.5 L = 2.00 cents.
Spacing—10½" between rows. (One row of cotton for every eleven rows of groundnut).
Manuring—
Sown on—14th July 1951.

Harvested on—

Bunch groundnut—12th November 1951 to 18th November 1951.
Spreading groundnut—3rd December 1951 to 6th December 1951.
Cotton—2nd November 1951 to 18th January 1952.

Treatments.

1 Groundnut bunch pure.	7 Groundnut spreading pure.
2 Do. + 881 F.	8 Do. + 881 F.
3 Do. + Pratap.	9 Do. + Pratap.
4 Do. + Umri.	10 Do. + Umri.
5 Do. + 197-3.	11 Do. + 197-3.
6 Do. + H. 420.	12 Do. + H. 420.

Serial number and treatment.	Yield of produce in pounds per acre.		Money value.	Cost of cultivation.	Net income per acre.
	Groundnut.	Cotton.			
1 Groundnut bunch pure ..	431	..	RS. 86	RS. 44	RS. 42
2 Do. + 881 F. ..	397	96	111	52	59
3 Do. + Pratap ..	347	82	97	52	45
4 Do. + Umri ..	339	72	102	52	50
5 Do. + 197-3 ..	395	59	99	52	47
6 Do. + H. 420 ..	370	42	88	52	36
Whether 'Z' test satisfied ..	Yes	..	..	..	..
Standard error ..	16	..	..	..	..
Critical difference ..	46	..	..	..	..
7 Groundnut spreading pure ..	241	..	52	44	8
8 Do. + 881 F. ..	239	93	81	52	29
9 Do. + Pratap ..	228	56	64	52	12
10 Do. + Umri ..	216	62	64	52	12
11 Do. + 197-3 ..	236	42	61	52	9
12 Do. + H. 420 ..	245	42	63	52	11
Whether 'Z' test satisfied ..	No.	Yes.	Yes.	..	..
Standard error ..	17	5.0	3.5	..	..
Critical difference ..	..	15.0	10.0	..	..

Conclusions—

Cotton kapas—2, 8, 3, 4, 10, 5, 9, 6, 11, 12.

Money value—2, 4, 6, 3, 6, 1, 8, > 9, 20, 12, 11, 7.

NOTE.—Cotton kapas are valued at 3 lb. per rupee.

Groundnut is valued at 1 lb. per rupee.

Reduction in groundnut yield (Bunch) 11.8 per cent. (Spreading) 10.7 per cent.

It may be seen from the table that spreading groundnut was almost a failure and uneconomical. Due to the mixture of cotton there has been a reduction in groundnut yield but the reduction was more than offset by the yields of cotton. The yield differences in groundnut were significant in the case of bunch type only. In the yields of cotton 881F was the best and this was in conformity with the last year's trial. H. 420 was the poorest. The maximum income was obtained from 881F and bunch groundnut mixture. During last season the yields of spreading groundnut were about double the yields of bunch types and during this season the bunch type yielded better than spreading.

(ii) *Mixed cropping trials.*—This experiment, started with a view to study the economics of growing cotton as mixture with groundnut or korra in preference to redgram, was in the second year of trial. The two varieties of cotton, N. 14 and 881F, were sown with groundnut (bunch) and korra in 1 : 5 ratio and compared with redgram in the same proportion in both korra as well as groundnut. The yields of the crops and their yields are given in Table XXI.

TABLE XXI.—*Mixed cropping trials.*

Field number—7.
Layout—Randomized blocks (6 × 6).

Area of each plot—
Gross—32 × 70 L = 2.24 cents.
Net—32 × 62.5 L = 2.00 cents.

Treatments.

1 Groundnut + Redgram.	Sown on—14th July 1951.
2 Do. 881 F Cotton.	Harvested—
3 Do. N. 14 Cotton.	Korra—24th October 1951.
4 Korra + Redgram.	Groundnut—8th November 1951.
5 Do. 881 F Cotton.	Cotton—23rd November 1951 to 8th February 1952.
6 Do. N. 14 Cotton.	

Summary of results.

Serial number and treatments.	Yield of produce in pounds per acre.			Cotton.	Money value.	Cost of cultivation.	Net income per acre.
	Groundnut.	Korra.	Redgram.				
1 Groundnut + Redgram ..	279	..	106	..	RS. 69	RS. 60	RS. 9
2 Do. 881 F cotton ..	289	..	..	259	144	80	64
3 Do. N. 14 cotton Redgram ..	280	..	..	242	136	80	56
4 Korra + Redgram ..	..	277	147	..	52	44	8
5 Do. 881 F cotton ..	..	240	..	173	88	60	28
6 Do. N. 14 cotton 6 ..	..	256	..	195	97	60	37
Whether significant by 'Z' test ..	No.	No.	Yes.	No.	Yes.	..	..
Standard Error ..	10	14	9	16	5	..	..
Critical difference ..	..	..	32	..	14	..	..

Conclusions—

Redgram—Redgram with Korra > Redgram with groundnut.

Money value—2, 3, < 6, 5, 1, 4.

NOTE.—The produce was valued as follows:—

Groundnut at 5 lb. per rupee.

Korra at 8 lb. per rupee.

Redgram at 8 lb. per rupee.

Cotton at 3 lb. per rupee.

yielder in two years and equal in the final year. It can, therefore, be distributed in preference to local.

(ii) *TMV-2*.—*TMV-2* was sown in an area of 0.32 acre for seed multiplication. The seed rate adopted was 60 lb. per acre. It gave an yield of 413 lb. per acre. No manuring was done to the crop. This was not distributed.

(iii) *TMV-3*.—The spreading type of groundnut was sown in an area of 0.57 acre for seed multiplication. The seed rate adopted was 70 lb. per acre. It gave an acre yield of 243 lb. Due to adverse seasonal conditions the yield was far below normal and lower than bunch type.

(iv) *Redgram trials*.—Eight strains of redgram Nos. 37, 553; 562, 630, 762, 807, 814 and 2900 received from Coimbatore were sown for comparing with the local farm bulk in randomized block with four replications. The varieties were sown as mixture with korra in 1:4 ratio and each plot had two rows of redgram. Due to adverse seasonal conditions the crop was a failure and yields were low. The results are furnished in Table XXV.

TABLE XXV.—*Redgram trials*.

Field Number—3 B.
Layout—8 × 4 Randomized blocks.
Area of each plot—
Gross—13 × 150 L—0.02 cents.
Net—(13 × 120 L—0.015 cents.

Date of sowing—28th July 1951.
Date of harvest—28th December 1951.

Summary of results.

Serial number and variants.				Yield of grain in pounds per acre.	Yield as per- centage over local
1	Local	..	..	25	100
2	37	..	..	16	64
3	553	..	..	17	68
4	562	..	..	26	104
5	630	..	..	29	116
6	762	..	..	15	60
7	807	..	..	25	100
8	814	..	..	21	84
9	2,900	..	..	14	56
Whether 'Z' Test satisfied				No.	..
Standard error				4 lb.	

It may be seen that the differences were not significant.

(v) *Redgram No. 37*.—Redgram No. 37 was sown mixed with korra in 1:5 proportion in about 3.00 acres in field No. 3-B. It gave an yield of 18 pounds per acre. The yield is very low due to adverse seasonal condition and poor soil.

(vi) *The mass selected farm redgram*.—It was sown as mixture with korra in 1:5 proportion in about 7 acres in field No. 4. It gave an yield of 102 lb. per acre. The yield of Korra was 82 pounds per acre.

(vii) *Bengalgram*.—Bengalgram No. 482 was sown in an area of 1.00 acre for seed multiplication. It gave an acre yield of 216 lb. Pusa type M.P. 2 received from the Pulses specialist was sown in small area of half cent along with 482 for comparison in December under irrigation. The pusa type was late and failed to set seed. Local gave about 100 lb. per acre.

(viii) *Paddy*.—G.E.B. 24 being the popular local variety was sown in an area of 2.75 acres for seed multiplication purpose. S.R. 26-B the saline resistant variety and 6612 (Bangaru theegalu culture) were also raised in 0.50 acre and 0.75 acre, respectively in wet land block. The paddy crop was preceded by a green-manure crop of sunhemp which gave about 12,000 lb. of leaf. In addition to the

green manure ammonium sulphate and groundnut cake were applied to paddy to give a total of 40 lb. of nitrogen per acre. Due to shortage of water-supply, the crop had wettings like green crop only. Following are the yields field-war :—

Field number.			Strain.	Area.	Yield.	Yield per acre.
				ACS.	LB.	LB.
9	..	..	G.E.B. 24	1.10	2,139	1,945
10. A	..	..	6612	0.74	1,755	2,372
10. B	..	..	S.R. 26 B	0.47	1,188	2,527
10. C	..	..	G.E.B. 24	0.41	810	1,978
10. D	..	..	G.E.B. 24	0.35	585	1,672
10. E	..	..	G.E.B. 24	0.53	1,040	1,962
11	..	..	G.E.B. 24	0.40	436	1,090
Total			..	4.00		

12. *Vegetables*.—Tomato and brinjal were sown in an area of 0.50 acre in F. No. 11 under irrigation. Due to inadequate supply of water they did not fare well. They yielded only 335 lb. of tomato and 20 lb. of brinjal. Benda and Newera were sown in 0.50 acre in F. 2 B. for seed multiplication purpose under rainfed conditions. Benda yielded 264 lb. and Newera 68 lb. in addition to giving 50 lb. of Benda seed and 60 lb. of Cowpea seed.

13. *Budama*.—*Cucumis trigonus*.—A.H 15 selection of Budama of this station which is a popular vegetable of this tract was sown as mixture with korra and redgram in an area of 9.75 acres. A good yield of 500 lb. of fruits per acre was obtained.

14. *Green-manure crops*.—(i) *Sunhemp*.—Sunhemp was sown in wet lands in an area of 3.50 acres with early rain in June as a green manure crop. A two and a half months growth of the crop gave an acre yield of 13,000 lb. of green leaf which was applied to paddy crop.

(ii) *Glyricidia maculata*.—The 187 plants of Glyricidia on the channel bund gave two cuttings of leaf aggregating to about 100 lb. of leaf per tree. The first cutting was applied to wet lands while the second cutting was utilized for composting. Five and half pounds of seed was collected from older trees in the yard left unpruned for seed purpose.

15. *Pillipesara*.—All field boarders and pathways were sown with Pillipesara. The crop gave two cuttings on an average and provided good feed for cattle. From the ratoon crop fifteen pounds of seed was collected.

16. *Blackgram*.—Greengram and horsegram were sown in the wet lands after the harvest of paddy. They were pulled out and fed to cattle as green haulms.

17. *Fodder jonna*.—An area of 17 acres was sown with fodder jonna to provide enough fodder for the livestock on the station. It gave an acre yield of 10,800 lb. of green fodder.

18. *Tree planting*.—Nurseries of economic trees like margosa, tamarind and Glyricidia were raised on a large scale on the channel bund and 1,650 seedlings were distributed for tree planting during this year. About 200 Glyricidia cuttings were planted on the station during the tree planting week.

19. *Live-stock*.—There are five pairs of work animals on the farm. Six cows were maintained for supply of milk to the staff. On an average two cows were in milk and a total of 4,478 lb. of milk was obtained. As most of the cows were uneconomical, being poor milkers, permission to transfer the same to Livestock department was obtained. Seven calves were transferred during the year with a view to minimize expenditure.

20. *Programme of work for 1952-53 is briefly detailed below*—A. *Crop Improvement*.—(i) Maintenance and multiplication of pure seeds of strain under distribution of paddy, sorghum, setaria, cotton and groundnut.

(ii) Improvement of white Northern cotton by breeding methods as per programme approved by the Indian Central Cotton Committee.

(iii) (a) Improvement of Patcha Jonna by breeding.

(b) Breeding striga resistant type of sorghum and control of striga as per programme approved by the Indian Council of Agricultural Research.

(iv) *Varietal trials of other miscellaneous crops.*—Redgram varieties from the Pulses specialist.

B. Agronomy—Experiments to increase area and yields of cotton.—

(a) Experiments to study the effects of previous leguminous crops and manures on cotton—final year.

(b) Trial of early varieties of cotton as mixture with groundnut.

(c) Observational trial on inter-sowing of cotton in the standing crop of groundnut in September.

(d) Experiments to study if cotton would be more paying than redgram as mixture with either korra or groundnut (third year.)

(e) Observational trials of growing green manures and ploughing them in as manure for jonna. (This experiment is suggested by Government Agricultural Chemist.)

21. *Steps taken to increase the revenue of the station.*—(i) Increasing crop yields are aimed at by judicious rotation and manuring. Output of compost and cattle manure are being increased by adding green leaf collection from waste lands and field borders. Green leaf yielding plants are being grown in all waste areas and field bunds for this purpose.

(ii) Ten uneconomic cows and calves were transferred to Livestock Research Station, Guntur, to reduce the costs in cattle maintenance.

(iii) Cultivation of commercial crops like tobacco, chillies and cambodia cotton under irrigation is taken up.

(iv) Increasing the area under cultivation by reducing the area under cart-tracks and foot paths in fields, sowing of useful pulse crops in the foot-paths of experimental areas and reclaiming and adding about half an acre of cultivable area on the channel bund, has been done.

22. *Seeds distributed during the year.*—The following quantities of various seeds were distributed during the year:—

1 Jonna	18,003 lb.	8 Paddy S.R. 26 B	880 lb.
2 Korra	808 lb.	9 6612 (Paddy)	1,280 lb.
3 N. 14 cotton	1,212 lb.	10 Benda	42 lb.
4 881 F cotton	90 lb.	11 Glyricidia	6 lb.
5 Umri cotton	2 lb.	12 Newera	8 lb.
6 Moco seed packets	100 Nos.	13 Indigofera grandiflora	8 oz.
7 Paddy G.E.B. 24	4,000 lb.	14 Sesbania speciosa	4 oz.

23. *Cost of cultivation of bulk crops.*—Presented in Appendix III.

24. *Statement of expenditure and income.*—Presented in Appendix IV.

AGRICULTURAL RESEARCH STATION,
NANDYAL.

20th March 1953.

A. APPA RAO,
Cambodia Cotton Assistant Incharge,
Assistant Cotton Specialist.

APPENDIX I.

PARENTS OF F-2. AND F-3. GENERATIONS.

Direct crosses.

F-2 and F-3. Generation—

Female parents—

6435-2
5001
7125-2
5359-B. 7
5975 DA2
6185-8
6315-A 2/2
5966 1/2
7070 A3
6445

Male parents—

5202
5888
7070-3D 2/1
7022
7070 B5 D. 1/2
5001
6325-4
4996
6445

Back cross.

5001 × 6307-4
5001 × 7112 B1-21
5001 × 6313-3
4527 × 7057-18A
5938 × 6313-3
5936 × 7057 18A
5938 × 7112 B6-5/1
5938 × 6319
4527 × 7066
5966 1/2 × 6313

5202
4996
5888
5001

Direct Crosses.

F. 3. Generations—

4527 EC.
5938
5001 DE.
5202
5975 DA.

7066 C. 4
7057 18-A. 5/3
5620-2
6310-1
7112-B. 1-21
6313-3
6325-4

APPENDIX II.

PARENTS OF F. 1. GENERATION POPULATION.

*Direct crosses.**Female parents—*

4996
5202
5001
5289
5975
5888
5966
6116
6212
6214
6234

Male parents—

7112 B. 1. 49
6435 2/10
6188-3-A2
7067 F. C-2
5314-12-3
7109 E8 5/2
7070 B5-B 1/2
7125-10-B. 1-7
7066-Fc-E
6435-2/5
6215-B. 1
5001
5975

Back crosses.

5001 × 7070 3D 2/4
5359-B7 (w) × 6325-4
6315 A1 × 4996
7070 A3-F3 × 4996

5202
5975

APPENDIX III.

COST OF CULTIVATION OF BULK CROPS.

Crop.	Area.	Yield per acre.		Cost of cultivation per acre.		Gross income per acre.		Net income per acre.	
		ACS.	LB.	RS.	A. P.	RS.	A. P.	RS.	A. P.
Paddy	4'00	2,205		250	0 0	325	0 0	75	0 0
Jonna	13'00	708		38	0 0	118	0 0	80	0 0
Cotton N. 14	2'50	190		60	0 0	78	0 0	18	0 0
Groundnut TMV. 2. ..	0'32	412		60	0 0	116	0 0	56	0 0
Fodder Jonna	17'00	2,565		44	0 0	126	0 0	82	0 0

APPENDIX IV.

STATEMENT OF RECEIPTS AND EXPENDITURE (1951-52).

							RS.
(i) Expenditure—							
(a) Establishment—							
Pay							9,745
Dearness allowance							3,330
House-rent allowance							414
Travelling allowance							776
Total ..							14,265
(b) C.A. 3. Other charges—							
Petty construction and repairs							4,650
Dead stock							1,403
Working expenses							13,043
Total ..							19,096
(c) C.A. 2. Office contingencies—							
Rates and taxes							636
Service Postage							250
Other contingencies							125
Dearness allowance to menials							2,449
Total ..							3,460
(ii) Receipts—							
(a) Agricultural Stations							3,863
(b) Miscellaneous							800
(c) Rents on buildings							263
(d) Value of seeds transferred							2,981
Total ..							7,907

ANNUAL REPORT OF THE AGRICULTURAL RESEARCH STATION,
HAGARI, FOR THE YEAR 1951-52 (FASLI 1361).

Season.—A total rainfall of 19.44 inches was received in 38 rainy days as against a ten-year average of 19.20 inches in 46.9 rainy days and a forty-one year average of 20.74 inches in 53.6 rainy days. Though the total rainfall was about normal, its distribution was faulty. The three main crops, namely, *setaria*, cotton and sorghum were sown in the third week of July, second and third weeks of September and third and fourth weeks of October respectively. Due to lack of sufficient post sowing rains, all the three crops suffered. Timely cultural operations kept them healthy and they recorded about normal yields. Safflower and bengalgram had poor growth and recorded poor yields. The rainfall data during the three main periods of the year are given below:—

	1951-52.	Average for the past ten years.
South-west monsoon	10.25	9.70
North-east monsoon	4.16	6.02
Hot weather	5.03	3.48
Total ..	19.44	19.20

Detailed rainfall data are presented in Table I:—

TABLE I.—Statement of rainfall for 1951-52.

Month.	Week.	1951-52.		1950-51.		Average for the past ten years.		Average for the past 40 years.	
		Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.
South-west monsoon.									
1951.									
June	7-13	0.09	1	2.65	1	0.66	1.4	0.61	1.7
	14-20	0.09	1	1.07	2	0.23	0.7	0.24	0.7
	21-27	0.16	1	0.46	1	0.46	1.2	0.27	1.2
June-July	28-4	0.12	1	0.57	1	0.41	1.6	0.36	1.9
	5-11	0.97	3	0.26	1	0.26	1.7	0.30	1.6
	12-18	2.00	3	0.28	1	0.45	1.4	0.53	1.7
	19-25	0.27	2	0.24	1	0.20	1.7	0.36	1.8
July-August.	26-1	0.23	1	0.11	1	0.37	1.0	0.38	1.2
	2-8	0.23	1	0.11	1	0.61	1.1	0.37	1.6
	9-15	0.09	1	0.11	1	0.49	1.4	0.41	1.0
	16-22	0.11	1	0.14	1	0.25	1.2	0.95	2.0
	23-29	0.51	1	4.17	4	0.69	1.9	0.61	1.8
August-September.	30-5	1.26	3	0.11	1	0.73	1.6	0.60	1.5
	6-12	2.16	2	1.34	2	0.81	2.4	0.82	1.9
September.	13-19	2.34	2	1.80	2	1.80	1.4	1.50	2.7
	20-26	0.05	1	0.54	1	1.08	1.5	1.61	2.4
Total		10.25	19	11.11	14	9.70	23.2	9.92	26.7
North-east monsoon.									
September-October.	27-3	1.58	5	1.76	1	0.94	2.4	1.41	2.9
	4-10	1.20	2	4.44	4	1.45	2.1	1.08	2.2
	11-17	0.44	1	1.83	4	0.46	1.1	0.77	1.5
	18-24	0.70	1	0.11	1	0.73	2.0	0.67	1.5
	25-31	0.05	1	0.05	1	0.46	0.8	0.48	1.2

Month.	Week.	1951-52.		1950-51.		Average for the past ten years.		Average for the past 40 years.	
		Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.
1951.		North-east monsoon—cont.							
November ..	1-7	..	..	3.00	3	0.84	1.4	0.66	1.4
	8-14	0.01	..	0.03	..	0.30	0.8	0.50	1.1
	15-21	0.01	..	..	..	0.27	0.6	0.24	0.7
	22-28	0.22	1	..	..	0.36	0.8	0.23	0.6
November-	29-5	..	..	..	..	0.01	..	0.71	0.3
December.	6-12	..	..	..	..	0.08	0.1	0.08	0.1
	13-19	..	..	..	..	0.05	0.1	0.05	0.3
	20-26	..	..	..	..	..	0.1	0.01	0.1
December- and January 1952.	27-3	..	..	..	..	0.02	0.1	0.02	0.1
	4-10	..	..	..	..	0.04	0.2	0.02	0.1
	11-17	..	..	..	..	..	..	..	..
	18-24	..	..	..	..	..	..	0.04	0.1
	25-31	..	..	..	..	0.01	0.1	0.01	0.1
Total ..		4.16	10	11.05	12	6.02	12.7	6.98	14.8

Hot weather period.

February ..	1-7	..	..	..	..	0.02	0.2	0.17	0.3
	8-14	..	..	..	..	..	..	0.03	0.1
	15-21	..	..	..	..	0.02	0.1	0.01	0.1
	22-29	..	..	..	..	0.02	0.1	0.05	0.1
March ..	1-7	..	..	..	..	..	..	0.05	0.1
	8-14	..	..	..	..	0.02	0.2	0.01	0.1
	15-21	..	..	..	..	..	..	0.04	0.1
	22-28	..	..	2.07	2	0.01	0.1	0.04	0.2
March-April.	29-4	..	..	0.50	1	0.07	0.3	0.20	0.5
	5-11	..	..	0.57	..	0.12	0.8	0.13	0.7
	12-18	..	..	..	..	0.24	0.7	0.20	0.7
	19-25	0.38	1	0.03	..	0.21	1.0	0.21	0.8
April-May ..	26-2	0.18	..	0.65	2	0.20	1.2	0.31	1.2
	3-9	0.53	2	0.14	1	0.30	1.2	0.34	1.2
	10-16	0.15	1	0.07	..	0.61	1.6	0.43	1.4
	17-23	0.80	1	0.54	3	0.61	1.3	0.60	1.5
May-June ..	24-30	2.81	3	0.45	1	0.68	1.1	0.56	1.4
	31-6	0.18	1	1.69	2	0.32	1.1	0.46	1.6
Total ..		5.03	9	6.71	12	3.48	11.0	3.84	12.1
Grand total ..		19.44	38	28.87	38	19.20	46.9	20.74	53.6

NOTE.—Prior to 1948-49, even days with precipitation below 0.10" were considered as rainy days.

From 1948-49 only days on which 0.10 inch were precipitated, were considered as rainy days.

PART I.

AGRONOMY.

2. *Rotation experiment.*—The object of this experiment is to ascertain if the black soils of this tract behave in a similar manner as the black soils of Tirunelveli district, where it was found, that growing the same crop on the same land, year after year, did not in any way affect the normal yields of crops. This is the twelfth year of trial and results so far recorded, show that, unlike the black soils of Tirunelveli district, the black soils of this tract, deteriorate when the same crop is grown year after year on the same land. Rotation of sorghum and cotton proved beneficial to each other in maintaining the average yields of both. Fallow preceding a crop, is found to be beneficial to the crop following. Further, a pulse, preceding either sorghum or cotton, is found to be more beneficial than a fallow. During

this year, due to lack of any post sowing rains, the growth of sorghum and bengalgram was poor and low yields were recorded. But, the results are in conformity with the previous indications. The yield data are given in Table II:—

TABLE II.—Rotation experiment, 1950-51.

Field number 2 A and B.

Area of plot—

Gross—50 L x 100 L = 5 cents

Net—40 L x 90 L = 3.6 cents.

Dates of harvest—

Sorghum—28th February 1952.

Cotton—13th February to 29th March 1952.

Bengalgram—19th February 1952.

Layout—

6 x 6 randomized blocks.

Year.	Mean yields per acre in lb.					
	A rotation. Cotton.	B rotation. Sorghum.	C rotation. Cotton Sorghum Cotton.	D rotation. Cotton Sorghum Pulse.	E rotation. Cotton Pulse Sorghum.	F rotation. Cotton Fallow Cotton.
1940-41 ..	Cotton— 103	Grain— 232 Straw— 893	Cotton— 110	Cotton— 103	Cotton— 101	Cotton— 103
1941-42 ..	Cotton— 116	Grain— 195 Straw— 533	Sorghum— Grain— 214 Straw— 715	Sorghum— Grain— 209 Straw— 733	Bengalgram— 115	Fallow.
1942-43 ..	(No crop owing to failure of sowing rains.)					
1943-44 ..	Cotton— 188	Grain— 492 Straw— 1013	Cotton— 194	Bengalgram— 270	Sorghum— Grain— 393 Straw— 878	Cotton— 163
1944-45 ..	Cotton— 248	Grain— 323 Straw— 927	Sorghum— Grain— 423 Straw— 1,410	Cotton— 322	Cotton— 314	Fallow.
1945-46 ..	Cotton— 105	Grain— 145 Straw— 557	Cotton— 129	Sorghum— Grain— 110 Straw— 726	Bengalgram— 77	Cotton— 219
1946-47 ..	Cotton— 213	Grain— 92 Straw— 505	Sorghum— Grain— 131 Straw— 1,079	Bengalgram— 166	Sorghum— Grain— 137 Straw— 1,232	Fallow.
1947-48 ..	Cotton— 239	Grain— 571 Straw— 991	Cotton— 269	Cotton— 305	Cotton— 316	Cotton— 282
1948-49 ..	Cotton— 51	Grain— 289 Straw— 870	Sorghum— Grain— 241 Straw— 1,289	Sorghum— Grain— 262 Straw— 1,354	Bengalgram— 155	Fallow.
1949-50 ..	Cotton— 262	Grain— 318 Straw— 564	Cotton— 307	Bengalgram— 86	Sorghum— Grain— 698 Straw— 1,134	Cotton— 197
1950-51 ..	Cotton— 150	Grain— 442 Straw— 637	Sorghum— Grain— 539 Straw— 782	Cotton— 303	Cotton— 258	Fallow.
1951-52 ..	Cotton— 249	Grain— 134 Straw— 271	Cotton— 306	Sorghum— Grain— 143 Straw— 331	Bengalgram— 63	Cotton— 411

3. *Manurial experiment with groundnut cake on cotton and sorghum.*—In this dry land tract, the cattle population is meagre. Consequently the quantity of cattle manure produced is not sufficient for manuring all the land. This experiment was started with the object of finding out how far groundnut cake can be used as a suitable substitute for cattle manure and also the optimum dose required, under the prevailing poor and precarious rainfall conditions.

(i) *Cotton.*—The various treatments received their respective doses of groundnut cake and farm yard manure as per schedule. The rainfall was good during the early growth period of the crop and plots that received farm-yard manure every year and in alternate years have again shown marked responses to direct application of manure, confirming the previous years' results. However, the yield differences are not significant. The results are given in Table III.

TABLE III.—*Manurial experiment on cotton with groundnut cake.*

Field number 5.
 Treatments—16.
 Layout—16 × 4 randomised blocks.
 Variety—Westerns 1 cotton.
 Size of plot—
 Gross—80' × 18' = 3.31 cents.
 Net—74' × 12' = 2.04 cents.

Spacing—36'.
 Sown—12th September 1951.
 Pickings—
 1st picking on 16th February 1952.
 2nd picking on 4th March 1952.
 3rd picking on 11th March 1952.
 Previous crop—M. 47-3 Sorghum.

Summary of results.

	30 lb. Nitrogen.			20 lb. Nitrogen.			10 lb. Nitrogen.		
Doses manures applied.	Once in 4 years applied in 1948-49.	Once in 2 years applied in 1948-49 and 1950-51.	Every year applied in 1948-49, 1949-50, 1950-51 and 1951-52.	Once in 4 years applied in 1948-49.	Once in 2 years applied in 1948-49 and 1950-51.	Every year applied in 1948-49, 1949-50, 1950-51 and 1951-52.	Once in 2 years applied in 1948-49 and 1950-51.	Every year applied in 1948-49, 1949-50, 1950-51 and 1951-52.	No manure (Control).
Farm-yard manure—									
Acre yield in pounds.	333	434	411	317	381	411	..	360	..
Yield expressed as percentage of control.	101	131	124	96	116	124	..	109	..
Groundnut cake—									
Acre yields in pounds.	319	470	359	325	323	420	313	381	..
Yield expressed as percentage of control.	96	142	103	93	99	127	95	115	..
No manure (control)—									
Acre yield in pounds.	..	..	..	..	..	..	..	..	331
Yield expressed as percentage of control.	..	..	..	..	..	..	..	..	100
General mean.	368.3								
Standard error.	35.3								
Standard error of mean per cent.	9.58								
Results significant or not by 'Z' test.	No.								

Summary of yield data of the previous year of the manurial experiment with groundnut cake on cotton.

Treatments and doses.	Acre yield of kapas in pounds.		
	1948-49.	1949-50.	1950-51.
Groundnut cake—			
30 lb. N. once in 4 years	326	424	329
30 lb. N. once in 2 years	291	423	394
30 lb. N. every year	226	518	415
20 lb. N. once in 4 years	293	447	287
20 lb. N. once in 2 years	204	427	361
20 lb. N. every year	216	383	434
10 lb. N. once in 2 years	263	340	314
10 lb. N. every year	253	480	366
Farm-yard manure—			
30 lb. N. once in 4 years	210	370	312
30 lb. N. once in 2 years	322	419	367
30 lb. N. every year	223	450	360
20 lb. N. once in 4 years	341	294	301
20 lb. N. once in 2 years	283	392	356
20 lb. N. every year	289	474	359
10 lb. N. every year	308	408	318
No manure (control)	224	424	295

(ii) *Sorghum.*—In sorghum also, the various treatments received their respective doses of groundnut cake and farm-yard manure as per schedule. The manures were applied sufficiently in advance of the sowing of the crop and the variety sown for the experiment was the short-duration Bombay type M. 47-3. The growth of the crop had been moderate as post sowing rains were practically useless but the heading was very impressive. All manurial treatments recorded higher yields over no manure, though none of the yield differences proved significant. The results are presented in Table IV.

TABLE IV.—*Manurial experiment on sorghum with groundnut cake.*

Field number 5.	Area of plot—Gross—18' × 80' or 3.31 cents.											
Treatments—16.	Net—12' × 74' or 2.03 cents.											
Layout—16 × 4 randomized blocks.	Sown—19th October 1951.											
Variety—M. 47-3 sorghum.	Harvested—17th March 1952.											
	Previous crop—Western 1 cotton.											
Summary of results.												
	30 lb. Nitrogen.			20 lb. Nitrogen.			10 lb. Nitrogen.					
Doses and manures applied.	Once in 4 years applied in 1948-49.	Once in 2 years applied in 1948-49 and 1950-51.	Every year applied in 1948-49, 1949-50, 1950-51 and 1951-52.	Once in 4 years applied in 1948-49.	Once in 2 years applied in 1948-49 and 1950-51.	Every year applied in 1948-49, 1949-50, 1950-51 and 1951-52.	Once in 2 years applied in 1948-49 and 1950-51.	Every year applied in 1948-49, 1949-50, 1950-51 and 1951-52.	No manure (Control).			
Farm-yard Manure—												
Grain—												
Acre yields in pounds.	441	510	574	480	584	327	..	471	..			
Yield expressed as percentage of control.	138	160	180	144	183	103	..	148	..			
Straw—												
Acre yields in pounds.	1,195	1,054	1,288	1,028	1,179	1,256	..	976	..			
Yield expressed as percentage of control.	133	117	143	114	131	140	..	108	..			
Groundnut cake—												
Grain—												
Acre yields in pounds.	337	442	521	426	399	550	476	436	..			
Yield expressed as percentage of control.	122	139	164	134	125	173	149	148	..			
Straw—												
Acre yields in pounds.	1,038	888	1,003	972	1,231	1,163	1,036	990	..			
Yield expressed as percentage of control.	115	99	111	108	137	129	118	110	..			
No Manure—												
Grain—												
Acre yields in pounds.	..	..	..	..	..	..	..	..	319			
Yield expressed as percentage of control.	..	..	..	..	..	..	..	..	100			
Straw—												
Acre yields in pounds.	..	..	..	..	..	..	..	..	930			
Yield expressed as percentage of control.	..	..	..	..	..	..	..	..	100			
General mean.	456	1,075										
Standard error (per acre).	63	84										
Whether significant or not by 'Z' test.	No.	No.										

Summary of yield data of the previous years of the manurial experiment with groundnut cake on sorghum.

Treatment and doses.		Acre yield in pounds.		
(1)		1948-49.	1949-50.	1950-51.
(2)	(3)	(4)		
Groundnut cake	30 lb. N. once in 4 years.	Grain: 804	881	538
		Straw: 1,621	1,832	1,668
	30 lb. N. once in 2 years.	Grain: 824	863	617
		Straw: 1,634	1,832	1,574
	30 lb. N. every year	Grain: 277	928	587
		Straw: 1,658	1,921	1,670
	20 lb. N. once in 4 years.	Grain: 881	861	634
		Straw: 1,645	1,869	1,463
	20 lb. N. once in 2 years.	Grain: 339	902	545
		Straw: 1,648	2,038	1,567
	20 lb. N. every year	Grain: 248	847	735
		Straw: 1,491	1,503	1,870
Farm-yard manure	10 lb. N. once in 2 years.	Grain: 250	821	609
		Straw: 1,419	1,847	1,443
	10 lb. N. every year	Grain: 321	815	586
		Straw: 1,528	1,743	1,590
	30 lb. N. once in 4 years.	Grain: 254	913	616
		Straw: 1,642	2,023	1,611
	30 lb. N. once in 2 years.	Grain: 303	807	791
		Straw: 1,537	1,764	1,893
	30 lb. N. every year	Grain: 228	897	824
		Straw: 1,404	1,980	1,754
	20 lb. N. once in 4 years.	Grain: 251	854	610
		Straw: 1,343	1,961	1,703
No manure	20 lb. N. once in 2 years.	Grain: 265	797	681
		Straw: 1,546	1,847	1,863
	20 lb. N. every year	Grain: 293	930	923
		Straw: 1,417	1,921	1,438
	10 lb. N. every year	Grain: 249	913	784
		Straw: 1,445	2,010	1,458
Control		Grain: 247	787	712
		Straw: 1,406	1,601	1,844

4. *Manurial experiment with superphosphate on cotton and sorghum.*—In this tract of poor rainfall, early maturity of any crop is an advantage. This experiment was intended to find out, if the application of superphosphate induces earliness in maturity, in the two main crops of this tract, viz., cotton and sorghum. This is the fourth year of trial.

The following manurial doses were tried:—

(a) Superphosphate to supply 30 lb. of P_2O_5 .

(b) Farm-yard manure to supply 30 lb. of 'N'.

(c) No manure (control).

(i) *Cotton.*—The manures were applied as per schedule. The growth of the crop was fair without any marked differences amongst the treatments. As in the previous year, superphosphate did not induce any earliness in the maturity of the cotton crop. The results are given in Tables V and VI.

TABLE V.—*Manurial experiment on cotton.*

Field number 2c 7 and 8.	Size of plot—
Number of treatments—3.	Gross—80' × 18' = 3.31 cents.
(a) Farm-yard manure at 30 lb. per acre (6,000 lb.)	Net—74' × 12' = 2.03 cents.
(b) Phosphoric acid at 30 lb. per acre in the form of superphosphate.	Distance between rows—36"
(c) No manure control.	Date of sowing—11th September 1951.
Number of replications—8.	Date of harvest—17th and 29th of February and 10th, 17th and 29th of March 1952.
Layout—3 × 8 randomized blocks.	

Summary of results.

Particulars.	Treatments.			General mean.	Standard error.	Critical difference.	Results significant or not by 'Z' test.
	Super-phosphate.	Farm-yard manure.	No manure.				
Acre yields of kapas in pounds.	333	339	314	329	13	38	Not significant.
Yield expressed as percentage of manure plot.	106	108	100	..	3.9	12	..

TABLE VI.—*Manurial experiment on cotton—Proportions of kapas picked.*

Serial number and date of picking.	Treatments.		'No manur (control).'
	Super- phosphate.	Farm- yard manure.	
Percentage of kapas picked.			
1 17th February 1952	32	40	27
2 29th February 1952	39	38	42
3 10th March 1952	22	18	25
4 17th March 1952	5	2	4
5 29th March 1952	2	2	2
Total ..	100	100	100

Manurial experiment on cotton with superphosphate.

(Previous years' results.)

Treatments.	Acre yields in pounds.		
	1948-49.	1949-50.	1950-51.
	KAPAS.	KAPAS.	KAPAS.
Superphosphate	261	351	260
Farm-yard manure	229	370	257
No manure (control)	191	349	256

(ii) *Sorghum.*—As in previous years, the short duration Bombay type of sorghum, M. 47-3, was sown. The growth was moderate, but heading was good. Plots that received superphosphate, flowered five days earlier than plots that received farm-yard manure or plots that did not receive any manure. But, plots that received farm-yard manure gave a significant increase in the yield of grain as well as straw over the control and the superphosphate plots. The results are given in Table VII.

TABLE VII.—*Manurial experiment on sorghum with phosphoric acid.*

Field number—2c 7 and 8.	Number of replications—8.
Treatments—	Layout—3 × 8 randomized blocks.
1 30 lb. of phosphoric acid in the form of superphosphate.	Size of plot—
2 30 lb. of nitrogen in the form of farm-yard manure.	Gross—80' × 18' = 3.31 cents.
3 No manure—control.	Net—74' × 12' = 2.03 cents.
Variety—M. 47-3 sorghum.	Sown on—22nd October 1951.
	Harvested on—15th March 1952.

Summary of results.

Particulars.	Treatments.			General mean.	Standard error.	Critical difference.	Results significant or not by 'Z' test.
	Farm-yard manure.	P205	No manure.				
	(1)	(2)	(3)				
Acre yields in pounds—							
Grain	377.6	255.2	260.9	297.9	20.46	62	Significant.
Straw	827.7	533.8	550.3	637.3	35.26	107	Do.
Yield expressed as percentage—							
Grain	144.7	97.8	100	..	..	..	..
Straw	150.4	100.7	100	..	..	..	..
Conclusions—Grain	1, 3, 2.						
Straw	1, 3, 2.						

Manurial experiment on sorghum with superphosphate.

(Previous years' results.)

Treatments.	Acre yields in pounds.					
	1948-49.		1949-50.		1950-51.	
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
Superphosphate	133	1,603	614	1,861	470	1,145
Farm yard manure	120	1,680	963	1,837	444	887
No manure (control)	112	1,496	942	1,886	329	834

5. *Co-ordinated crop weather scheme.*—This is the fourth year of the working of the scheme on this station. The following meteorological and microclimatic data are being recorded:—

Rainfall.

Maximum and minimum temperatures.

Relative humidity.

Wind velocity.

Intensity of sunshine.

Rate of evaporation of water.

Soil temperatures at 5, 15 and 30 c.ms. depths.

Vapour pressure.

Temperature, relative humidity and vapour pressure are noted in the observatory at 1 foot, 2 feet, 4 feet, 8 feet and 12 feet heights, at 1 foot, 2 feet and 4 feet heights in cotton crops and 1 foot, 4 feet and 8 feet heights in jonna crop. The following crop observations are being recorded:—

Germination counts—Both in jonna and cotton.

Periodical height measurements—Both in jonna and cotton.

Monopodial and sympodial counts—In cotton.

Flower counts—In cotton.

Earhead emergence—In jonna.

Incidence of pests and diseases—In both jonna and cotton.

Yield records—In both jonna and cotton.

The above two sets of observations enable us to correlate crop behaviours and performances with certain sets or groups of weather and climate factors after a number of seasons' study.

In addition, fortnightly soil-moisture estimations are carried out by taking samples of soils from the open observatory as well as cropped fields at different depths. This enables us to find out the effect of crop on the soil-moisture content at the specific depths, namely, 3 inches, 6 inches, 12 inches, 18 inches and 24 inches and conversely upon the effect of differential soil moisture content on crop behaviour and performance. Collection of data for a number of years is necessary before the data can be analysed and definite relationships established between the crop factors on the one hand and climatic factors on the other.

6. *Run-off plots.*—Soil run-off studies were commenced in the old run-off plots that were already in existence on the station from 3rd July 1950 to 17th September 1951. The plots are in duplicate. Size of plot 66 feet $\times$ 9 feet. Slope of plots 1:80. Size of cistern for collecting run-off 5½ feet $\times$ 3½ feet. From the data gathered the following conclusions were arrived at:—

(1) The chances of loss as run-off are greater with heavier precipitations.

(2) The longer the period of precipitation the greater the absorption and the loss as run-off the lesser.

(3) When the period between periods of precipitation is longer, the absorption is greater and loss as run-off less.

(4) When the rainfall is heaviest in the shortest time, the loss as run-off is most.

(5) When the soil is fully soaked and there is continuous rain each day, the run-off is more than when there are dry spells between precipitation and precipitation.

(6) Loss of surface soil in the run-off appears to be directly proportional to the intensity of the precipitation combined with the degree of wetness of the soil. The soil loss is more when there is a heavy downpour on a soil already soaked by previous rain. During the period under review about 1.6 tons of top soil was lost from an acre of land due to run-off.

Data are given in Table VIII.

TABLE VIII.—Summary of data collected from the run-off plots.

Date.	Rainfall in inches.	Duration.	Rainfall lost as run-off in inches.	Rainfall absorbed in inches.	Soil washed off in 100 ccf.	Height of water in tube in inches.	Soil lost per plot in grams.	Soil lost per acre in lb.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
3rd July 1950	0.04	1 hour	No run off.	0.04	0.1752	1.6	140.0	22.7	
4th July 1950	0.53	2 hours	No run off.	0.478	0.1987	0.32	31.46	5.07	
12th July 1950	0.28	4½ hours	No run off.	0.23					
21st July 1950	0.24	20 minutes	No run off.	0.09					
26th July 1950	0.02	30 minutes	No run off.	0.14					
28th July 1950	0.09	15 minutes	No run off.	0.16					
21st August 1950	0.14	30 minutes	No run off.	0.16					
24th August 1950	0.16	15 minutes	No run off.	0.25	0.1800	1.8	167.6	27.0	Short duration.
25th August 1950	3.50	2 hours	Cistern overflowed.	0.19					
26th August 1950	0.32	30 minutes	No run off.	0.39	0.1680	1.75	140.00	22.70	Soil was very much soaked due to previous day rain.
27th August 1950	0.19	10 minutes	No run off.	0.03	0.3400	18.00	2,794.00	452.20	
8th September 1950	0.46	3 hours	No run off.	0.03	0.04	0.7	14.49	2.4	
9th September 1950	0.83	2 hours	No run off.	0.61	0.22	10.00	1,138.5	189.20	Soil was very much soaked due to previous day rain.
10th September 1950	0.03	15 minutes	No run off.	0.05					
23rd September 1950	0.54	10 hours	No run off.	0.24					
8th October 1950	1.34	7 hours	0.49	0.24					
9th October 1950	0.45	2½ hours	0.49	0.35	0.23	12.4	1,440.00	233.00	
10th October 1950	0.74	3½ hours	0.50	0.35	0.199	2.3	1,258.70	43.01	
14th October 1950	0.45	1 hour	0.10	0.40	0.2040	5.3	548.50	81.40	
15th October 1950	0.30	1 hour	0.20	0.4	0.2190	9.4	1,062.00	177.00	
17th October 1950	0.94	1½ hours	Cistern overflowed.	0.05					
1st November 1950	2.03	3 hours	Cistern overflowed.	0.05	0.23	11.00	1,139.00	189.80	
2nd November 1950	0.50	2 hours	0.45	0.05	0.2190	10.5	1,137.00	189.5	
3rd November 1950	0.47	1 hour	0.42	0.05	0.2190	10.5	1,137.00	189.5	
28th March 1951	1.88	3 hours	0.19	1.69	0.2070	4.7	486.40	81.06	
3rd April 1951	0.50	3 hours	0.18	0.32	0.2070	4.7	486.40	81.06	
6th April 1951	0.37	15 minutes	0.40	0.37	0.2070	4.7	486.40	81.06	
26th April 1951	0.34	20 minutes	0.02	0.32	0.2070	4.7	486.40	81.06	
28th April 1951	0.27	2 hours	0.03	0.24	0.2070	4.7	486.40	81.06	
24th May 1951	0.40	50 minutes	0.06	0.34	0.2070	4.7	486.40	81.06	
1st June 1951	1.49	5 hours	0.40	0.86	0.2070	4.7	486.40	81.06	
18th July 1951	0.56	5 hours	0.07	0.56	0.2070	4.7	486.40	81.06	
12th July 1951	0.56	3 hours	0.14	0.41	0.2070	4.7	486.40	81.06	
16th July 1951	0.56	15 minutes	0.41	0.06	0.2070	4.7	486.40	81.06	
17th July 1951	0.39	45 minutes	0.80	0.39	0.2070	4.7	486.40	81.06	
26th August 1951	0.41	45 minutes	0.03	0.39	0.2070	4.7	486.40	81.06	
26th August 1951	1.55	45 minutes	0.03	1.45	0.2070	4.7	486.40	81.06	
8th September 1951	0.37	3 hours	0.50	0.07	0.2070	4.7	486.40	81.06	
17th September 1951	1.97	1½ hours	0.21	0.86	0.2070	4.7	486.40	81.06	

PART II.

CROP IMPROVEMENT.

7. *Millet*.—Both *setaria* and sorghum were sown in proper season. Both suffered for lack of post sowing rains and the crops remained gappy stunted and poor. The yields were erratic. Hence results in all the trials cannot be taken at their face value.

(i) *Sorghum yield trials*.—Nine cultures were under yield trials in two series. Series number one consisted of five short duration cultures with M. 47-3, the short duration strain as control and series number two consisted of four long duration cultures, with H. 1 as control. In all these strains, except M. 47-3 the earheads were compact and oval in shape. In series number one, two cultures, viz., J. 718 and 720-2-6-2, were found to be on par with the control. M. 47-3, regarding grain yields but were found to be significantly superior to M. 47-3 regarding straw yields. But M. 47-3 was significantly superior in grain yields to the other three strains. In series number two, all the four strains under comparison gave higher yields of both grain and straw over H. 1 but the yield differences in either case were not significant.

Results are given in Tables IX and X.

TABLE IX.—*Sorghum preliminary yield trial—Series I.*

Field number—4.	Area of plot— Gross—13½ L x 110 L or 1'485 cents. Net—9 L x 100 L or 0'9 cents. Sown—13th October 1951. Harvested—20th February 1952.									
Varieties—6.										
Layout—6 x 6 randomized blocks.										
Summary of results.										
Particulars.	Varieties.						General mean.	Standard error (per acre).	Critical difference (per acre).	Difference significant or not by 'Z' test.
	J. 762.	J. 740.	J. 718.	J. 735.	J. 720-2-6-2.	M. 47-3.				
	(1)	(2)	(3)	(4)	(5)	(6)				
Grain	408	470	527	488	574	538	508.8	33.36	97	Yes.
Acre yields in pounds—										
Straw	1,493	1,247	1,617	1,432	1,776	1,610	1,429	111.0	323	Yes.
Grain	80.5	79.6	89.6	83.0	96.6	100	..	..	..	..
Yield expressed as percent of control, M. 47-3—										
Straw	147.8	123.4	161.1	141.7	176.6	100	..	..	..	..
Conclusions—										
Grain—6, 5, 3, 4, 2, 1.										
Straw—5, 3, 1, 4, 2, 6.										

TABLE X.—*Sorghum yield trial—Series II.*

Field number—4.	Area of plot— Gross—13½ L x 110 L or 1'485 cents. Net—9 L x 100 L or 0'9 cents. Sown—13th October 1951. Harvested—20th February 1952.								
Varieties—5.									
Layout—5 x 6 randomized blocks.									
Summary of results.									
Particulars.	Varieties.					General mean.	Standard error (per acre).	Critical difference (per acre).	Differences significant or not by 'Z' test.
	J. 776.	J. 761.	J. 782.	J. 744.	H. 1.				
	(1)	(2)	(3)	(4)	(5)				
Grain	497	467	500	457	376	459.4	50.6	..	No.
Acre yields in pounds—									
Straw	1,404	1,255	1,481	1,431	1,448	1,343.8	86.7	..	No.
Grain	132.2	124.2	132.9	121.6	100	..	..	..	..
Yield expressed as percent of control H. 1—									
Straw	122.4	109.8	129.0	124.7	100	..	..	..	..

(ii) *Preliminary yield trials*.—Seventeen pure lines and fourteen hybrid cultures were under preliminary yield trials in four series, with H. 1 and M. 47-3 as controls, according to the duration of the cultures. The first two series consisted of the fourteen hybrid cultures along with M. 47-3 and H. 1. In series I the differences in yields of straw only were found to be significant whereas in series II neither the grain yield differences nor the straw yield differences were found to be significant. Results are embodied in Tables XI and XII.

TABLE XI.—*Sorghum preliminary yield trial—Series I.*

Field number—4.	Area of plot—Gross 9 L. x 55 L. or 0'495 cents. Net 4½ L. x 50 L. or 0'225 cents.						
Varieties—9.	Sown—13th October 1951. Harvested—20th February 1952.						
Layout—9 x 4 randomized blocks.	Summary of results.						
	Varieties.						
Particulars.	J. 716-1-3-3.	J. 756-1.	J. 759-1.	J. 757-1.	J. 749-6.	J. 716-1-6-2.	J. 750-2.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Acre yields in pounds—							
Grain	465	396	417	368	453	465	417
Straw	1,611	1,333	1,097	889	1,236	1,527	1,250
Yield expressed as percentage of (control)—							
M. 47-3—							
Grain	81.7	69.6	73.2	64.6	80.4	81.7	73.2
Straw	90.5	74.9	61.6	49.9	69.4	85.8	70.2
H. 1—							
Grain	115.4	98.2	103.5	91.3	113.6	115.4	103.5
Straw	108.9	90.1	74.1	60.1	83.6	103.2	84.5
	Varieties—cont.						
Particulars.	M. 47-3.	H. 1.	General mean.	Standard error (per acre).	Critical difference (per acre).	Differences significant or not by 'Z' test.	
	(8)	(9)					
Acre yields in pounds—							
Grain	569	403	439.8	69.6	..	No.	
Straw	1,791	1,479	1,244.4	179.4	524	Yes.	
Yield expressed as percentage of (control)—							
M. 47-3—							
Grain	100	70.8	..	..	..	..	
Straw	100	83.1	..	..	..	..	
H. 1—							
Grain	141.2	100	..	..	..	..	
Straw	120.3	100	..	..	..	..	
Conclusions for straw—8, 1, 6, 9, 2, 7, 5, 3, 4.							

TABLE XII.—*Sorghum preliminary yield trial—Series II.*

Field number—4.	Area of plot—						
Varieties—9.	Gross—9 L x 55 L or 0.495 cents.						
Layout—4 x 4 randomized and replicated blocks.	Net—4½ L x 50 L or 0.225 cents.						
	Sown—13th October 1951.						
	Harvested—20th February 1952.						
Summary of results.							
Particulars.	Varieties.						
	J. 720- 2-7-2 (1)	J. 720- 4-4-1 (2)	J. 716- 1-4-3 (3)	J. 711- 3-4-6 (4)	J. 720- 2-7-5 (5)	J. 760- 6 (6)	J. 724- 3-3-4 (7)
Acre yields in pounds—							
Grain	308	243	250	292	313	389	294
Straw	1,194	1,125	1,069	1,264	1,333	1,500	1,547
Yield expressed as per cent of control—							
M. 47-3—							
Grain	73.4	58.2	59.9	70.0	75.1	93.3	63.3
Straw	74.1	69.8	66.3	78.4	88.8	93.1	96.0
H. 1—							
Grain	72.1	57.3	58.9	68.8	73.8	91.7	62.2
Straw	107.4	101.2	96.2	113.6	119.0	135.0	139.0
	Varieties—cont.		General mean.	Standard error (per acre).	Critical difference (per acre).	Differences significant or not by 'Z' test.	
	M. 47-3. 3. (8)	H. 1. (9)					
Acre yields in pounds—							
Grain	417	424	322	65.9	..	Not significant.	
Straw	1,611	1,111	1,306	150.1	..	Not significant.	
Yield expressed as per cent of control—							
M. 47-3—							
Grain	100	101.7	..	..	..	..	..
Straw	100	69.0	..	..	..	..	..
H. 1—							
Grain	95.5	100	..	..	..	..	..
Straw	145.0	100	..	..	..	..	..

The 17 pure line cultures were under trial in two series with H. 1 as control. Due to adverse season, the results had been erratic. Both the grain and straw yield differences were not significant. Results are given in Tables XIII and XIV.

TABLE XIII.—*Sorghum preliminary yield trial—Series III.*

Field number—4. Sown—13th October 1951.
Varieties—9. Harvested—20th February 1952.
Layout—9 × 4 randomized blocks.
Area of plot—
Gross—9 L × 55 L or 0.495 cents.
Net—4½ L × 50 L or 0.225 cents.

Summary of results.

Particulars.	Varieties.						
	J. 777.	J. 787.	J. 775.	J. 786.	J. 785.	J. 783.	J. 774.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Acre yields in pounds—							
Grain	306	485	238	264	278	229	389
Straw	1,222	1,639	1,000	1,208	1,222	1,305	1,166
Yield expressed as per cent of control—							
H. 1—							
Grain	142.3	216.3	96.9	122.8	129.3	106.5	180.9
Straw	88.4	118.6	72.4	87.4	89.4	94.4	84.4

Particulars.	Varieties—cont.		General mean.	Standard error (per acre).	Critical difference (per acre).	Differences significant or not by 'Z' test.
	J. 778.	H. 1.				
(9)	(10)	(11)	(12)	(13)	(14)	
Acre yield in pounds—						
Grain	299	215	294.8	69.6	..	Not significant.
Straw	930	1,382	1,230.4	139.1	..	Not significant.
Yield expressed as per cent of control—						
H. 1—						
Grain	139.0	100	..	..	..	..
Straw	67.3	100	..	..	..	..

TABLE XIV.—*Sorghum preliminary yield trial—Series IV.*

Field number—4. Sown—13th October 1951.
Varieties—10. Harvested—20th February 1952.
Layout—10 × 4 randomized blocks.
Area of plot—
Gross—9 L × 55 L or 0.495 cents.
Net—4½ L × 50 L or 0.225 cents.

Summary of results.

Particulars.	Varieties.						
	J. 793.	J. 782.	J. 769.	J. 779.	J. 768.	J. 781.	J. 778.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Acre yields in pounds—							
Grain	458	220	243	292	334	292	341
Straw	1,611	1,403	1,166	1,333	1,361	1,403	1,686
Yield expressed as per cent of control—							
H. 1—							
Grain	206.3	103.1	109.4	131.5	150.4	131.5	153.6
Straw	113.7	99.0	82.7	94.1	96.1	99.0	113.3

Particulars.	Varieties—cont.		General mean.	Standard error (per acre).	Critical difference (per acre).	Differences significant or not by 'Z' test.
	J. 791.	H. 1.				
(9)	(10)	(11)	(12)	(13)	(14)	
Acre yields in pounds—						
Grain	236	222	229	83.2	..	Not significant.
Straw	1,416	1,416	1,430.2	175.4	..	Not significant.
Yield expressed as per cent of control—						
H. 1—						
Grain	106.3	100	..	..	..	..
Straw	100	100	..	..	..	..

Hybridization.—It was already mentioned in the previous report that a dozen crosses—six between H. 1 and J. 744 (a high straw-yielder as well as a good grain yielder) and six between M. 47-3 and J. 744 were effected. Out of the F. 1s grown, 13 heads from the former cross and 2 heads from the latter cross were taken for growing F. 2s in 1952-53. In the previous report it was recorded that 385 cross progeny cultures were carried for further study. Out of those, 36 apparently pure cultures were carried forward for further observation.

Trial of Hagari hybrid cultures at the Agricultural Research Station, Siruguppa, under irrigated conditions.—(i) Nine cultures were tried under irrigation. Sowing was done on 19th September 1951. Season was adverse. None of the nine cultures tried gave higher yields of grain over the control H. 1. Regarding straw yields, except two cultures, all the rest have given higher straw yields over the control H. 1.

(ii) **Korra.**—The season had been adverse and the stand of the korra crop was poor due to a rainless period of nearly 1½ months during the best growth period of the crop. Hence the results cannot be taken at their face value and all the trials will be repeated in the coming season.

Yield trials.—Eleven cultures were under yield trials in two series with H. 1 and H. 2 as controls. In series I H.K. 289 gave significantly higher yield of grain over both H. 1 and H. 2, and was on par with H.K. 336. Straw yield differences were not significant. In series II six cultures were compared with H. 1 and H. 2 along with H.K. 282 and H.K. 289. The yield differences either for grain or for straw were not significant. The results are given in Tables XV and XVI.

TABLE XV.—*Setaria yield trial—Series I.*

Field number—4. Net—9 L × 100 L or 0.90 cents.
Varieties—7. Sown—23rd July 1951.
Layout—7 × 6 randomized blocks. Harvested—7th November 1951.
Area of plot—
Gross—13½ L × 110 L or 1.485 cents.

Summary of results.

Particulars.	Varieties.				
	H.K. 282.	H.K. 289.	H.K. 313.	H.K. 318.	H.K. 336.
(1)	(2)	(3)	(4)	(5)	(6)
Acre yield in pounds—					
Grain	230	209	166	224	278
Straw	435	521	410	457	508
Yield expressed as percentage of control H. 1—					
Grain	92.1	97.3	66.5	74.6	114.0
Straw	90.6	103.5	85.4	95.2	107.9
Yield expressed as percentage of control H. 2—					
Grain	113.3	147.3	81.8	110.4	137.0
Straw	105.3	126.1	99.3	110.6	122.6

Particulars.	Varieties—cont.		General mean.	Standard error (per acre).	Critical difference (per acre).	Differences significant or not by 'Z' test.
	H. 1.	H. 2.				
(9)	(10)	(11)	(12)	(13)	(14)	
Acre yield in pounds—						
Grain	244	203	235	15.1	44	Significant.
Straw	480	413	460	59.5	..	Not significant.
Yield expressed as percentage of control H. 1—						
Grain	100	83.2	..	..	..	..
Straw	100	86.1	..	..	..	..
Yield expressed as percentage of control H. 2—						
Grain	120.1	100	..	..	..	..
Straw	116.2	100	..	..	..	..

Conclusion for—
Grain—2, 5, 6, 1, 4, 7, 8.

TABLE XVI.—*Setaria* yield trial—Series II.

Field number 4.
Varieties—9.
Layout—9 × 6 randomized blocks.
Area of plot—
Gross—13½ L × 110 L or 1'485 cents.
Net—9 L × 100 L or 0'90 cents.

Sown—23rd July 1951.
Harvested—7th November 1951.

Summary of results.

Particulars.	Varieties						
	H.K. 363 (1)	H.K. 365 (2)	H.K. 366 (3)	H.K. 367 (4)	H.K. 368 (5)	H.K. 370 (6)	H.K. 282 (7)
Acre yields in pounds—							
Grain	257	233	251	244	215	282	273
Straw	433	442	498	410	458	388	482
Yield expressed as percentage of control H. 1—							
Grain	100.8	91.4	98.5	95.7	84.3	110.6	107.1
Straw	94.3	96.3	106.5	81.5	99.8	83.5	105.0
Particulars.	Varieties—cont.		General mean.	Standard error (per acre).	Critical difference (per acre).	Differences significant or not by 'Z' test.	
	H.K. 289 (8)	H. 1. (9)					
Acre yields in pounds—							
Grain	322	255	259	37.5		Not significant.	
Straw	550	459	457	53.2		Do.	
Yield expressed as percentage of control H. 1—							
Grain	128.3	100					
Straw	119.9	100					

Preliminary yield trials.—Seventeen cultures were under preliminary yield trials in three series. Series I consisted of seven cultures with H. 2 as control. Six cultures recorded higher yields of grain over H. 2, the control, though the yield differences were not significant. The differences of straw yields were significant. Results are given in Table XVII.

TABLE XVII.—*Setaria* preliminary yield trial—Series I.

Field number 4.
Varieties—8.
Layout—8 × 4 randomized blocks.
Area of plot—
Gross—9 × 55 or 0'495 cent.
Net—9 × 50 or 0'45 cent.

Sown—23rd July 1951.
Harvested—8th November 1951.

Summary of results.

Particulars.	Varieties.					
	H.K. 349. (1)	H.K. 378. (2)	H.K. 374. (3)	H.K. 375. (4)	H.K. 376. (5)	H.K. 377. (6)
Acre yields in pounds—						
Grain	330	264	368	317	288	351
Straw	472	305	504	455	441	628
Yield expressed as percentage of control H. 2—						
Grain	121.6	98.9	137.8	118.7	107.9	131.5
Straw	119.2	77.0	127.3	114.9	111.4	158.6
Particulars.	Varieties—cont.		General mean.	Standard error (per acre).	Critical difference (per acre).	Differences significant or not by 'Z' test.
	H.K. 378. (7)	H. 2. (8)				
Acre yields in pounds—						
Grain	368	267	319.1	39.7		Not significant.
Straw	510	395	453.3	47.4	129	Significant.
Yield expressed as percentage of control H. 2—						
Grain	137.8	100				
Straw	128.9	100				
Conclusions for—						
Straw—6, 7, 3; 1, 4, 5, 8, 2.						

In series II five cultures were included along with H.K. 282 and H.K. 289 and H. 1 as control. Though most of the cultures have given higher yields of grain as well as straw over H. 1 (Control) the yield differences were not significant. The results are given in Table XVIII.

TABLE XVIII.—*Setaria* preliminary yield trial—Series II.

Field number 4.
Varieties—8.
Layout—8 × 4 randomized blocks.
Area of plot—
Gross—9 L × 55 L or 0'495 cents.
Net—4½ L × 50 or 0'225 cent.

Sown—23rd July 1951.

Harvested—8th November 1951.

Summary of results.

Particulars.	Varieties.				
	H.K. 282. (1)	H.K. 289. (2)	H.K. 356. (3)	H.K. 357. (4)	H.K. 358. (5)
Acre yields in pounds—					
Grain	288	313	406	438	323
Straw	438	431	413	424	413
Yield expressed as percentage of control H. 1—					
Grain	98.8	104.7	135.9	96.3	108.0
Straw	106.0	104.2	100.0	102.9	100.0

Particulars.	Varieties—cont.			General mean.	Standard error (per acre).	Critical difference (per acre).	Differences significant or not by 'Z' test.
	H.K. 359. (6)	H.K. 360. (7)	H. 1. (8)				
Acre yield in pounds—							
Grain	308	413	299	329.8	33.61	..	Not significant.
Straw	333	611	413	434.5	44.72	..	Do.
Yield expressed as percentage of control H. 1—							
Grain	103.0	118.1	100	..	..	..	..
Straw	80.6	147.9	100	..	..	..	..

In series III, five cultures were included in addition to H.K. 282 and H.K. 289 and H. 1 as control. Here also most of the cultures have recorded higher yields of grain as well as straw over H. 1, the standard. The yield differences were not significant. The results are given in Table XIX.

TABLE XIX.—*Setaria* preliminary yield trial—Series III.

Field number 4.
Varieties—8.
Layout—8 × 4 randomized blocks.
Area of plot—
Gross—9 L × 55 L or 0'495 cent.
Net—4½ L × 50 L or 0'225 cent.

Sown—23rd July 1951.

Harvested—8th November 1951.

Summary of results.

Particulars.	Varieties.					
	H.K. 282. (1)	H.K. 289. (2)	H.K. 361. (3)	H.K. 362. (4)	H.K. 364. (5)	H.K. 369. (6)
Acre yield in pounds—						
Grain	351	330	330	326	402	361
Straw	521	444	431	441	580	521
Yield expressed as percentage of control H. 1—						
Grain	115.1	108.2	108.2	106.9	131.5	118.3
Straw	122.7	116.6	101.7	104.0	151.0	122.9
Particulars.	Varieties—cont.		General mean.	Standard error (per acre).	Critical difference (per acre).	Differences significant or not by 'Z' test.
	H.K. 371. (7)	H. 1. (8)				
Acre yield in pounds—						
Grain	337	305	342.8	24.2		Not significant.
Straw	472	424	479.3	51.7		Do.
Yield expressed as percentage of control H. 1—						
Grain	110.8	100				
Straw	116.7	100				

Pure line cultures.—Fifty-one single plant cultures (36 from the red-soil zone and 15 from the black-soil zone) were under study during the year. Out of the 51 cultures, 170 promising single plants were carried forward for further study.

Rust resistance studies.—In the previous report it was recorded that 53 cultures were sent to the Government Mycologist for testing their rust resistant character under artificial bombardment. After test, all of them were found to be highly susceptible to the infection. During the season under review, 51 single plant cultures that were under observation were studied for their rust resistant characters also. Eleven cultures that recorded 20 per cent and less infection are carried forward for further trials.

Trial of promising cultures in the districts.—Samples of H.K. 282 and H.K. 289 were issued in six taluk centres in Anantapur district and six taluk centres in Bellary district for observation along with H. 1 and H. 2 respectively. Most of the taluks in both the districts reported almost complete failure of korra in the tract itself. The following centres, viz., Uravakonda, Harpanahalli and Hada-galli furnished results which definitely indicated the superiority of H.K. 282 and H.K. 289 over H. 2 as well as the local. The trials will be repeated till an overall picture is obtained covering the entire tract in both the districts.

8. Minor crops.—(a) *Onions and garlic.*—Six types each, in onion and garlic from different places in the State, were kept for further trials.

(b) *Tomatoes.*—Eighteen varieties were obtained from the Indian Council of Agricultural Research, New Delhi. Most of the seed material failed to germinate and the few plants that resulted did not fare well. The trial had been a failure.

(c) *Safflower.*—Out of the 24 apparently pure promising single plants that were advanced from the previous year's crop, 12 cultures and the five existing bulks were put under yield trials in two series. Due to lack of any post sowing rains, the crop was poor and the results were erratic. The trials will be repeated in the coming season. The remaining 12 cultures will again be under observation. In addition to the above seed material 200 fresh single plants collected from the cultivators' fields will be under study in the coming season.

(d) *Dry paddy.*—Three dry paddy strains, namely, TKM. 2, Bairivadlu 2999 and TKM. 1 were sown in two instalments, one on 25th July 1951 and the other on 25th September 1951. The germination, stand and the initial progress of the crop in both the sowings were good. Later, for want of adequate and proper rainfall, the plants slowly dried up without even flowering.

(e) *Linseed.*—One variety of linseed, namely, I.P. 68, was sown along with local to study their fibre producing capacity and seed producing capacity. The seed rate utilized for fibre was 80 lb. per acre while that for seed 12 lb. per acre. The germination was good and the progress of the crop in the early stages was also good. Due to lack of sufficient moisture, the thick sown crop was not well grown as the thin sown crop, even though the plants remained branchless as it ought to be for fibre. In both the varieties the plants in the seed crop were much better grown with a good number of branches. The following results were recorded.

	Yield per acre in pounds.	
	Seeds.	Fibre.
I.P. 68 sown for fibre	110	114
Local sown for fibre	103	10
I.P. 68 for seed	100	..
Local for seed	95	..

(f) *Wheat.*—Again for the second year in succession the performance of C 253 wheat had been disappointing. This variety appears to be unsuitable to the locality.

(g) *Potatoes.*—Thirty varieties of potatoes were obtained from the Central Potato Research Institute, Patna, for trials. They were planted in two instalments, one on 29th September 1951 and the other on 18th October 1951. Ten tubers in each of the varieties were planted for each planting. A few varieties failed to germinate in both the plantings. In the rest, the germination varied from 20 to 90 per cent. Crop in both the sowings succumbed to 'blight' in spite of prompt adoption of remedial measures.

(h) *Vegetables and fruits.*—An assortment of common Indian vegetables were grown in small plots in the garden land for local consumption. The following quantities of vegetables and fruits were produced and disposed off during the year :—

Particulars.	Area in acres.	Quantity in pounds.
(i) Tomatoes	0.15	1,092
(ii) Greens	0.15	195
(iii) Tapioca	0.15	857
(iv) Vegetables—		
Benda	0.08	240½
Brinjals	0.35	1,693½
Cluster beans	0.30	265
Gourds	0.24	283½
Drumsticks	0.02	132½
(v) Miscellaneous	0.36	364
	Number of trees.	Yield in pounds.
(vi) Fruits—		
Mangoes local	2	35 *
Bangalora	4	570½
Benishan	3	155
Mulgoa	2	40
Neelam	3	21
Rumani	1	34
Papaya	22	431
Pomegranates	6	50
Plantains	105	633½

* One tree failed to set fruit.

(i) *Fodders.*—As stated in the previous report, the fodder difficulty on the station still remains acute. Usual green fodder programme of 15 acres in the garden land was continued. During the period under review, 36,890 lb. of jonna fodder, 8,094 lb. of maize fodder, 5,055 lb. of miscellaneous grasses and 21,231 lb. of green grass were produced and fed to cattle.

9. Seeds and seed materials.—The following seed materials were transferred to the several district officers during the year :—

Particulars.	Quantity or number.
	LB.
Cotton seed	6,000
Jonna seed	20,653
Korra seed	2,929
Ragi seed	702
Onion seed	213
Prosopis pods	1,250
Prosopis seed	1,372
Safflower seed	26
Economic plant seed	213
Grass seeds	20
Seedlings of economic plants	2,075 nos.
Grass slips	9,245 ..

10. Livestock.—Thirty-one head of animals were on hand at the beginning of the year. There were seven births bringing the total to 38. Four animals were sold, three were transferred and four died leaving a balance of 27 by the end of the year.

AGRICULTURAL RESEARCH STATION, HAGARI,
2nd September 1952.

S. RAMACHANDRA RAO,
Superintendent.
MUHAMMAD OBEIDULLA SHAH,
Deputy Director of Agriculture, Cuddapah.

APPENDIX I.

STATEMENT OF EXPENDITURE AND RECEIPTS, JULY 1951 TO JUNE 1952.

Charges—	Rs.
40. Agriculture—C. Experimental Farms—	
Pay of officer	2,760
Pay of establishment	8,410
Allowances of officer and establishment	6,972
Total ..	18,142
Petty construction and repairs	483
Live stock and dead stock	1,397
Other contingencies (including service postage)	7,331
Working expenses	24,928
Dearness allowance to menials	6,577
Total ..	40,716
Receipts—	
XXIX. Agriculture—	
Sale of farm produce	6,241
Miscellaneous	692
Sale of cotton lint	4,409
Approximate value of seed material transferred to District Work Officers.	6,600
Total ..	17,942

APPENDIX II.

STATEMENT SHOWING THE COST OF CULTIVATION AND INCOME FROM THE "MAJOR BULK CROPS" AT THE AGRICULTURAL RESEARCH STATION, HAGARI, DURING THE YEAR 1951-52.

1. Crop—Westerns 1 cotton (average for 34.35 acres)—

Cost of cultivation.	Per acre. RS. A. P.
(1) Share of permanent improvement .. .. .	.. .. .
(2) Preparatory cultivation	5 6 0
(3) Manure and manuring .. .. .	.. .. .
(4) Seeds and sowing	3 12 9
(5) After cultivation	4 12 0
(6) Harvesting : Picking kapas	8 14 0
Total ..	22 12 9

Produce.	Yield per acre.	Value per acre. RS. A. P.	Rate. RS. A. P.
	LB.		
Kapas	263	82 3 0	0 5 0 (per lb.)
Total value per acre ..		82 3 0	
Expenses per acre ..		22 12 9	
Balance profit per acre ..		59 6 3	

2. Crop—Jonna H. 1 (average for 43.28 acres)—

Cost of cultivation.				Per acre.		
				RS.	A.	P.
(1) Share of permanent improvement	..	..	..	..		
(2) Preparatory cultivation	..	..	..	7	8	0
(3) Manures and manuring	..	..	..	..		
(4) Seeds and sowing	..	..	..	2	14	4
(5) After cultivation	..	..	..	6	8	0
(6) Harvesting, threshing and cleaning, etc.	..	..	..	13	0	0
Total				29	14	4

Produce.	Yield per acre.			Value per acre.			Rate.		
			LB.	RS.	A.	P.	RS.	A.	P.
(1) Jonna grain	..	..	347	39	12	2	0	1	1
							per lb.		
(2) Jonna straw	..	..	727	24	3	9	30	lb.	per upee.
Total				63	15	11			
Total value per acre				63	15	11			
Expenses per acre				29	14	4			
Balance profit per acre				34	1	7			

3. Crop—Korra (average for 5.20 acrer)—

Cost of cultivation.					Per acre.		
					RS.	A.	P.
(1) Share of permanent improvement	..	..	..	..	..		
(2) Preparatory cultivation	..	..	..	..	5	13	10
(3) Manure and manuring	..	..	..	..	..		
(4) Seeds and sowing	..	..	..	..	3	4	0
(5) After cultivation	..	..	..	..	1	12	1
(6) Harvesting, bundling, carrying, threshing, cleaning, etc.					15	8	8
Total ..					26	6	7

Produce.				Yield per acre.	Value per acre.			Rate.		
				LB.	RS.	A.	P.	RS.	A.	P.
(1) Korra grain	..	..	..	498	51	14	0	0	1	8
(2) Korra straw	..	..	..	530	10	9	7	50 lb. per rupee		
Total ..					62	7	7			
Total value per acre				..	62	7	7			
Expenses per acre				..	26	6	7			
Balance profit per acre				..	36	1	0			

ANNUAL REPORT OF THE
AGRICULTURAL RESEARCH STATION, HAGARI

APPENDIX III.

STEPS TAKEN TO INCREASE THE INCOME OF THE STATION.

(1) Previously only one 4-inch pump was catering to the water needs of the humans, livestock and 15.20 acres of the garden area. Irrigation water was rather precarious. Now, a diesel oil engine pumpset is secured and it is working a 3-inch pump which is expected to supply sufficient water to the garden land and improve the yields thereby.

(2) Forty acres of paddocks along the Hagari river were reclaimed for cultivation. Out of these 40 acres, 20 acres are low-lying and loamy. Four acres are now put under *gliricidia*. Two acres are programmed to be sown to *sesbania* and fourteen acres to sorghum, more to make the farm self-sufficient with regard to fodder requirements for cattle. The other twenty acres are sandy and they will be sown to *sajja*.

(3) *Gliricidia* plants were planted all along the road sides and *prosopis* seed will be dibbled all along the fence line to grow a live fence round the farm.

(4) A beginning was made with gathering of all available green leaf and dry leaves on the farm and converting them into compost to meet at least a considerable part of the organic matter requirements of the farm lands. A target of about 100,000 lb. is set up for the year.

(5) As soon as electricity is installed, the two power gins on the farm will be opened for ginning outside cotton also which is expected to give at least Rs. 5,000 per year.

ANNUAL REPORT OF THE AGRICULTURAL RESEARCH STATION,
PALUR, FOR THE YEAR 1951-52 (FASLI 1361).

Season.—A total rainfall of 40.77 inches was recorded in 49 rainy days as against 43.20 inches in 58 rainy days in the previous *fasli* year. The average rainfall for the previous ten years was 53.20 inches while that for the previous 46 years, since the inception of the station was 50.18 inches. The rainfall was below normal in all the three seasons, viz., south-west monsoon, north-east monsoon and hot weather. The rainfall of 12.30 inches during the south-west monsoon period, though below normal was evenly distributed and it helped the standing *kuruvai* paddy and other garden land crops and facilitated in preparing the land for *samba* paddy, *ragi*, *cumbu*, *varagu* and green manure crops but it interfered with the threshing and drying operations for *ragi* and groundnut. The rains received during the final stages of the monsoon period did much damage to the mature *kuruvai* paddy, ready for harvest by flooding the fields and submerging it completely under water, thus causing much inconvenience in the harvesting and threshing operations. Sowing of *ragi*, *cumbu* and *samba* seed beds was delayed. Though there was a rainfall of 25.61 inches during the north-east monsoon period it was not evenly distributed. Much difficulty was experienced in preparing land for sowing and planting of *samba* paddy. The very heavy rainfall received in November inundated the fully mature and lodged GEB. 24 paddy crop causing slight damage. Due to the insufficient rainfall during the later stages of the north-east monsoon season water-supply became insufficient in the river channel and very much difficulty was experienced to irrigate the wet lands. The crops in the high level lands had to be irrigated by lift irrigation from wells. The hot weather period recorded only a meagre rainfall of 2.86 inches and consequently the water-table went down and supply of water from the wells also became insufficient. In general the season was unfavourable for paddy cultivation. The maximum temperature during the year ranged from 84° F to 107° F and the minimum from 65° F to 87° F. The highest maximum temperature of 107° F was recorded on the 18th May 1952 while the lowest minimum temperature of 65° F was recorded on 30th December 1951. The average relative humidity ranged from 76 per cent in July 1951 to 88 per cent in November 1951. The highest relative humidity, 97 per cent was recorded on 30th March 1952 and the lowest 61 per cent was recorded on 1st July 1951. The statements of rainfall and meteorological readings recorded are summarized in Tables I and II.

TABLE I.—Statement of rainfall, 1951-52.

Month.	Week.	1951-52. Fasli 1361.		1950-51. Fasli 1360.		Average for the last ten years Fasli 1351 to 1360.		Average for the last 44 years. Fasli 1315 to 1360.	
		Rain- fall in inches.	Number of rainy days.	Rain- fall in inches.	Number of rainy days.	Rain- fall in inches.	Number of rainy days.	Rain- fall in inches.	Number of rainy days.
		South-west monsoon.							
June	7-13					0.27	0.9	0.33	1.0
	14-20	0.72	3	1.31	2	0.36	0.7	0.50	1.4
	21-27			0.16	1	0.11	0.5	0.50	1.2
June-July	28-4					0.21	0.9	0.30	1.0
	5-11	0.03		0.06		0.98	1.6	0.70	1.4
	12-18	0.78	2	1.21	3	0.49	1.1	0.52	1.5
July-August	19-25	0.83	3			1.67	2.4	0.92	1.9
	26-1			0.83	1	1.08	1.5	0.92	1.7
	2-8			1.98	3	1.70	1.9	0.93	2.0
	9-15	4.48	3	0.55	1	1.12	1.8	1.58	2.2
	16-22	1.25	1	2.44	3	0.93	1.8	1.14	2.5
	23-29	3.91	3	0.48	1	0.15	0.3	1.05	2.1
August-September	30-5	0.10	1	1.84	3	1.20	0.2	0.83	1.9
	6-12	0.04		0.81	3	2.40	0.1	1.14	1.4
	13-19	0.19	1	0.92	1	1.10	1.9	1.31	2.0
	20-26	9.47	1	0.99	3	1.60	0.3	1.33	1.6
Total ..		12.80	18	13.56	25	15.37	17.9	13.98	27.1

Month.	Week.	1951-52. Fasli 1361.		1950-51. Fasli 1360.		Average for the last ten years. Fasli 1351 to 1360.		Average for the last 44 years. Fasli 1315 to 1360.	
		Rain- fall in inches.	Number of rainy days.	Rain- fall in inches.	Number of rainy days.	Rain- fall in inches.	Number of rainy days.	Rain- fall in inches.	Number of rainy days.
		North-east monsoon.							
September-October	27-3	2.03	3	0.77	2	1.90	2.7	1.93	2.0
	4-10	0.54	1	6.41	2	2.51	2.6	1.51	2.3
	11-17	..	..	2.84	4	1.31	2.2	1.92	2.3
	18-24	1.41	4	0.92	2	1.60	2.4	2.51	3.3
	25-31	0.63	1	..	..	1.70	1.7	3.20	3.2
November	1-7	2.60	2	1.40	5	2.40	2.8	3.15	3.5
	8-14	3.52	3	0.74	3	2.30	2.6	2.91	3.1
	15-21	8.20	3	2.94	2	3.20	2.6	2.82	2.4
	22-28	0.49	2	..	..	1.80	2.2	1.93	2.4
November-December	29-5	5.50	2	..	..	3.50	1.9	1.42	2.0
	6-12	..	..	..	..	2.20	2.2	0.92	1.9
	13-19	..	..	5.78	3	3.10	3.1	1.12	1.9
	20-26	..	..	..	..	1.11	1.4	1.10	1.5
December-January	27-3	..	..	0.15	1	2.70	1.5	0.72	1.1
	4-10	..	..	0.42	1	0.80	0.9	0.70	1.0
	11-17	..	..	..	..	0.20	0.3	0.93	0.9
	18-24	..	..	..	..	0.70	0.7	0.41	0.1
	25-31	0.60	2	..	..	0.10	0.3	0.42	0.5
Total ..		25.61	23	22.37	25	33.13	34.1	29.62	35.4
Hot weather.									
February	1-7	..	..	..	..	0.03	0.1	0.08	0.3
	8-14	..	..	..	..	..	..	1.07	0.2
	15-21	0.30	1	..	..	0.36	0.7	1.18	0.3
	22-28	0.83	2	..	..	0.08	0.2	0.02	0.4
	or 29	..	..	..	..	..	..	..	..
March	1-7	..	..	..	..	0.80	1.1	0.22	0.4
	8-14	..	..	..	..	..	..	0.40	0.2
	15-21	..	..	..	..	..	..	0.02	0.2
	22-28	..	..	..	..	..	..	0.11	0.3
March-April	29-4	..	..	0.02	..	0.02	0.2	0.17	0.3
	5-11	..	..	0.15	1	0.02	0.1	0.22	0.3
	12-18	..	..	1.49	3	0.88	0.6	0.51	0.7
	19-25	..	..	1.22	1	0.21	0.4	0.12	0.3
April-May	26-2	..	..	..	..	0.45	0.6	0.42	0.4
	3-9	..	..	..	..	0.19	0.3	0.30	0.5
	10-16	0.28	1	..	..	0.56	0.9	0.92	0.8
	17-23	0.78	2	0.44	1	0.27	0.1	0.32	0.5
	24-30	0.26	1	3.85	2	0.16	0.8	0.43	0.3
May-June	31-6	0.41	1	0.10	1	0.67	0.9	0.10	0.1
	Total ..		2.86	8	7.27	9	4.70	7.0	6.61	6.5
Grand total ..		40.77	49	43.20	59	53.20	59.0	50.18	69.0
South-west monsoon ..		12.30	18	13.56	25	15.37	17.9	13.95	27.1
North-east monsoon ..		25.61	23	22.37	25	33.13	34.1	29.62	35.4
Hot weather ..		2.86	8	7.27	9	4.70	7.0	6.61	6.5

TABLE II.—Statement showing meteorological observations recorded during 1951-52.

Name of the month.	Maximum temperature.			Minimum temperature.			Mean relative humidity per cent.	Number of cloudy days.
	Highest °F.	Lowest °F.	Average °F.	Highest °F.	Lowest °F.	Average °F.		
1951—								
June	102.0	94.0	98.6	83.0	78.0	80.5	78	10
July	102.0	90.0	96.0	82.0	75.0	78.0	76	12
August	103.0	84.0	96.0	83.0	78.0	80.0	80	15
September	100.0	92.0	96.0	82.0	78.0	79.5	81	12
October	99.0	85.0	95.0	80.0	76.5	78.0	77	14
November	87.0	84.0	90.0	79.0	73.0	76.0	88	24
December	96.0	88.0	92.0	77.0	85.0	72.0	83	2
1952—								
January	92.0	84.0	90.0	80.0	67.0	72.0	84	4
February	94.0	86.0	93.0	75.0	68.0	70.0	87	2
March	98.0	92.0	95.0	80.0	70.0	74.0	78	1
April	103.5	95.0	93.0	82.0	76.0	81.0	81	2
May	107.0	88.0	97.0	87.0	77.0	82.0	82	8

I. PADDY.

2. Paddy was grown this year in four seasons, *kar*, *samba*—single crop and second crop (*thaladi*), and *navarai*. The total area on which the crop was grown was 19.31 acres as against 19.07 acres in the previous year. The details are furnished below :—

	ACS.
Area cropped twice	5.66
Area cropped once	11.63
Seed bed followed by crop	2.02
Total	19.31

The season was very unfavourable for paddy this year also as in last year. Due to the inadequate rainfall and uneven distribution during the north-east monsoon period preparatory cultivation for *samba* paddy was delayed and consequently overaged seedlings had to be planted and the crop suffered due to inadequate water-supply in the irrigation channel. Some of the high level fields were irrigated by oil engines and they did not receive enough water-supply. The average yields of paddy for the different seasons are furnished below :—

Season.	Grain yield in lb. per acre.
<i>Kar</i> (June-September)	3,015
<i>Samba</i> —Single crop (July-January)	3,109
<i>Samba</i> —Second crop (September-February)	2,150
<i>Navarai</i> —(January-April)	2,644

The yield of strains grown on a bulk scale for seed multiplication were as follows :—

Season.	Strain number.	Area.	Grain yield in lb. per acre.
		ACS.	
<i>Kar</i>	PLR. 2	1.00	3,167
	Sw. 7	0.40	2,024
	TKM. 3	1.00	3,811
	Sw. 1251	1.00	2,543
	Co. 13	1.00	2,936
<i>Samba</i> —Single crop	G.E.B. 24	1.16	2,807
	PLR. 1	1.00	2,990
	Co. 5	1.00	2,496
	Co. 19	0.83	3,123
	Co. 25	6.30	3,254
<i>Samba</i> —Second crop	Co. 26	1.40	3,112
	ASD. 5	1.90	2,632
	Co. 2	1.84	1,787
	BAM. 3	0.40	1,525
	Co. 13	0.10	2,420
<i>Navarai</i>	TKM. 3	0.10	2,080
	Sw. 7	0.20	2,830
	ADT. 18	0.09	3,069
	PLR. 2	0.12	2,426
	Co. 18	0.11	2,925

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 crop. TKM. 3, *sornavari* recorded the highest yield of 3,811 lb. grain per acre for the *kar* season while Co. 25, blast resistant *sirumani*, ASD. 5, *karthigai samba* and ADT. 18, *vellakuruwai* 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 the *kar* season recorded an acre yield of 8,379 lb. of grain.

3. *Paddy improvement work—Pure line selection—(a) Kar season.*—Three *sornavari* cultures of Tirurkuppam Nos. 2332 (TKM. 3), 2473 and 2529 were sown along with culture No. 1251, a *sornavari* culture of the station during the *kar* season for comparative yield trials for the second year. Out of the three cultures from Tirurkuppam, culture No. 2529 did not germinate and so the other two cultures 2332 and 2473 were planted along with 1251. Fisher's 'Z' test was not satisfied for grain yield. However it was seen that the Tirurkuppam cultures were earlier than the Palur culture and yielded 12 per cent more. The results are furnished in Table III. During 1950-51 the three cultures yielded 20 to 30 per cent more and flowered ten days earlier than 1251.

TABLE III.—*Paddy yield trial—Kar season, 1951-52.*

Field number 56. Previous crop—Paddy. Manure— Green leaf—4,600 lb. per acre. Superphosphate—100 lb. per acre. Ammonium sulphate—75 lb. per acre. Varieties—No. 2332, 2473 and 1251 (standard).				Layout—Randomized blocks. Replications—Six. Size of plot—28' x 5'. Date of sowing—6th June 1951. Date of planting—4th July 1951. Date of harvest—11th September 1951 and 3rd October 1951.		
Particulars.	2332.	2473.	1251.	General mean.	Standard error.	Fisher's 'Z' test satisfied or not P=0.05.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Grain—						
Yield per acre in lb.	2,570	2,572	1,843	2,328	170	No
Percentage of standard	112.3	112.5	100	108.2	7.9	No
Flowering duration	52	56	65	..	..	..

(b) *Navarai season.*—Three sets of yield trials were conducted during the *navarai* season.—

(i) *Inter-strain yield trials.*—Seven *kar* and *kuruvai* duration strains, viz., Co. 13 (*arupatham kodai*), TKM. 3 (*sornavari* Chingleput), ADT. 20 (hybrid *kuruvai*), ADT. 16 (*konakuruvai*), *sornavari* strains Sw. 7 and Sw. 1251 and PLR. 2 (*chitrakali*) were under yield trials. Fisher's 'Z' test was satisfied and it was seen that *sornavari* strains Sw. 7 and Sw. 1251 fared best while TKM. 3, ADT. 20 and ADT. 16 recorded significantly poor yields. Summary of conclusions is presented in Table IV.

TABLE IV.—*Inter-strain yield trials—Navarai season—1951-52.*

Field number 17. Previous crop—Paddy. Manure—Old green manure seed—500 lb. per acre. Superphosphate—100 lb. per acre. Ammonium sulphate.—100 lb. per acre.						Layout—Randomized block. Replications—Four. Size of plot—20' × 4'. Date of sowing—13th January 1952. Date of planting—16th and 17th February 1952. Date of harvest—16th May 1952.					
Varieties—ADT. 16, PLR. 2 (standard), Co. 13, Sw. 7, TKM. 3, ADT 20 and Sw. 1251.											
Particulars.	ADT. 16.	PLR. 2 (Std.)	Co. 13.	Sw. 7.	TKM. 3.	ADT. 20.	Sw. 1251.	General mean.	Standard error.	Fisher's 'Z' test satisfied or not P = 0.05.	Critical difference. P = 0.05.
Grain—											
Yield per acre in lb.	690	2,753	2,792	2,983	1,784	1,108	3,115	2,175	76	Yes.	244
Percentage of standard.	25.0	100.0	101.4	108.3	64.8	41.3	113.1	79.0	2.7	Yes.	8.6
Flowering duration.	67	70	63	63	63	62	72	..	..	..	..
Conclusion—	Sw. 1251, Sw. 7, Co. 13, PLR. 2, TKM. 3, ADT. 20, ADT. 16.										

(ii) *Mottakar yield trial.*—Three *mottakar* cultures from Tirurkuppam 7521, 10169 and 10178 were compared with Co. 18 (*vellakar*) PLR. 2 (*chitrakali*) and *mottakar* standard ryots unselected bulk in randomized and replicated plots. Fisher's 'Z' test was satisfied. Summary of results is presented in Table V and the following conclusions are drawn. *Mottakar* cultures 10169 and 10178 recorded significantly higher yields over *mottakar* standard and Co. 18,

(*vellakar*) and culture number 7521 but were on a par with ADT. 18 (*vellakuruvai*). PLR. 2 (*chitrakali*) was the earliest in duration and gave the poorest yield.

TABLE V.—*Mottakar yield trials—Navarai season.*

Field number 17. Previous crop—Paddy. Manure— Old green manure seed—500 lb. per acre. Superphosphate—100 lb. per acre. Ammonium sulphate—100 lb. per acre. Varieties—Co. 18, 7521, 10178, ADT. 18, 10169, PLR. 2 and Mottakar standard.						Layout—Randomized blocks. Replications—Four. Size of plot—20' x 4'. Date of sowing—13th January 1952. Date of planting—16th February 1952. Date of harvest—16th May 1952.					
Particulars.	Co. 18.	7521.	10178.	ADT. 18.	10169.	Mottakar stan- dard.	PLR. 2.	General mean.	Standard error.	Fisher's 'Z' test satisfied or not P = 0.05.	Critical differ- ence, P = 0.05.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Grain—											
Yield per acre in lb.	3,468	3,603	3,988	3,925	4,128	3,437	2,911	3,637	95	Yes.	301
Percentage of standard.	101.0	104.8	115.8	114.1	119.9	100.0	88.7	106.2	2.7	Yes.	8.6
Flowering dura- tion.	88	94	94	88	94	94	70	..	..	..	..
Conclusion—	10169, 10178, ADT. 18, 7521, Co. 18, Mottakar Standard, PLR. 2.										

(iii) *Vellakar yield trials.*—Three *vellakar* cultures from Tirurkuppam, 10115, 10047 and 10077 were compared with ADT. 18 (*vellakuruvai*), PLR. 2 (*chitrakali*) and Co. 18 (*vellakar*) in randomized and replicated plots. Fisher's 'Z' test was satisfied. Summary of the results presented in Table VI brings out the following conclusions. Culture No. 10077 gave significantly higher yield over Co. 18 (*vellakar standard*) while the other two cultures were on a par with it. In this series also PLR. 2 (*chitrakali*) was the earliest in duration and gave the poorest yield. Cultures 10077 and 10115 were on a par with ADT. 18 (*vellakuruvai*) while culture 10047 recorded significantly lower yield than ADT. 18.

TABLE VI.—*Vellakar yield trials—Navarai season.*

Field number—17. Previous crop—Paddy. Manures— Old green manure seed—500 lb. per acre. Superphosphate—100 lb. per acre. Ammonium sulphate—100 lb. per acre. Varieties—10077, P.L.R. 2, 10115, 10047, ADT. 18, Co. 18 (Standard.)						Layout—Randomized blocks. Replications—Four. Size of plot—20' x 4'. Date of sowing—13th January 1952. Date of planting—16th February 1952. Date of harvest—16th May 1952.					
Particulars.	10077	P.L.R. 2.	10115	10047	ADT. 18	Co. 18 (Std.)	General mean.	Standard error.	Fisher's 'Z' test satisfied or not P = 0.05.	Critical difference P = 0.05.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
Grain—											
Yield per acre in lb.	3,723	2,450	3,539	2,956	3,468	3,222	3,176	92	Yes.	308	
Percentage of standard.	115.4	75.9	109.6	91.5	107.6	100.0	100.0	2.9	Yes.	9.7	
Flowering duration.	93	75	93	93	88	88	..	..	..	..	
Conclusion—	10077, 10115, ADT. 18, Co. 18, 10047, P.L.R. 2.										

4. *Paddy—Manurial experiments—Effect of applying phosphatic manure to green manure crop on succeeding paddy crop.*—In order to study the effect of the application of phosphatic manure to green manure crop on the succeeding crop of paddy a replicated experiment with P₂O₅ at 30 lb. per acre in the form of superphosphate and bone meal to green manure crop, bone meal to paddy after green manure crop and green manure alone without P₂O₅ was laid out. A green manure crop of daincha was grown with and without P₂O₅ according to the schedule in June 1951

and the crop was harvested and incorporated in September 1951. It was found that the yields of green leaf from the plots to which P_2O_5 was applied were greater than those to which P_2O_5 was not applied. The yield data are furnished below:—

Treatments.	Yield of green matter in lb. per acre.
A. Green manure alone	8,900
B. Green manure crop to which super was applied at 30 lb. P_2O_5 per acre.	12,750
C. Green manure crop to which bone meal was applied at 30 lb. P_2O_5 per acre.	12,650
D. Green manure alone—bone meal to be applied for paddy before planting.	10,650

Paddy Co. 25 blast resistant *Sirumani* was planted on 12th October 1951 on which date the sub-plots comprising treatment D received P_2O_5 at 30 lb. per acre in the form of bone meal before planting. The crop was harvested on 27th February 1952 and weights were recorded for both grain and straw. Statistical analysis revealed that Fisher's 'Z' test was satisfied for grain yield only and that the treatment bone meal to green manure crop gave significantly lower yield than the other three treatments which were on a par among themselves. The results are presented in Table VII. In the previous year also the yield differences were not statistically significant.

TABLE VII.—Paddy—Manurial experiment—Effect of applying phosphatic manure to green manure crop on succeeding paddy crop.

Field Number 60. Previous crop—Paddy. Variants— A—Green manure alone. B—Green manure crop to which Super was applied at 30 lb. P_2O_5 per acre. C—Green manure crop to which bonemeal was applied at 30 lb. P_2O_5 per acre. D—Green manure alone—bone meal applied for paddy before planting.	Variety—Co. 25. Layout—Randomized blocks. Replications—6. Size of plot—56' x 16'. Date of sowing—26th August 1951. Date of planting—12th October 1951. Date of harvest—26th and 27th February 1952.							
Particulars.	A.	B.	C.	D.	General mean.	Standard error.	Fisher's "Z" test satisfied or not (P = 0.05).	Critical difference (P = 0.05).
Grain—								
Yield per acre in lb.	3,450	3,280	2,925	3,450	3,276	80	..	240
Percentage of standard ..	100.0	95.0	84.9	100.2	100	2.5	Yes.	7.4
Straw—								
Yield per acre in lb.	5,250	5,300	4,950	5,100	5,150	438	..	..
Percentage of standard ..	100.0	101.2	94.4	96.3	98.2	3.4	No.	..
Flowering duration ..	123	123	123	123	..	..	..	..
Conclusion—	Grain— D, A, B, C.							

II. COTTON.

5. *Cotton*.—The breeding trials on cotton at the Agricultural Research Station, Palur, is part of the scheme for the evolution of long staple cotton financed by the Indian Central Cotton Committee. The main object of the scheme is to evolve and isolate a *barbadense* type or their hybrids equivalent to the average imported Egyptian types suitable for cultivation in the coastal regions of South Arcot district. Dry weather prevailed during the important phase of the growth of the crop resulting in very poor yields. The rainfall was far below normal and the high temperature reaching to 107° F in May was conducive for the non-development of the anthers resulting in shedding of flowers and bolls on a large scale. The growth of the cotton crop was much restricted and the maximum yield recorded was only 500 lb. of seed cotton per acre. There has been a general lowering of the expression of staple length due to adverse season while the ginning percentage has not shown any variation.

The time of sowing experiment with ten sowings at fortnightly intervals starting from the last week of August has clearly established the great advantage of sowing cotton early to obtain good yields. By a shift in the time of sowing from March to August or September the yields are increased three-fold. Strain O-734 has recorded over 1,500 lb. in the first two sowings. Observations of flowers for the occurrence of contabescence of anthers has shown that their percentage was very low in plots sown up to October while in the case of November and December sown plots it increased to 35 per cent; this accounts for the increased yields in the early sown plots.

A large number of West Indies and Egyptian types were maintained in the varietal collections for study and effecting fresh crosses. A study of these types shows that by themselves they are not suited to the locality and so these were largely used as parents for inter-specific and intrabarbadense crosses. A large number of selections have been isolated recording significantly higher mean halo lengths over Madras Uganda I. One such strain is 7682 named recently as Madras Uganda 2 which is being tested in ryot's holdings in South Arcot district to assess its yield and adaptability for the locality. In the advanced stages of breeding trials strains 0401—C.3, 0478—D.4 and 0484—A.1 are very early while 0511—F.4 and 0744 are better in productivity. All the strains tested in the comparative yield trials show a marked improvement in staple length but are only equal in ginning percentage which ranges from 35 per cent to 37 per cent.

A detailed study of the second generation hybrids reveals that repeated doses of barbadense types tend to reduce productivity though there is a very marked improvement in staple length while back-crossing to standard *hirsutum* types shows a better vigour and productivity with a reduction in staple length. During the year about 2,000 fresh crosses have been effected in direct and multiple crosses to induce genetic variability in the material to exercise selection.

The new perennial cotton, Caramura 2, was tested during this season and this appears to be a better suited variety than Moco for the tract. It is equal in lint characters to Moco but has yielded more kapas per plant. This requires to be tested again.

Growing of short duration cotton in rice fallows.—Cotton P. 216 F was grown in an area of 2.77 acres in wet land after the harvest of *samba* paddy. The seeds were dibbled 1' x 6" using a seed rate of 40 lb. per acre. Mammatty hoeing and top-dressing with ammonium sulphate at 100 lb. per acre were attended to. The crop was affected by the severe drought and adequate irrigations could not be given. Harvest of kapas is still in progress.

6. *Cotton—Mixed cropping*.—(a) *Groundnut and cotton*.—Groundnut TMV. 3 was sown in an area of 0.20 acres and cotton P. 216 F was intersown 5 feet apart as a mixed crop in the same field under rainfed conditions. In another portion of the same field in an area of 0.20 acre a pure crop of groundnut TMV. 3 was raised. The stand of cotton P. 216 F was gappy due to the dry spell that followed after germination. Attempts made to improve the stand by gap filling also proved a failure for want of subsequent rains. The groundnut crop also was affected by severe drought and the experiment proved a failure.

(b) *Ragi, cotton and groundnut—observation plots*.—To test the effect of growing cotton on the bunds of plots of a mixed crop of *ragi* and groundnut, a field experiment was laid out with the following variants:—

(1) *Ragi* planted in January and groundnut intersown in March.

(2) *Ragi* planted in January, cotton sown on the bunds of plots on the same day and groundnut inter-sown in March.

The *ragi* was harvested in April and picking of cotton kapas and harvest of groundnut were done by the middle of August. The stand of cotton and *ragi* was uniform and satisfactory but the groundnut crop was subject to disease, *Alternaria* sp. and *Surul poochi* (*Stomopteryx nerteria*) and the crop was also

Series IV.

Field No.—1-3.
Previous crop—Sweet potato and tapioca.
Manure—Farmyard manure at 20 cart-loads per acre.

Layout—6 × 4 Randomized blocks.
Size of plot—1 cent—Two outer rows discarded.
Spacing—1 link.
Sown—22nd May 1951.
Planted—18th June 1951.
Harvested—17th September 1951.

Particulars.	P 1 (std.)	AKP. 6.	AKP. 7.	R. 582.	E.C. 2985.
(1)	(2)	(3)	(4)	(5)	(6)
Grain—					
Yield per acre in lb. ..	2,826	2,994	3,525	2,041	2,876
Percentage on general mean ..	104.2	110.4	129.9	75.2	106.0
Percentage on control ..	100.0	105.9	124.7	72.2	101.7
Flowering duration—days ..	86	87	87	87	87

Particulars.	E.C. 4190.	General mean.	Standard error.	Fisher's 'Z' test satisfied or not (P = 0.05).	Critical difference. P = 0.05.
(7)	(8)	(9)	(10)	(11)	
Grain—					
Yield per acre in lb. ..	2,018	2,713	149	..	448
Percentage on general mean ..	74.4	100.0	5.5	Yes.	16.5
Percentage on control ..	71.5	96.0	5.3	..	15.9
Flowering duration—days ..	87	..	..	..	..

Conclusion—
AKP. 7, AKP. 6, E.C. 2985, P 1 (Std.), R. 582, E.C. 4190.

Ragi—Varietal study and selection—(ii) December to March season.—The yield trials conducted during the previous May to September season were repeated during December to March season. Due to delayed planting caused by the breakdown of the oil engine, the selections in the first series performed very badly and hence the yield data could not be statistically analysed. In the first series out of the five selections compared with P. 1, AKP. 6, R. 582 and E.C. 2985 completely failed, while AKP. 7 and E.C. 4190, though they bore earheads, the yield was far below than that of P. 1 and hence the analysis was not worked out. None of the selections in the rest of the series, out-yielded the standard P. 1 ragi. The results are presented in Table IX.

TABLE IX.—*Ragi Yield trials, 1951-52.*

Series II.

Field number—13-15 W.
Previous crop—Sunn hemp.
Manure—Fifteen cart-loads of compost manure per acre plus 40 lb. of ammonium sulphate per acre.
Varieties—P 1 Standard, R. 954, R. 955, R. 958, R. 959, R. 961 and R. 963.

Layout—Randomized blocks.
Replications—Four times.
Size of sub-plot—
Gross—54 × 12 links—Two outer rows discarded.
Net—50 × 10 links.
Spacing—1 link.
Sown—24th December 1951.
Planted—5th February 1952.
Harvested—15th April 1952.

Particulars.	P 1 (Std.)	R. 954.	R. 955.	R. 958.	R. 959.
(1)	(2)	(3)	(4)	(5)	(6)
Grain—					
Yield per acre in lb. ..	1,537	1,531	1,417	1,240	1,131
Percentage on general mean ..	114.0	113.0	105.0	92.0	84.0
Percentage on control ..	100.0	98.0	91.0	81.0	75.0
Flowering duration—days ..	88	86	86	84	85

Particulars.	R. 961.	R. 963.	General mean.	Standard error.	Fisher's 'Z' test satisfied or not (P = 0.05).
(7)	(8)	(9)	(10)	(11)	
Grain—					
Yield per acre in lb. ..	1,549	994	1,343	117	..
Percentage on general mean ..	115.0	74.0	100.0	8.7	No.
Percentage on control ..	101.0	65.0	37.7	7.6	..
Flowering duration—days ..	86	86	..	..	..

Series III.

Field number—13-15 W.
Previous crop—Sunn hemp.
Manure—Fifteen cart-loads of compost manure per acre plus 40 lb. of ammonium sulphate per acre.
Crop—P 1 (Std.), R. 967, R. 968, R. 969, R. 970, R. 971 and R. 972.

Layout—Randomized blocks.
Replications—Four times.
Size of sub-plot—
Gross—54 × 12 links.
Net—50 × 10 links.
Spacing—1 link.
Two outer rows discarded.
Sown—24th December 1951.
Planted—5th February 1952.
Harvested—15th April 1952.

Particulars.	P.1 (Std.)	R. 967.	R. 968.	R. 969.	R. 970.
(1)	(2)	(3)	(4)	(5)	(6)
Grain—					
Yield per acre in lb. ..	1,291	1,344	1,372	1,655	1,585
Percentage on general mean ..	118	104	106	123	123
Percentage on control ..	100	104	106	123	123
Flowering duration—days ..	88	88	88	88	86

Particulars.	R. 971.	R. 972.	General mean.	Standard error.	Fisher's 'Z' test satisfied or not (P = 0.05).
(7)	(8)	(9)	(10)	(11)	
Grain—					
Yield per acre in lb. ..	731	1,047	1,289	121	..
Percentage on general mean ..	57	81	100	9.4	No.
Percentage on control ..	57	31	84.7	7.9	..
Flowering duration—days ..	88	88	..	..	..

The yield trials so far conducted on this station prove that the selections are all inferior in yielding capacity to the standards P. 1 and AKP. 1. Hence this necessitated to restart selection work this year from a fresh sample of ryots' bulk seed and two hundred single plant selections were made.

9. *Ragi—Age of seed experiment—May to September and December to March seasons.*—In an experiment with P. 1 and AKP. 1 to find out the effect of age of seed on yield conducted during the two seasons in which the December season seed was compared with the previous May season seed, it was observed that during both the seasons for both the strains, the yield differences were not statistically significant. The summary of results is presented in Tables X and XI. The experiment was started during 1950-51 and it was observed that the yield differences in both the strains were not significant.

TABLE X.—*Ragi—Effect of age of seed.*

Series I.

Field number—1 to 3.
Previous crop—Sweet potato and tapioca.
Manure—Farmyard manure at 20 cart-loads per acre.
Variety—AKP.1.

Layout—Randomized block.
Size of sub-plot—Gross—54 × 12 links.
Spacing—
One link.
Two outer rows discarded.
Sown on—18th June 1951.
Planted—25th July 1951.
Harvested—7th October 1951.

Particulars.	May ragi.	December ragi.	General mean.	Fisher's 'Z' test satisfied or not (P = 0.05).
(1)	(2)	(3)	(4)	(5)
Grain—				
Yield per acre in lb. ..	537.5	597.5	567.5	..
Percentage on control ..	100	111.2	105.6	No.

Series II.

Field number—1-3.
Previous crop—Sweet potato and tapioca.
Manuring—20 cart-loads of farmyard manure.
50 lb. of ammonium sulphate.
150 lb. of groundnut cake.
Variety—P. 1.

Layout—2 × 10 randomized blocks.
Size of plot—Half cent.
Spacing—One link.
Sown—18th June 1951.
Planted on—25th July 1951.
Harvested—22nd October 1951.

Particulars.	May ragi.	December ragi.	General mean.	Fisher's 'Z' test satisfied or not (P = 0.05).
(1)	(2)	(3)	(4)	(5)
Grain—				
Yield per acre in lb.	1,126.2	1,238.7	1,182.4	..
Percentage of control	100	101.1	100.5	No

TABLE XI-A.—Effect of age of seed—December v. May, 1951-52.

Series I.

Field number—48-A.
Previous crop—Greengram culture No. 62.
Manure—Twenty cart-loads of compost manure per acre
and 20 lb. of ammonium sulphate.
Crop—AKP. 1 ragi.

Layout—2 × 12—AB, BA.
Size of the plot—Half cent.
Spacing—One link.
Sown—25th January 1952.
Planted—15th February 1952.
Harvested—19th April 1952.

Particulars.	December ragi.	May ragi.	General mean.	Fisher's 'Z' test satisfied or not (P = 0.05).
(1)	(2)	(3)	(4)	(5)
Grain—				
Yield per acre in lb.	1,610.3	1,663.7	1,637	..
Percentage on control	100	103.2	101.6	No.

Series II.

Field number—48-A.
Previous crop—Greengram culture No. 62.
Manure—Twenty cart-loads of compost manure per acre
and 20 lb. ammonium sulphate.
Crop—P. 1 ragi.

Layout—2 × 12—AB, BA.
Size of the plot—Half cent.
Spacing—One link.
Sown—25th January 1952.
Planted—15th February 1952.
Harvested—8th May 1952.

Particulars.	December ragi.	May ragi.	General mean.	Fisher's 'Z' test satisfied or not (P = 0.05).
(1)	(2)	(3)	(4)	(5)
Grain—				
Yield per acre in lb.	1,746.4	1,751.9	1,749.1	..
Percentage on control	100	100.3	100.15	No.

TABLE XI-B.—Ragi—Yield trials—Effect of age of seed, 1950-51.

Field number—4-7.
Previous crop—Sugarcane.
Manure—
Cattle manure—Twenty cart-loads per acre.
Super—50 lb. per acre.
Groundnut cake—150 lb. per acre.
Ammonium sulphate—60 lb. per acre.
Variety—AKP. 1 (December to March season seed) and
P. 1 (December to March season seed).
Layout—Randomized block.

Replications—Six times.
Size of plot—
Gross—54 × 10 links.
Net—50 × 10 links.
Date of sowing—AKP. 1—12th June 1950.
F. 1—7 June 1950.
Date of planting—AKP. 1—3rd July 1950.
P. 1—3rd July 1950.
Date of harvest—AKP. 1—9th September 1950.
P. 1—25th September 1950.

Layout—Randomized Block							
Yield of ragi in lb. per acre.							
Whether differences significant or not (P = 0.05).							
Name of ragi strain.							
December to March season seed.							
May to September season seed.							
(1)							
(2)							
(3)							
(4)							
AKP. 1	..	..	..	..	1,816	2,016	No.
P. 1	..	..	..	..	1,758	1,724	No.

10. *Varagu* (*Paspalum scrobiculatum*) and redgram.—*Varagu* strain P. 1 was grown as a mixed crop with redgram C. 37 for seed multiplication under rain-fed conditions. The *Varagu* crop yielded 450 lb. of grain per acre and this low yield was due to the paucity of timely rains during the early stages of growth of the crop. Redgram C. 37 gave a yield of 275 lb. per acre which is higher than those of previous years. The stand of the crop was good and the yield would have been better had it not suffered for want of rains during its growing period.

11. *Varagu*—District trials.—*Varagu* P. 1 was tried in seven centres in Chingleput district and the results are awaited.

IV. GROUNDNUT.

12. *Groundnut*.—Groundnut TMV. 2 was grown in an area of 0.90 acre during the summer season of 1951. The field was prepared by ploughing and farm yard manure at 10 cart-loads per acre was incorporated. Sowing was done on 19th March 1951 and harvest taken up on 9th July 1951 and the crop received two weedings and eleven irrigations. Due to the paucity of rains during the growth period and the attack of *Alternaria* sp. and *surulpoochi* (*stomopteryx nerteria*) the stand of the crop was not satisfactory and it gave a poor yield of 683 lb. of pods per acre. TMV. 4 groundnut grown in one acre had a good stand and the harvest of the crop is in progress.

13. *Groundnut yield trials*.—Four selections of short duration irrigated groundnut of the Agricultural Research Station, Tindivanam, were compared with TMV. 2 standard in randomized replicated plots. Sowing was done on 17th March 1951 and harvesting was done on 3rd August 1951. The yield of groundnut pods was below normal due to want of rains and consequent insufficient supply of water from the irrigation source during the growing phase of the crop. The results of the trial are furnished in Table XII. Fisher's 'Z' test was not satisfied for grain yield while for haulms no selection has out yielded TMV. 2 standard.

TABLE XII.—Groundnut—Comparative yield trials.

Field number—11 (0.50 acre).
Previous crop—Vegetable.
Manure—Cattle manure—10 cart-loads per acre.
Varieties—A.H. 4111, A.H. 4218, A.H. 4515, A.H. 6481
and TMV. 2 (standard).
Layout—Randomized block.

Replications—6 times.
Size of plots—
Gross—36' × 12'.
Net—32' × 10'.
Date of sowing—17th March 1951.
Date of harvest—3rd August 1951.

Particulars.	A.H. 4111.	A.H. 4515.	A.H. 6481.	A.H. 4218.	TMV. 2.	Standard error.	Whether difference significant (P = 0.05).	Critical difference (P = 0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Yield of—								
Groundnut pods per acre in lb.	1,952	1,755	1,867	2,029	1,781	..	..	..
Percentage of stand- ard.	100.6	98.6	104.8	113.9	100	..	No.	..
Groundnut haulms (green) per acre in lb.	8,356	8,904	6,576	8,219	8,904	..	..	..
Percentage of stan- dard.	93.9	100	73.9	92.3	100	3.5	Yes.	10.3

Conclusion—
Haulms—TMV. 2, A.H. 4515, A.H. 4111, A.H. 4218, A.H. 6481.

The yield trials were repeated during 1952 also. Sowing was done on 14th February 1952 and the crop was harvested on 11th June 1952. The results of the trial are given in Table XIII.

TABLE XIII.—Groundnut—Comparative yield trials, 1951-52.

Field numbers—22-27 (W).
Previous crop—Sunn hemp.
Sown—14th February 1952.
Harvested—10th June 1952.
Layout—Randomized blocks.

Replications—6 times.
Size of the sub-plots—
Gross—36' × 9'.
Net—33' × 7'.
Spacing—9' × 9'.

Particulars.	TMV. 2 (Std.).	A.H. 6481.	A.H. 4218.	A.H. 4515.	A.H. 4111.	General mean.	Standard error.	Fisher's 'Z' test satisfied or not (P = 0.05).	Critical difference (P = 0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Grain—									
Yield per acre in lb.	1,546.2	506.8	1,408.3	1,496.8	1,337.7	1,259	6.6	..	19.5
Percentage on gene- ral mean.	120.7	40.5	112.6	119.6	106.9	100	5.3	Yes.	15.5
Percentage on con- trol.	100.0	33.6	93.2	99.1	89.6	82.0	4.3	..	12.7

Conclusion—
TMV. 2 Std., A.H. 4515, A.H. 4218, A.H. 4111, A.H. 6481.

14. *Groundnut irrigation experiment*.—An experiment to find out the optimum frequency of irrigation required for the groundnut crop was laid out in randomized replicated plots with the following four treatments using TMV. 4 groundnut :—

Treatment—1—Irrigating every 10 days from the date of first flowering.

Do.	2	Do.	15	do.
Do.	3	Do.	20	do.
Do.	4	Do.	25	do.

Life irrigation, second irrigation after ten days and third irrigation at the time of flowering were all common to all the treatments.

15. *Groundnut in rice fallows*.—TMV. 2 groundnut was raised in an area of 0.68 acre in wet land after the harvest of samba paddy. The crop was suffering due to continuous drought and so in spite of irrigations the crop has recorded a poor yield of 660 lb. of pods per acre.

V. OTHER CROPS.

16. *Gingelly*.—Gingelly TMV. 3 was sown in an area of 1.00 acre in garden land. The stand of the crop was good and its performance was highly satisfactory, since it recorded an acre yield of 450 lb. of seed which is double the yield of previous years.

17. *Sweet potato*.—Twenty varieties of sweet potato were grown for obtaining vines as seed material for conducting yield trials in the coming season. The yield performance is furnished below :—

Variety.	Yield in lb. per acre Tubers.	Variety.	Yield in lb. per acre Tubers.
1 4004 CBE.	4,000	11 5949	8,880
2 B. 219	5,250	12 4003.	6,800
3 4304	8,000	13 B.W.	20,000
4 F. 17 (White) ..	4,000	14 B. 198	2,800
5 F. 17 (Red) ..	4,000	15 V. 6	4,480
6 I.B. 22	4,908	16 V. 10	4,485
7 Ranger	7,875	17 V. 12	4,866
8 Triumph	2,800	18 Local variety ..	4,888
9 Jersey big stem ..	6,588	19 4004	7,585
10 Orange little stem ..	6,142	20 I.B. 22 CBE. ..	16,000

18. *Tapioca—Comparative yield trials*.—Six varieties of tapioca, namely, Bassoria, Butterstick, Haparica, Tapierin, Velenca and local (standard) were planted in randomized and replicated plots in March 1951. Sprouting of the sets was very poor and all attempts to improve the stand of the crop by gap filling proved a failure. The yields recorded were very poor and the trials were a failure. The same experiment with the six varieties was repeated again and the crop was harvested in July.

19. *Compost experiments*.—A series of field experiments to compare the manurial value of compost with that of cattle manure were commenced in March 1949. The main crops on which the trials were proposed to be conducted were sugarcane, *ragi* and *cumbu* with groundnut and sunnhemp as catch crops, the rotation being sugarcane-cumbu-groundnut-*ragi*-sunn hemp-sugarcane. The manurial treatments consisted of no manure, cattle manure and compost to supply 250 lb. N. for sugarcane and 60 lb. N. for each of *cumbu* and *ragi*. The trials were laid out in three sets of plots. Sugarcane was planted in the first area, *cumbu* in the second area and *ragi* in the third area. Subsequently, as the cultivation of sugarcane was discontinued, it was dropped from the rotation and the first area was abandoned. In the second and third areas, the experiment was continued, eliminating sugarcane from the rotation. The soils of the fields were analysed before the plots were laid out and the manures, cattle manure and

compost were analysed just before application for each crop. The results of the trials during the year are summarized below :—

(a) *III Area—Groundnut*.—The fourth crop in the III area, groundnut was sown on 25th January 1951 without the application of manure. The crop was observed to be affected by *Alternaria* sp. and it was sprayed twice with Bordeaux mixture to check it. Both the manured plots yielded more pods than the unmanured plots but the yield differences were not statistically significant. The yield data and the results of analysis are furnished in Table XIV.

TABLE XIV.—Compost experiment, 1951-52.

III Area—Groundnut.					
Field numbers—22-27 (E). Previous crop—Cumbu. Treatments—Residual effect of— (i) No manure. (ii) Cattle manure—60 lb. of N. (iii) Compost—60 lb. of N. Variety—Groundnut TMV. 4.			Layout—Randomized block. Replication—6 items. Size of plot— Gross—45 × 54 links. Net—41 × 52 links. Sown—25th January 1951. Harvested—1st to 3rd July 1951.		
Particulars.	No manure.	Cattle manure.	Compost.	Standard error.	Whether difference significant (P=0.05).
(1)	(2)	(3)	(4)	(5)	(6)
Yield of groundnut pods per acre in lb.	1,475	1,875	1,566	..	..
Yield as percentage of control..	100	127.1	106.2	9.6	No.
Yield of groundnut haulms (green) per acre in lb.	3,571	3,857	3,571	..	..
Yield as percentage of control..	100	108.0	100	3.4	No.

(b) *II Area—Ragi*.—The fifth crop of *ragi* P-1 was planted in II area of the compost experiment plot on 9th July 1951 without the application of manure. Due to the failure of the monsoon the growth and development of the crop were not satisfactory. Harvesting was done on 1st October 1951. Results of analysis presented in Table XV reveal that though cattle manure and compost plots yielded more grain than no manure plots, yet the treatment differences were not statistically significant.

TABLE XV.—Compost experiment, 1951-52.

II Area—Ragi P-1.					
Field numbers—22-27 (E). Previous crop—Sunn hemp. Treatments—Residual effect of— 1 No manure. 2 Compost. 3 Cattle manure. Variety—Ragi P. 1.			Layout—Randomized block. Replication—6 times. Size of plot— Gross—45 × 54 links. Net—41 × 50 Sown on—18th June 1951. Planted on—9th July 1951. Harvested—1st and 2nd October 1951.		
Particulars.	No manure.	Cattle manure.	Compost.	Standard error.	Whether difference significant (P=0.05).
(1)	(2)	(3)	(4)	(5)	(6)
Ragi—					
Grain yield per acre in lb.	1,009	1,122	1,088	..	..
Percentage over control ..	100	111.2	108.8	3.2	No.
Straw—					
Yield per acre in lb.	2,195	2,585	2,342	..	..
Percentage over control..	100	113.2	106.7	4.7	No.

(c) *III area—Ragi*.—The fifth crop of this area was *ragi* P-1. It was planted on 10th July 1951 without the application of manures. The crop was stunted in growth due to severe drought and it was harvested on 3rd October 1951. Even though the cattle manure and compost plots yielded more grain than

the control—No manure plots, the yield differences were not statistically significant. The results of analysis are presented in Table XVI.

TABLE XVI.—Compost experiment, 1951-52.

III Area—Ragi P-1.					
Field numbers—22-27 (E).					
Previous Crop—Groundnut.					
Treatments—Residual effect of					
1 No manure.					
2 Compost.					
3 Cattle manure.					
Crop—Ragi P. 1.					
Layout—Randomized block.					
Replications—6 times.					
Size of plot—					
Gross—45 × 54 links.					
Net—41 × 50					
Sown on—18th June 1951.					
Planted on 10th July 1951.					
Harvested—3rd and 4th October 1951.					
Particulars.	No manure.	Cattle manure.	Compost.	Standard error.	Whether differences significant (P=0.05).
(1)	(2)	(3)	(4)	(5)	(6)
Ragi—					
Grain yield per acre in lb.	1,010	1,118	1,076	4.2	No.
Percentage over control	100	110.7	106.5		
Straw—					
Yield per acre in lb.	2,085	2,456	2,324	6.2	No.
Percentage over control	100	117.8	111.5		

(d) II and III areas—Ragi P-1.—The sixth crop of ragi P. 1 was planted on 22nd February 1952 in both the areas after the application of manures at the rate of 60 lb. N. per acre. In both the areas the crop was performing well in the initial stages but latter on due to extreme drought the crop suffered in spite of lift irrigation. The crop was harvested on 6th May 1952 in II area and on 7th May 1952 in III area. Though increased yields were obtained from the manure plots than from the no manure plots the yield differences were not statistically significant. The results are furnished in Table XVII and XVIII.

TABLE XVII.—Ragi—Compost experiment—II Area—1951-52.

Field numbers—22-27 (E).							
Previous crop—Ragi P-1.							
Manure—Cattle manure and compost manure at the rate of 60 lb. of Nitrogen per acre.							
Layout—Randomized block.							
Replications—6 times.							
Size of the sub-plot—							
Gross—36' × 30'							
Net—32' × 28'							
Spacing—1 link—Two outer rows discarded.							
Sown—25th January 1952.							
Planted—20th February 1952.							
Harvested—6th May 1952.							
Particulars.	No manure.	Cattle manure.	Compost manure.	General mean.	Standard error.	Fisher's 'Z' test satisfied or not. (P=0.05)	Critical difference. (P=0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Grain—							
Yield per acre in lb.	455	582	543	527	37	No.	..
Percentage on control	100	129	119	115.7	8.0	..	..
Straw—							
Yield per acre in lb.	700	1,011	1,055	952	51	Yes.	161
Percentage on control	100	128.0	133.8	120.6	6.5	..	20.4
Duration of flowering days.	79	82	82	..	..	..	..
Conclusion—							
Straw—Compost manure, Cattle manure, No manure.							

TABLE XVIII.—Ragi—Compost experiment—III Area 1951-52.

Field numbers—22-27 (E).							
Previous crop—Ragi P-1.							
Manure—Cattle manure and compost manure at the rate of 60 lb. of nitrogen per acre.							
Layout—Randomized block.							
Replications—6 times.							
Size of plot—							
Gross—36' × 30'							
Net—32' × 28'							
Spacing—1 link—Two outer rows discarded.							
Sown—25th January 1952.							
Planted—20th February 1952.							
Harvested—6th May 1952.							
Particulars.	No manure.	Cattle manure.	Compost manure.	General mean.	Standard error.	Fisher's 'Z' test satisfied or not. (P=0.05).	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	
Grain—							
Yield per acre in lb.	491	522	559	524	25	No.	..
Percentage on control	100	106	114	106.3	4.9	..	..
Straw—							
Yield per acre in lb.	857	753	930	847	53	No.	..
Percentage on control	100	87.9	108.4	95.7	6.2	..	..
Duration of flowering days.	80	82	82	..	..	..	..

VI. VEGETABLE CROPS.

20. *Vegetables*.—Both indigenous and exotic vegetables were grown in an area of 1.50 acres primarily for seed production. Cabbage, knol khol, Ladys finger, American long, V. 14, Tomato, Lab lab varieties 269 and 277, Butter beans, Snake gourd, Pumpkin, Wyand giant and Brinjal were grown. Among them Cabbage and knol khol were utilized for consumption. Pumpkin, Wyand giant gave 96 lb. of fruits. The size of the fruits was found to be small. Two varieties of brinjal, namely, Wyand purple streak and Wyand white giant were grown on the farm. Since there was no fruit setting the plants were pulled out. A total quantity of 878 lb. of green vegetables and 286 lb. of vegetable seeds were produced during the year. Cowpea varieties 419 and New Era grown in 20 cents and 11 cents in orchard area in the inter spaces between fruit trees have yielded 95 lb. and 23½ lb. of seed respectively. Roselle (*Hibiscus sabdariffa*), the seeds of which were received from the Fruit Specialist, Coimbatore, and sown on 21st March 1952 has put on very good vegetative growth but no flowering or fruit setting is noticed. The plants are coming up well in this locality.

VII. FODDER CROPS.

21. *Fodder grasses*.—Fodder grasses like Guinea grass, Napier grass, Cumbu X Elephant grass hybrid and buffalo grass were grown in an area of 0.54 acre in field number 21 and outskirts of field number 13-15. The crops were given mammuty hoeing, top dressing with ammonium sulphate at 50 lb. per acre and irrigation. The following quantities of green grasses and slips were obtained :—

	Quantity of grasses in lb.			Number of slips.
	Area in acres.	Per plot.	Per acre.	
Napier grass ..	0.20	9,500	47,500	1,300
Buffalo grass ..	0.07	400	5,714	..
Cumbu hybrid ..	0.15	900	6,000	..
Guinea grass ..	0.12	500	4,166	7,500

The grasses were fed to cattle and the slips were sold to ryots for multiplication. Due to the severe drought the growth and stand of the fodder grasses were not satisfactory.

22. *Cholam (Sorghum)*, sp.—A. S. 7081, Irungu × Periamanjol cholam was grown as a dry crop for fodder. It was sown in December 1951 and harvested on 28th February 1952. The green matter obtained was 1,957 lb. per acre. The low yield of the crop was due to the paucity of rains during the growing period of the crop.

VIII. GREEN MANURE CROPS.

23. *Green manure crops*—(a) *Daincha*.—This was grown in an area of 0.50 acre in field number 53 with seeds treated with bacterial culture. The crop grew up well in the initial stages but finally there was no seed setting and it practically failed due to unfavourable seasonal conditions.

(b) *Sunnhemp*.—This was cultivated in an area of 7.43 acres. The total yield of green matter obtained was 37,971 lb. thus recording 5,420 lb. per acre on an average.

(c) *Gliricidia maculata*.—This quick growing and heavy yielding green manure plant was propagated on a large scale on the farm along field bunds, road margins and in all available vacant spaces. During the year 1,647 rooted cuttings and seedlings were planted and these have established well.

(d) *Sesbania speciosa*.—Seedlings of this very useful and quick growing green manure plant were planted four inches apart all along kuruvai paddy field bunds.

in puddle and 2 feet apart along samba paddy field bunds. The plants grew up well and there was profuse flowering and pod formation. Seed collection was done and by the end of June 1952, 750 lb. of seed were obtained. *Sesbania* was grown on a bulk scale in wet land in field number 68-B in an area of 0.09 acre and it recorded an acre yield of 43,622 lb.

(e) *Indigofera teysmanii*.—Three hundred and eighty seeds of this plant from Peradenia, Ceylon were received from the Government Lecturing and Systematic Botanist, Coimbatore, in two consignments. They were sown in seed pans on 26th December 1951 and 6th May 1952. On 31st March 1952, 32 plants were planted in the orchard. Two of them subsequently died and were gap filled. At present there are 18 plants in the seed pan ready for planting. At the early stages the tender shoots and leaves were found affected by lab lab aphid (*Aphis medicaginis*) and this was successfully controlled by dusting Gammaxane. In bigger plants agathi weevils (*Alcidis bubo*) were noticed and these were hand picked and destroyed. The heights of the plants range from four inches to four feet.

IX. FRUIT TREES.

24. *Orchard*.—A plot of two acres in extent in which different fruit trees had been planted was maintained as an orchard. A few citrus and mango trees planted in the poultry runs and outskirts of two fields were also maintained. Two Italian lemon, two Malta lemon and two Lucknow seedless plants received from the Fruit Research Station, Kodur, and four Bulls heart and two mangosteen plants received from the Fruit Station, Kallar, were planted in the orchard. Out of them, two mangosteen failed to establish. Four Nepali lemon round, one Nepali oblong, one Seville lemon and one acid lime were also planted. One Pomelo red and one young sathgudi died during the year.

(a) *Citrus*.—No zinc deficiency in citrus trees was noticed this year. The trees were manured by incorporating sunnhemp which was grown as a cover and green manure crop around trees together with 10 lb. of old *Kolinji* seeds per plant. Dead woods and water shoots were pruned and removed and periodical spraying with perenox was done. The following are the trees which commenced bearing:—

Citrus *Hawayii* planted on 8th December 1947.

Rajahmundry lemon planted on 8th December 1947.

Sathgudi tree numbers 137, 138 and 139 planted on 8th December 1947.

The following is the yield data of the citrus trees according to the varieties:—

Variety.	Number of trees.	Number of fruits.	Quantity. LB. OZ.
Sathgudi	20	596	230 8
Washington naval ..	3	21	10 8
Sour orange	2	170	83 0
Pomelo	6	101	205 0
Lemon	8	610	228 0

(b) *Mango*.—Mango hoppers (*Idiocerus niveosparsus*) were found at the time of flowering and DDT 550 wettable powder was sprayed before flowering and two sprayings with fish oil resin soap were given after flowering due to which fruit setting in Jehangir was found to be better this year than in the previous year. No uniform flowering was noticed in mango this year, except in the case of Jehangir which flowered twice with an interval of 15 days between them. In the rest of the varieties flowering as well as fruit setting were not at all satisfactory. There was no fruit setting in Alfonso even though the tree produced only one flower-head. Grafting work was also done and 108 grafts were distributed during the year.

The following is the yield data of mango plants according to varieties:—

Variety.	Number of trees.	Number of fruits.	Quantity. LB. OZ.
Neelum	7	1,709	749 8
Bangalora	1	324	278 0
Jehangir	2	56	78 0
Himayuddin	2	43	74 12
Kadar	2	50	22 0
Padiri	3	144	94 0

(c) *Sapota*.—There are seven sapota trees in the orchard. A total quantity of 287½ lb. of sapota fruits was harvested and sold.

(d) *Jack*.—All the trees except four commenced bearing. Jack plants were planted in 1940 and they bore fruit for the second time. Twenty-eight fruits weighing 591 lb. were harvested. One hundred and fifty-two jack seedlings were distributed. Tree No. 144 is peculiar in that it produced only double fruits with a single fruit stalk. The four Singapore jack tree seeds sown in November 1947 have not so far produced any fruits. They have grown to heights of 2½ feet, 10 feet, 12½ feet and 13½ feet.

25. *Banana*.—Seventeen varieties of Banana which were planted in field No. 12 on 18th May 1951 commenced flowering during April and May 1952. The variety Mauritius has begun to put forth bunches. The seventeen varieties are—(1) Mauritius, (2) Monthan, (3) Kostha Bontha, (4) Rasthali, (5) Krishna vashai, (6) Batheesa green, (7) Poovan, (8) Batheesa ashy, (9) Bontha ashy, (10) Kunnan, (11) Thiruvananthapuram, (12) Peyan, (13) Nendran, (14) Bontha green, (15) Senkathali, (16) Anaikomban and (17) Karpooora chakrakali. Out of these, Monthan, Karpooora chakrakali, Anaikomban, Nendran, Batheesa ashy, Batheesa green and Krishna vazhai have put forth bunches.

26. *Papaya*.—A total quantity of 254 lb. of fruits and 3 lb. of seeds were obtained. Planting of seedlings was done and it was found that majority of them were male plants. These will be replaced when seedlings grow in the new nursery recently sown.

27. *Pineapple*.—It is found that it takes two years to bear fruits from the data of planting when suckers are planted in rows in between banana plants. So far only six fruits from the two year old plants were harvested. These were found to be attacked by squirrels at the time of the ripening stages of the fruits.

28. *Date palm*.—Twenty-three date palm seedlings were planted along the pathway of 54 mound. Out of these 21 seedlings have established.

X. OTHER TREES AND PLANTS.

29. *Kapok*.—Out of the 54 kapok plants growing along the boundary of the farm 8,600 pods were collected during the year. Two hundred and fifty kapok seedlings were planted and it was found that due to the drought conditions only 28 seedlings established. Gap filling will be taken up during the course of the year.

30. *Palms*.—The five Malayan oil palm or African palm (*Elaeis guineensis*) produced no fruits during the year. Three pounds of seeds were sent to the Oil Technologist, Kerala Institute, Kozhikode, for extraction of oil. Six seedlings of the palm which were planted during *Vanamahotsava* in 1950 near the jaggery yard have established well. Out of the two doum palm seedlings and one sago palm planted, only one doum palm has established and it has grown to a height of 2½ feet.

31. *Rattan cane*.—Twenty rattan cane suckers received from the Banana Research Officer, Aduthurai, were planted in field No. 10 on 20th March 1952. Though seven suckers sprouted first, at present only four suckers are found to be thriving.

32. *Perennial Mung*.—Two ounces of perennial mung seed from Philippines received from the Pulses Specialist, Coimbatore, were sown in Field No. 10 on 22nd July 1951. The plants grew well and after four months, commenced flowering and a total quantity of 1 lb. 2 oz. of seed was collected. There was no uniform maturity of the pods. At present the plants are bushy and full of vegetative growth.

XI. POULTRY.

33. *Poultry*.—The maintenance of White Leghorn breed of poultry was continued during the year. 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 eggs were hatched under the incubator, 240 eggs were sold for table and the rest for breeding. Out of the hatchlings 7 chicks were converted as adults, 36 were sold for breeding and two were sold for table. The stock position at the end of the year consisted of two cocks and eight hens. The poultry worked at a profit of Rs. 33-2-0 during the year.

XII. MISCELLANEOUS.

34. *Bee-keeping*.—Two hives were maintained during the year. Two more hives were separated during the swarming season. Out of the two hives separated, only one colony established. A total quantity of 1½ lb. of honey was obtained during the year.

35. *Pisciculture*.—The fish pond dug in July 1948 in which Gourami fingerlings were let in was maintained during the year. Four good-sized fish were caught and exhibited during the 'Farmers' Day' held in June 1952. The maximum weight noted was 2 lb. 12 oz. A total quantity of 8 lb. 12 oz. was realized and this was sold.

36. *Sinking of tube-wells*.—As per the instructions of the Director of Agriculture, sinking of tube-wells at the Agricultural Research Station, Palur, was taken up and it was proposed to sink three tube-wells, two in wet lands and one in garden land to supplement the water-supply from the irrigation channel and wells. A Russel and Newberry oil-engine with four-inch suction and three inches delivery pipes was fitted and worked successfully in the tube-well in Field No. 57. The output of water pumped out is about 14,000 gallons per hour and it is maintained for any length of time thus proving that the spring tapped is very successful. Since the supply channel from the river Gadilam has almost failed, it is only with the help of this tube-well the cultivation of *kuruvai* paddy was taken up in an area of six acres in addition to growing of green manure crops in four acres. With regard to the other two bore-wells sunk in Field Nos. 58 and 60 in wet land area, though water was tapped, the bores failed to supply water to the oil engines and hence they were given up. In garden land area in Field No. 28-34 a bore-well was sunk and a good spring was tapped at 48 feet level. Since the Deputy Director of Agriculture, Tanjore, felt that by going still further down, the supply can be improved, further deepening was done but without success. The Deputy Director of Agriculture, Tanjore, divined another spot in Field Nos. 21-34 and the work was taken up in July.

37. *Seed distribution*.—The particulars of seeds and plants distributed during the year are furnished in Annexure I.

38. *Finance*.—A statement of receipts and expenditure during the *fasli* year is furnished in Annexure II.

AGRICULTURAL RESEARCH STATION, PALUR,
26th August 1952.

TANJORE,
15th December 1952.

M. RAYAPPA PILLAI,
Superintendent.

K. VARADACHARI,
Deputy Director of Agriculture.

ANNEXURE I.

STATEMENT OF SEEDS AND PLANTS DISTRIBUTED DURING THE YEAR, 1951-52.

	LB.		
Paddy seed	42,657	Fruit plant (Grafts, layers and seedlings).	564
Ragi seed	7,072	Tomato seedlings	528
Cumbu seed	540	Miscellaneous tree seedlings	3,717
Varagu seed	952	Rose rooted cuttings	27
Groundnut seed	1,965		CENTS.
Redgram seed	250	Paddy seedlings	19½
Gingelly seed	227	Ragi seedlings	2½
Vegetable seed	285½	Fodder grass slips	12,000
Vegetables (green)	878½	Tapioca cuttings	1,000

ANNEXURE II.

STATEMENT OF RECEIPTS AND EXPENDITURE FOR THE YEAR ENDING 30TH JUNE 1952 (FASLI 1361).

Receipts.		RS.	RS.
By sale of farm produce		6,595	
Value of seeds transferred to district staff on free transfer.		6,255	
Rent on buildings		50	
Stationery and printing—			
(Sale of books)		6	
Miscellaneous		432	
Total, receipts			13,338
Expenditure.			
I. 40. C. Agriculture—Experimental Farm—			
1. Pay of officer		2,300	
Pay of establishment		8,743	
Travelling allowance		1,326	
Dearness allowance		3,736	
			16,105
2. Contingencies—			
Purchase of live and dead stock		1,701	
Working expenses		22,542	
Other contingencies		389	
Dearness allowance		4,929	
Total			29,561
Total expenditure			45,666

APPENDIX I.

STATEMENT SHOWING THE EXPENDITURE AND RECEIPTS OF THE AREAS IN WHICH BULK CROPS HAVE BEEN GROWN IN AGRICULTURAL RESEARCH STATION, PALUR.

Particulars of crops.	Bulk area cultivated in acres.	Receipts.		Expenditure.		Profit.		Rates adopted for working receipts.
		RS.	A. P.	RS.	A. P.	RS.	A. P.	
Paddy—								
Kar paddy—								
Sw. 1251	1.00	316	12 0	295	4 0	21	8 0	Paddy, ragi and varagu grain = Re. 0-2-0 per lb.
PLR. 2	1.00	366	7 0	118	10 0	247	13 0	....
Co. 13	1.00	307	5 0	130	1 0	177	4 0	....
TKM. 3	0.50	225	7 6	164	1 0	61	6 6	Gingelly and redgram = Re. 0-4-0 per lb.
Samba paddy—								
GEB. 24	1.16	428	5 0	116	2 0	310	3 0	Sweet potato = Re. 0-0-6 per lb.
PLR. 1	1.00	377	8 0	139	7 0	238	1 0	....
Co. 5	1.00	329	5 0	174	1 0	155	4 0	Sunnhemp, pillipesara and paddy straw and fodders = 100 lb. per rupee.
Co. 26	1.75	627	15 0	306	15 0	321	0 0	....
Co. 19	0.83	360	6 0	126	9 0	233	13 0	....
Co. 25	5.95	2,344	8 0	866	7 0	1,478	1 0	....
Samba paddy—								
Thaladi ASD. 5 ..	2.00	520	3 0	246	14 0	273	5 0	Vegetables = Re. 0-1-0 to 0-2-0 per lb.
Co. 2	1.50	367	10 0	223	9 0	139	1 0	....
Millets—								
Ragi	3.33	586	15 0	480	15 0	106	0 0	....
Varagu and redgram..	3.15	123	0 0	104	0 0	24	0 6	....
Oilseeds—								
Gingelly	1.00	112	8 0	46	1 6	66	6 6	....
Green manure—								
Sunnhemp	7.40	232	15 6	139	14 0	93	1 6	....
Pillipesara	0.40	55	0 0	52	13 0	2	3 0	....
Fodders—								
Cholam	0.30	17	8 0	15	10 0	1	14 0	....
Napier grass	0.58	53	8 0	39	13 0	13	11 0	....
Miscellaneous crops—								
Sweet potato	1.00	186	0 0	125	7 6	60	8 6	....
Vegetables	0.60	330	7 0	146	4 0	184	3 0	....
Total area under bulk crops in 1951-52								36.54 acres.
								RS. A. P.
Receipts								8,272 9 0
Expenditure								4,053 14 0
Profit								4,208 11 0

APPENDIX II.

STEPS TAKEN TO INCREASE THE REVENUE OF THE STATION.

To make the farm self-supporting, attempts to increase the area under money crops like cotton in rice fallows, growing of groundnut, increasing the area under double crop land in wet land and bringing the lands under cultivation with one crop or other without allowing the land to remain fallow are being done. During the year 4½ acres were grown with P. 216 F cotton and one acre with TMV 2 groundnut in rice fallows. Due to the improved irrigation facilities available now, the whole wet land area will be grown with two crops of paddy together with a cash crop of short duration cotton or groundnut. In block 17—area 1.16 acres, it is programmed to grow three crops of paddy in a year and if it is found successful the area under three crops of paddy on the farm will be increased. To overcome the irrigation difficulties, recently two tube-wells have been sunk and it is hoped with the availability of water more crops can be raised without difficulty and the revenue will be increased.

ANNUAL REPORT OF THE AGRICULTURAL RESEARCH STATION, TINDIVANAM, FOR THE YEAR 1951-52 (FASLI 1361).

This is the report of work done on the station during the fasli year 1361 (i.e., from 1st July 1951 to 30th June 1952).

2. Season—(i) Rainfall.—The statement of rainfall for the year in weekly periods along with those of the previous year and the average for the previous decennium are given in Table I.

TABLE I.—Rainfall statement.

TABLE I.—Rainfall statement.								Average for the last ten years.	
Month.	1951-52.			1950-51.					
	Week	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.		
South-west monsoon.									
June	7-13	0.18	1	0.19	1	0.44	0.9		
	14-20	0.18	1	0.19	1	0.09	0.3		
	21-27	0.18	1	0.19	1	0.45	0.8		
June-July	28-4	0.05	1	0.19	1	0.47	1.0		
	5-11	0.56	1	0.19	1	0.92	1.3		
	12-18	0.09	1	0.42	1	0.54	1.2		
	19-25	0.07	1	0.09	1	0.49	1.2		
July-August	26-1	0.11	1	2.84	1	1.41	1.9		
	2-8	0.10	1	0.38	2	0.78	1.6		
	9-15	0.31	2	0.38	2	0.57	1.6		
	16-22	0.86	1	1.21	3	0.67	1.9		
	23-29	4.66	4	0.12	1	1.68	2.2		
August-September	30-5	0.67	1	0.23	2	0.93	1.8		
	6-12	1.66	2	2.60	3	1.74	1.9		
	13-19	1.12	1	1.12	3	1.39	1.9		
	20-26	0.17	1	0.65	2	1.47	1.5		
Total ..		10.29	15	9.85	19	14.04	22.4		
North-east monsoon.									
September-October	27-3	2.87	2	0.88	2	1.34	1.9		
	4-10	0.62	1	1.70	4	2.13	2.2		
	11-17	0.05	1	1.61	8	1.49	2.2		
	18-24	0.80	1	1.11	1	1.00	2.0		
November	25-31	0.33	2	1.11	1	1.16	1.8		
	1-7	0.65	2	1.71	3	1.09	1.5		
	8-14	3.03	2	2.65	3	1.94	2.1		
	15-21	2.20	3	1.45	1	2.55	2.6		
	22-28	0.51	2	1.45	1	1.47	2.0		
November-December	29-5	2.23	2	1.45	1	2.42	2.2		
	6-12	0.08	1	1.54	2	0.63	0.9		
	13-19	0.08	1	1.54	2	0.80	1.7		
	20-26	0.08	1	1.54	2	0.52	0.9		
December-January	27-3	0.08	1	0.08	1	0.35	0.5		
	4-10	0.08	1	0.08	1	0.67	1.0		
	11-17	0.08	1	0.08	1	0.19	0.3		
	18-24	0.08	1	0.08	1	0.23	0.3		
	25-31	0.17	1	0.08	1	0.14	0.3		
Total ..		13.57	18	12.74	19	20.17	25.9		
Hot weather.									
February	1-7	0.01	1	0.01	1	0.01	0.1		
	8-14	0.01	1	0.01	1	0.03	0.2		
	15-21	0.09	1	0.01	1	0.03	0.2		
	22-28	0.01	1	0.01	1	0.01	0.1		
March	29-4	2.22	4	0.01	1	0.31	0.6		
	5-11	0.14	1	0.01	1	0.05	0.2		
	12-18	0.14	1	0.01	1	0.05	0.2		
March-April	19-25	0.14	1	0.01	1	0.05	0.2		
	26-1	0.14	1	0.01	1	0.05	0.2		
	2-8	0.14	1	0.01	1	0.05	0.2		
	9-15	0.14	1	0.01	1	0.05	0.2		
	16-22	0.14	1	0.01	1	0.05	0.2		
April-May	23-29	0.14	1	0.01	1	0.05	0.2		
	30-5	0.14	1	0.01	1	0.05	0.2		
	6-12	0.14	1	0.01	1	0.05	0.2		
	13-19	0.14	1	0.01	1	0.05	0.2		
	20-26	0.14	1	0.01	1	0.05	0.2		
May-June	27-3	0.14	1	0.01	1	0.05	0.2		
	4-10	0.14	1	0.01	1	0.05	0.2		
	11-17	0.14	1	0.01	1	0.05	0.2		
	18-24	0.14	1	0.01	1	0.05	0.2		
	25-31	0.14	1	0.01	1	0.05	0.2		
Total ..		6.84	13	4.01	6	6.28	6.3		
Grand total ..		20.70	45	22.60	44	40.49	54.6		

The total rainfall received during the year was 30.70 inches distributed over 45 rainy days as against 26.60 inches on 44 days during the last year and the ten-year average of 40.49 inches on 54.6 rainy days. The rainfall received was short of the normal by 9.79 inches.

(i) The south-west monsoon was late this season and was also feeble in the initial stages. The total rainfall was below normal and was ill-distributed. The north-east monsoon was fairly active in the early stages but completely failed from the beginning of December. Long spells of drought in the initial stages and absence of rains during the pod formation and development stages of the groundnut crop have resulted in very poor yields. Great difficulty was also experienced in harvesting the groundnut crop in the absence of adequate rains. The hot weather rains were late and preparatory cultivation to the fields was delayed.

(ii) *Temperature*.—The maximum temperature ranged from 89°F in January 1952 to 109°F in May 1952. The minimum temperature recorded ranged from 63°F in December 1951 and January 1952 to 80°F in June 1952. The average humidity was the highest in November 1951 (92.9 per cent) and lowest (63.0 per cent) in December 1951 and January 1952.

3. *Oilseed crops*.—A. *Groundnut*.—(i) *General*.—With the receipt of 0.49 inches of rain on the 14th August 1951 sowings of groundnut both experimental and bulk units were taken up on the farm. An area of 10.20 acres was covered on the 15th and further sowings were suspended for want of sufficient moisture. Sowings were resumed on the 22nd August with a fall of 86 cents of rain and completed on the 25th covering an area of 18.89 acres. The germination was poor in the first sown units while it was good in the others. Gaps were filled up to improve the stand. The growth was fair but was inhibited by the long spells of drought. A mild attack of '*Surul Poochi*' (*Stomopteryx nerteria*) was noticed in the month of September but it disappeared with the north-east monsoon rains. Light traps were set up and large number of moths of '*Surul*' and red hairy caterpillar was caught. In spite of the control measures the second brood of '*Surul*' was very severe and the bunch crop was much affected. *Tikka* (*Cercospora personata*) appeared in the second fortnight of October and was severe during the month of November. The bunch types attained maturity by the end of November and were pulled out with the help of north-east monsoon showers. The yields obtained were generally poor. The month of December was completely dry and the spreading crop was very much affected. Harvesting had to be delayed and was taken up under difficult conditions. The yield was poor. The average acre yields obtained on the station for the important strains are as follows.—

Strain.	Average acre yield in lb.
TMV. 1	281
TMV. 2	228
TMV. 3	468

(ii) *Comparative yield trials of selections*.—(a) *Bunch*.—Three bunch strains obtained one each from Bombay, Madhya Pradesh and Mysore were compared with the local bunch strain TMV. 2 for the first year. Germination was poor in the strain (H.G. 5) from Mysore and fair in the other two. The strain from Bombay was slightly longer in duration than the local strain and the strain from Mysore had the longest duration, viz., 136 days. Results of statistical analysis of

the yield data and qualitative studies on the produce of the strains are presented in Tables II and III.

TABLE II.—Comparative yield trials of bunch selections—1951-52 Rainfed season.

Object—To compare the yields of three bunch strains obtained from other States.
Field—A-7 (area 0.87 acre).
Previous crop—Castor.
Manuring—10,000 lb. of town rubbish per acre.
Layout—Randomized blocks replicated six times.
Plot size—Gross—67' x 34',
Net—66' x 24' or 1/264 acre.
Spacing—6' x 6'.
Strains—A.H. 6707 from Mysore (H.G. 5).
A.H. 6708 from Madhya Pradesh (Improved Spanish).
A.H. 6709 from Bombay (Spanish Improved).
Sown on—23rd August 1951.
Harvested on—8th December 1951 and 7th January 1952.

Strains.	Duration in days.	Acre yield in lb.	Percentage on control.	Whether 'Z' test satisfied or not (P = 0.05)
TMV. 2 (control)	105	907	100.0	
A.H. 6707 (Mysore)	136	451	49.7	
A.H. 6708 (Madhya Pradesh)	105	823	90.7	Yes.
A.H. 6709 (Bombay)	108	832	91.7	
Standard error	..	29.3	3.2	
Critical difference	..	88.2	9.7	

(P = 0.05.)

Conclusion—TMV. 2, A.H. 6709, 6708, 6707.

TABLE III.—Qualitative determinations on the strains under comparative [yield trials.

Strain.	Shelling percentage.	* Natural test weight of one Madras Measure of		Number of kernels per lb.
		Pods.	Kernels.	
TMV. 2	77.2	678	1,240	1,361
A.H. 6707	77.3	650	1,272	1,428
.. 6708	73.2	450	1,268	1,955
.. 6709	68.4	334	1,244	1,304

* Natural test weight is the weight in grams per unit volume (1 Madras measure) determined under standardized conditions.

The strain from Mysore has recorded very poor yield and it is significantly lower than the other two which are on a par with the local strain. Regarding quality, the strain from Mysore is as good as the local strain while the other two strains are very poor.

The trial will be repeated next year along with a new strain H.G. 6 from Mysore.

(b) *Spreading*.—Eight selections from progenies of crosses, six from Local Mauritius and two strains from other States were compared with TMV. 1, TMV. 3 and local spreading groundnut during the year in four separate series. Of them, six selections were compared for the third time, five other selections for the second time and the rest for the first time. Six selections have yielded significantly higher than the local groundnut, five selections higher than TMV. 3 and two higher than TMV. 1 strain. The results of the trials and qualitative studies on the produce of the selections are presented in Tables IV and V:—

TABLE IV.—Comparative yield trials of spreading selections—1951-52 Rainfed season.

Object—To compare the yield performances of fourteen selections and two strains from other States with the local groundnut, TMV. 1 and TMV. 3 strains.
Field—A-3 and A-4.
Area—1.00 and 0.89 acre, respectively.
Previous crop—Castor.
Manure—10,000 lb. of town rubbish per acre.
Layout—Randomized blocks replicated six times in Series I and II, five times in Series III and four in Series IV.
Plot size—67' x 51' gross.
66' x 34' net or 1/176 acre.
Spacing—9' x 9'.
Sown on—22nd August 1951.
Harvested on—18th January and 10th January 1952.

Series I.

Selections.	Acres yield in lb.	Percentage on control.
Local (control)	568	100.0
TMV. 1	691	121.7
TMV. 3	623	109.7
A.H. 6606 (Progeny from a cross between A.H. 82 x A.H. 45.)	753	132.6
A.H. 6607 (A.H. 25 x A.H. 73)	770	135.6
A.H. 6608 (A.H. 73 x A.H. 45)	843	148.5
A.H. 6609 (A.H. 73 x A.H. 45)	799	140.7
A.H. 6610 (Do.)	766	134.9
A.H. 6612 (A.H. 25 x A.H. 45)	587	103.4
Standard error	43.6	7.7
Critical difference (P=0.05)	124.7	21.9

Conclusion—

A.H. 6608, 6609, 6607, 6606, TMV. 1, T.M.V. 3, 6612, Local.

Series II.

Local (control)	543	100.0
TMV. 1	592	109.0
TMV. 3	690	127.1
A.H. 6614 (Progeny of a cross between A.H. 227 x 784).	604	111.3
A.H. 6615 (A.H. 82 x 73)	727	133.9
A.H. 6617 (Selection from A.H. 1) ..	532	97.9
A.H. 6622 (Do.)	517	95.2
A.H. 6624 (Do.)	583	98.2
Standard error	32.8	6.0
Critical difference (P=0.05)	93.7	17.8

Conclusion—

A.H. 6615, T.M.V. 3, 6614, TMV. 1, Local, 6624, 6617, 6622.

Series III.

Local (control)	511	100.0
TMV. 1	569	111.4
TMV. 3	654	128.0
A.H. 6693 (selection from A.H. 1) ..	514	100.6
A.H. 6694 (Do.)	544	106.4
A.H. 6700 (Do.)	524	102.5
Standard error	89.0	7.6

Series IV.

Local (control)	546	100.0
TMV. 1	602	110.3
TMV. 3	680	124.6
A.H. 6710 (T25 Kanpur, Uttar Pradesh) ..	416	76.2
A.H. 6711 (Local Samrala Punjab) ..	467	85.5
Standard error	61.3	11.3

Whether 'Z' test satisfied on not (P = 0.05).

Yes.

Yes.

No.

No.

TABLE V.—Qualitative determinations on spreading selections.

Selections.	Shelling percentage.	Natural test weight of one Madras measure of		Number of kernels per pound.
		Pods.	Kernels.	
(1)	(2)	(3)	(4)	(5)
Series I.				
Local	77.4	623	1,191	1,357
TMV. 1	72.5	539	1,172	1,074
TMV. 3	75.9	638	1,209	1,368
A.H. 6606	74.8	540	1,169	1,036
" 6607	72.3	537	1,171	1,000
" 6608	75.3	571	1,145	1,001
" 6609	75.3	573	1,152	967
" 6610	75.0	571	1,148	971
" 6612	76.0	611	1,184	1,395
Series II.				
Local	77.4	605	1,188	1,377
TMV. 1	71.9	533	1,171	1,167
TMV. 3	75.8	643	1,219	1,342
A.H. 6614	73.5	548	1,184	960
" 6615	73.2	547	1,173	1,201
" 6617	77.3	593	1,181	1,393
" 6622	77.3	600	1,181	1,422
" 6624	76.3	571	1,182	1,507
Series III.				
Local	77.0	586	1,178	1,380
TMV. 1	70.8	498	1,159	1,133
TMV. 3	75.4	579	1,194	1,365
A.H. 6693	77.0	567	1,171	1,423
" 6694	77.0	574	1,188	1,438
" 6700	77.5	577	1,194	1,395
Series IV.				
Local	77.0	584	1,178	1,381
TMV. 1	71.8	518	1,159	1,127
TMV. 3	75.7	589	1,200	1,392
A.H. 6710	74.4	491	1,160	953
" 6711	75.4	487	1,154	1,009

Series I.—The six selections from progenies of crosses have completed three years trials. The selections recorded consistently better yields than the control in all the three years and the average percentage increase in yield ranges from 30 to 40 over the Local Mauritius. The conclusions obtained in previous years are given below:—

1949-50—A.H. 6609, 6606, 6607, 6612, 6610, TMV. 1, 6608, Local.

1950-51—A.H. 6606, 6608, 6607, 6609, TMV. 1, 6610, 6612, Local.

The qualitative characters of the selections are poor compared with the Local Mauritius but they are better than TMV 1 strain.

The selections will be multiplied during 1952-53 rainfed season for conducting district trials next year.

Series II.—The selections A.H. 6615 has recorded significantly increased yields both during the last year and this year and the average percentage of

increase is 36.2 over the local control. The quality of the selections has not come up to the standard of the local spreading groundnut though it is better than TMV. 1.

1950-51—A.H. 6615, 6614, TMV 1, 6622, Local, 6624, 6617.

The trial will be repeated next year for the third time.

Series III and IV.—The differences in yield between the selections and the strains from other States did not attain the level of significance. This is the first year of the trial. The trial will be repeated. The quality of the two strains from the other States is not up to the standard.

(iii) *Preliminary yield trials*—(a) *Bunch*.—Four bunch selections from A.H. 6481 were compared with strain TMV. 2. The yield differences between the selections did not satisfy the 'Z' test. The yield data and the results of qualitative studies are given in Tables VI and VII. The trial will be repeated next year.

TABLE VI.—Preliminary yield trial of bunch selections—1951-52—Rainfed season.

Object—To compare the yields of four selections with TMV. 2.
Field—A-7 (portion) area: 0.84 acre.
Previous crop—Castor.
Manure—10,000 lb. of town rubbish per acre.
Layout—Randomized blocks replicated six times.

Size of plot—Gross 34' x 21'.
Net 33' x 11' or 1/78804.2 acre.
Spacing—6' x 6'.
Sown on—23rd August 1951.
Harvested on—7th January 1952.

Selections.	Acre yield in lb.	Percentage on control.	Whether 'Z' test satisfied or not (P = 0.05).
TMV. 2 (Control)	654	100.0	
A.H. 6730	784	119.9	
" 6731	747	114.2	
" 6732	887	135.6	No.
" 6733	815	124.7	
Standard error	52.0	8.0	

TABLE VII.—Qualitative determinations on bunch selections under preliminary yield trials.

Selections.	Shelling percentage.	Natural test weight of one Madras measure of kernels.	Number of kernels per lb.
(1)	(2)	(3)	(4)
TMV. 2	77.2	1,262	1,437
A.H. 6730	73.5	1,190	319
" 6731	76.0	1,194	952
" 6732	75.4	1,178	1,276
" 6733	75.6	1,188	1,235

(b) *Spreading*.—Nine selections for dessert purpose from the big seeded groundnut varieties were put under preliminary yield trials along with the local groundnut and TMV. 3 strain. Two selections have recorded significantly higher yields than TMV. 3 while six were superior to the local groundnut. Selection A.H. 6720 isolated from Virginia bunch variety have recorded significantly higher yields than all the others. The results of statistical analysis of the yield data and studies on the qualitative characters of the selections are presented in Tables VIII and IX.

TABLE VIII.—Preliminary yield trials of spreading selections—1951-52 Rainfed season.

Object—To compare the yields of 9 selections made for edible purpose with TMV. 3 strain and local groundnut.
Field—A-18 (portion) area—0.94 acre.
Previous crop—Groundnut.
Manure—10,000 lb. of town rubbish per acre.

Layout—Randomized blocks replicated 6 times.
Size of plot—Gross 34' x 31'.
Net 33' x 21'.
Spacing—9' x 9'.
Sown on—25th August 1951.
Harvested on—27th January 1952.

Selections.	Acre yield in lb.	Percentage on control.	Whether 'Z' test satisfied or not (P = 0.05).
(1)	(2)	(3)	(4)
Local (Control)	484	100.0	
TMV. 3	550	113.7	
A.H. 6712 (Rangoon)	612	126.5	
" 6713 (Do.)	543	112.2	
" 6714 (Do.)	473	97.7	
" 6715 (Mauritius Virginii)	643	132.8	
" 6716 (Do.)	684	141.3	
" 6717 (Do.)	657	135.8	
" 6718 (Do.)	621	128.3	
" 6719 (Do.)	636	131.4	
" 6720 (Virginia buncha)	816	168.6	
Standard error	42.4	8.8	
Critical difference (P = 0.05).	120.4	24.9	
Conclusion—			
A.H.—6720, 6716, 6717, 6719, 6718, 6712, TMV. 3, 6713, Local, 6714.			

TABLE IX.—Qualitative determinations.

Selections.	Shelling percentage.	Natural test weight of one Madras measure of	Number of kernels per lb.	Oil content (percentage).	Free fatty acid content (percentage).
(1)	(2)	(3) Pods. (4) Kernels.	(5)	(6)	(7)
Local	77.2	586	1,428	51.19	0.11
TMV. 3	75.8	589	1,202	50.53	0.14
A.H. 6712	71.9	407	1,154	48.90	0.20
" 6713	73.0	420	823	51.06	0.19
" 6714	72.5	400	844	50.39	0.23
" 6715	71.0	432	1,175	50.46	0.39
" 6716	71.4	440	1,182	52.31	0.79
" 6717	70.8	461	1,123	51.19	0.24
" 6718	71.4	448	1,190	50.25	0.62
" 6719	74.2	570	1,174	50.56	0.20
" 6720	71.1	440	1,180	49.03	0.14

The quality of the selections, as is to be expected, is poor. A type with low oil content will be more acceptable as an edible type.

The seven selections which recorded increased yields over local will be put under comparative yield trials next season.

(iv) *Observations on single plant selections*—(a) *Row tests*.—Nine bunch and thirty-six spreading selections were sown in single rows with a check row of control after every two selections. TMV. 2 was the control for the bunch selections and local for the spreading selections. Out of them five bunch and 19 spreading selections recorded higher yields than their adjoining controls. They will be put under replicated row tests next year.

(b) *Replicated row tests*.—Fourteen bunch selections (nine from progenies of crosses and five from varieties) were compared with TMV. 2 under replicated conditions. Only one selection recorded significantly increased yield over the control and the others were on a par with it. This selection and three others which were also promising will be multiplied next year.

Forty-five spreading selections (forty-two from progenies of crosses and three from varieties) were put under replicated row tests along with local spreading groundnut in two separate series. The yield differences on analysis were statistically significant. Twenty selections gave significantly increased yields over the control. These selections will be multiplied next year to get enough material for further trials.

(c) *Seed multiplication*.—Six selections from the dormant bunch strain A.H. 6481 were multiplied in small plots and studied. One selection was non-dormant and had other undesirable characters. The remaining five selections will be taken over to the preliminary yield trials.

Forty-nine spreading selections were multiplied to obtain sufficient seed material for advancing them to further trials. The details of the selections are—

A.H. 6 Rangoon	17
A.H. 10 Texas	12
A.H. 20 Mauritius Virgini	10
A.H. 74 Virginia bunch	1
A.H. 263 Jumbo runner	4
A.H. 1718 Masumbika	1

45

Four selections from varieties which yielded higher than the control in the replicated row test in 1950-51	4
--	---

Total .. 49

The selections were studied in detail for all their characters and qualitative studies were also conducted on the produce of the selections. Based on their quality, yield and availability of seed material, 17 selections (12 from A.H. 6 Rangoon, 2 from A.H. 10, Texas, 2 from A.H. 20 Mauritius Virgini and one from A.H. 1718 Masumbika) have been marked out for further trials. The rest of the selections after rejecting the undesirable ones will again be multiplied during the next season.

(d) *New selections*.—Two hundred and seventeen single plant selections (136 bunch and 81 spreading) were made this year from progenies of crosses and new varieties.

The details of the selections made during the year are—

	Bunch.	Spreading.
New varieties	133	52
Progenies of crosses	..	24
Other sources	3	5
Total	136	81 = 217

These will be tested for purity and yield under row tests next season.

(v) *Hybridization*.—Twenty-four new crosses were effected between selected pure lines with the following objects:—

- To evolve a high yielding dormant bunch strain.
- To evolve a white seeded strain.
- To improve the shelling outturn of TMV. 1 strain.

Sixteen crosses were made with object No. (i), six with object No. (ii) and two with object No. (iii). The hybrid seeds have been collected carefully along with the parents.

F₁ progenies of 24 crosses made last year were grown along with their parents. The plants were studied individually in great detail. The hybrid seeds were harvested separately to raise the F₂ generation.

The F₂ and F₃ progenies of earlier crosses were grown and studied. Fifty-four families have been selected from the F₂ generation for further propagation and study. Twenty-four single plants with desirable characters were selected from the F₂ and F₃ progenies.

(vi) *New varieties*.—Fifty-four new varieties received during 1950-51 rained season and nine new varieties received this year from the Head of the division of Botany, New Delhi, were raised in observation plots and studied in detail. One hundred and eighty-five single plants were selected from the promising varieties. All the varieties will again be raised next year.

(vii) *Rotation experiment*.—The experiment started in 1945-46 to find out the effect of rotating groundnut with other crops was continued for the seventh successive year during this season in the same fields without any change in the layout and randomization of plots. Preparatory cultivation, manuring, spacing and other cultivation practices were the same as those adopted in previous years. The schedule of cropping during the current year along with the previous years is given in Table X.

TABLE X.—Schedule of Cropping in the Rotation experiment.

Serial number and treatments.	1945-46.	1946-47.	1947-48.	1948-49.	1949-50.	1950-51.	1951-52.	1952-53.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1 Groundnut followed by groundnut	.. G	G	G	G	G	G	G	G
2 Groundnut followed by <i>chulam</i>	.. G	Ch	G	Ch	G	Ch	G	Ch
3 Groundnut followed by <i>cumbu</i>	.. G	Cu	G	Cu	G	Cu	G	Cu
4 Groundnut followed by <i>varagu</i>	.. G	V	G	V	G	V	G	V
5 <i>Chulam</i> followed by groundnut	.. ..	Ch	G	Ch	G	Ch	G	Ch
6 <i>Cumbu</i> followed by groundnut	.. ..	Cu	G	Cu	G	Cu	G	Cu
7 <i>Varagu</i> followed by groundnut	.. ..	V	G	V	G	V	G	V
8 <i>Chulam</i> followed by <i>chulam</i>	.. ..	Ch	Ch	Ch	Ch	Ch	Ch	Ch
9 <i>Cumbu</i> followed by <i>cumbu</i>	.. ..	Cu	Cu	Cu	Cu	Cu	Cu	Cu
10 <i>Varagu</i> followed by <i>varagu</i>	.. ..	V	V	V	V	V	V	V
11 Groundnut followed by gingelly in the same year.	.. ..	G	G	G	G	G	G	G
	.. ..	Gi	Gi	Gi	Gi	Gi	Gi	Gi

The average acre yields recorded for the different treatments for the seven years are given in Table XI.

TABLE XI.—Groundnut Rotation Experiment.
Yields (lb. per acre) of groundnut and cereal crops.

Years.	Bunch series.									
	Groundnut followed by groundnut	Groundnut followed by <i>Cholam</i>	Groundnut followed by <i>Varagu</i>	Groundnut followed by <i>Cumbu</i>	Groundnut followed by <i>Cholam</i>	Groundnut followed by <i>Varagu</i>	Groundnut followed by <i>Cumbu</i>	Groundnut followed by <i>Cholam</i>	Groundnut followed by <i>Varagu</i>	Groundnut in the main season and gingly in second
1945-46	G 1,192	G 1,157	G 1,125	G 1,145	Ch 770	V 1,234	Cu 588	Ch 778	V 1,283	G/Gi 1,135/105
1946-47	G 947	Ch 388	V 1,093	Cu 493	G 975	G 940	G 928	Ch 105	V 449	G/Gi 929/98
1947-48	G 1,037	G 1,168	V 1,100	G 1,035	Ch 576	G 332	Cu 295	Ch 269	V 181	G/Gi 1,113/30
1948-49	G 440	Ch 797	V 628	Cu 157	G 570	G 479	G 638	Ch 386	V 209	G/Gi 524/87
1949-50	G 1,299	G 1,341	V 1,357	G 1,324	Ch 257	V 14	Cu 293	Ch 105	V 37	G/Gi 1,307/Not raised
1950-51	G 699	Ch 1,644	V 352	Cu 771	G 863	G 797	G 869	Ch 770	V 287	G/Gi 713/Not raised
1951-52	G 750	G 600	G 802	G 681	Ch 859	V 99	Cu 470	Ch 586	V 74	705/failed

Years.	Spreading series.									
	Groundnut followed by groundnut	Groundnut followed by <i>Cholam</i>	Groundnut followed by <i>Varagu</i>	Groundnut followed by <i>Cumbu</i>	Groundnut followed by <i>Cholam</i>	Groundnut followed by <i>Varagu</i>	Groundnut followed by <i>Cumbu</i>	Groundnut followed by <i>Cholam</i>	Groundnut followed by <i>Varagu</i>	Groundnut in the main season and gingly in second
1945-46	G 962	G 985	G 982	G 962	Ch 352	V 645	Cu 451	Ch 398	V 738	G/Gi 1,052/81
1946-47	G 729	Ch 446	V 637	Cu 456	G 606	G 756	G 793	Ch 233	V 665	G/Gi 731/38
1947-48	G 808	G 749	V 754	G 730	Ch 372	V 445	Cu 337	Ch 260	V 424	G/Gi 755/39
1948-49	G 962	Ch 1,276	V 687	Cu 192	G 807	G 920	G 1,034	Ch 610	V 445	G/Gi 811/-
1949-50	G 988	G 840	V 1,036	Cu 1,007	Ch 34	V 29	Cu 494	Ch 164	V 125	G/Gi 1,007/-
1950-51	G 729	Ch 1,444	V 502	Cu 685	G 850	G 781	G 885	Ch 864	V 523	G/Gi 757/-
1951-52	G 650	G 783	V 736	G 705	Ch 898	V 170	Cu 724	Ch 790	V 107	G/Gi 760/-

The yield data obtained this year were statistically analysed and the results are presented in the Table XII (a). As in previous years the differences in yield of groundnut followed groundnut and groundnut following each of the three cereals did not satisfy the 'Z' test.

TABLE XII (a).—Groundnut—Rotation experiment—1951-52 Rainfed season (seventh year).

Object—To find out the effect of growing groundnut after other crops like *cumbu*, *cholam*, *varagu*, and gingly and also the effect of groundnut on other crops.
Field—Bunch series: A-11; Area, 0.84 acre.
Spreading series: A-12; Area—0.95 acre.
Manuring—10,000 lb. of town rubbish per acre.
Layout—Randomized blocks replicated four times.
Plot Size—A-11—Gross 62' x 13'. Net: 56' x 6'.
A-12—Gross 68' x 13' Net—60' x 6'.
Spacing—
Bunch TMV. 2—6" x 8"
Spreading—TMV. 3—9" x 9".
Cereals—1' x 1'
Sown on—15th August 1951.
Harvested on—
Cumbu—15th October 1951.
TMV 2—27th November 1951.
TMV 3—25th December 1951.
Cholam—7th January 1952.
Varagu—6th February 1952.

Treatments.	Bunch series.			Spreading series.		
	Acre yield in pound.	Percentage on control.	Whether 'Z' test satisfied or not (P = 0.05).	Acre yield in pound.	Percentage on control.	Whether 'Z' test satisfied or not (P = 0.05).
Groundnut after groundnut ..	750	100.0	No.	650	100.0	No.
Groundnut after <i>cholam</i> ..	600	80.0		783	120.2	
Groundnut after <i>varagu</i> ..	802	106.9		736	113.2	
Groundnut after <i>cumbu</i> ..	681	90.8		705	108.5	
Groundnut after gingly ..	705	94.0		760	116.9	
Standard error ..	53.9	7.2		46.8	7.2	

The germination, growth and yield of cereals rotated with groundnut were better than those of cereals raised year after year. The acre yields recorded for the different treatments are given below.

Bunch series A. 11.			Acre yield in lb.	Percentage on control.
<i>Cholam</i> after <i>cholam</i> ..	..	..	586	100.0
<i>Cholam</i> after groundnut ..	..	..	859	146.6
<i>Cumbu</i> after <i>cumbu</i> ..	..	..	437	100.0
<i>Cumbu</i> after groundnut ..	..	..	470	107.5
<i>Varagu</i> after <i>varagu</i> ..	..	..	74	100.0
<i>Varagu</i> after groundnut ..	..	..	99	133.8

Spreading series A. 12—			Acre yield in lb.	Percentage on control.
<i>Cholam</i> after <i>cholam</i> ..	..	..	790	100.0
<i>Cholam</i> after groundnut ..	..	..	898	113.7
<i>Cumbu</i> after <i>cumbu</i> ..	..	..	553	100.0
<i>Cumbu</i> after groundnut ..	..	..	724	130.9
<i>Varagu</i> after <i>varagu</i> ..	..	..	107	100.0
<i>Varagu</i> after groundnut ..	..	..	170	158.9

As in previous years the yield of cereals following a crop of groundnut either bunch or spreading have yielded better than the cereals following cereals.

Qualitative studies were carried out to find out the effect of rotation on the quality of the produce. The treatments do not appear to have affected the quality of the produce. The results are given in Table XII (b).

TABLE XII (b).—Qualitative determinations on the produce under different rotations.

Treatments.	Shelling percentage.	Natural test weight of one Madras measure of		Number of kernels per lb.
		Pods.	Kernels.	
Bunch series—				
Groundnut after groundnut	75.1	531	1,228	1,440
Do. <i>cholam</i>	76.0	545	1,244	1,419
Do. <i>cumbu</i>	76.4	560	1,246	1,409
Do. <i>varagu</i>	76.5	550	1,248	1,409
Do. <i>gingelly</i>	76.3	598	1,232	1,361
Spreading series—				
Groundnut after groundnut	75.5	605	1,180	1,282
Do. <i>cholam</i>	75.4	605	1,178	1,346
Do. <i>cumbu</i>	75.7	617	1,186	1,262
Do. <i>varagu</i>	76.3	614	1,182	1,324
Do. <i>gingelly</i>	75.4	626	1,190	1,266

The experiment is proposed to be continued for a further period of five years.

(viii) *Cultural experiment*.—The experiment was conducted for the fourth time in the same field with the same set of treatments and without any change in the randomization of plots. The details and the results of the experiment are given in Table XIII.

TABLE XIII.—Groundnut—Cultural experiment—1951-52 Rainfed season.

Object—To determine the best and most economical cultural practices to be adopted for the groundnut crop and also to find out the feasibility of substituting ploughing by light cultivation with junior hoe.
Field—B-3 (area—1.32 acres).
Previous crop—Groundnut.
Manure—10,000 lb. of town rubbish per acre.
Layout—Randomised blocks replicated four times.

Size of plot—Gross—82½' × 12'
Net—66' × 6' or 1/110 acres.
Treatments—Nine tillage treatments.
Variety—TMV. 3
Spacing—9' × 9'.
Sown on 20th August 1951.
Harvested on 30th January 1952.

Treatments.	Acre yield in pound.	Percentage on control.	Whether 'Z' test satisfied or not (P=0.05)
Country plough twice	505	91.5	
Do. four times (control)	552	100.0	
Do. six times	546	98.9	
Mould board plough twice	594	107.6	No.
Do. four times	498	90.2	
Do. once and junior hoe twice	504	91.3	
Do. once and junior hoe four times	497	90.0	
Do. twice and junior hoe twice	471	85.3	
Do. twice and junior hoe four times	436	78.8	
Standard error	40.1	7.3	

The yields obtained were poor. The data when analysed were not statistically significant. In all the previous years also the differences in yield due to the tillage treatments were not statistically significant.

Qualitative studies were conducted on the produce from the different treatments and the results are given in Table XIV. There was no difference in quality due to the cultural treatments.

TABLE XIV.—Qualitative determinations on the produce from the different treatments.

Treatments.	Shelling percentage.	Natural test weight of one Madras measure of		Number of kernels per lb.
		Pods.	Kernels.	
(1)	(2)	(3)	(4)	(5)
1 Country plough twice	76.6	598	1,192	1,294
2 Country plough four times (control)	76.6	617	1,202	1,248
3 Country plough six times	76.5	600	1,194	1,307
4 Mould board plough twice	76.1	613	1,193	1,230
5 Mould board plough four times	76.5	610	1,201	1,304
6 Mould board plough once and junior hoe twice	76.5	612	1,198	1,323
7 Mould board plough once and junior hoe four times	76.7	599	1,196	1,282
8 Mould board plough twice and junior hoe twice	76.6	606	1,206	1,297
9 Mould board plough twice and junior hoe four times	76.4	595	1,197	1,279

The economics of cultivation as per the different treatments were worked out and the results are given in Table XV.

TABLE XV.—Cultural experiment—Economics of cultural treatments.

Treatments.	Cost of cultivation.	Gross return.	Net return.
	RS.	RS.	RS.
1 Country plough twice	113	126	13
2 Country plough four times	116	138	22
3 Country plough six times	120	137	17
4 Mould board plough twice	119	149	30
5 Mould board plough four times	128	125	— 3
6 Mould board plough once and junior hoe twice	116	126	10
7 Mould board plough once and junior hoe four times	120	124	4
8 Mould board plough twice and junior hoe twice	118	118	..
9 Mould board plough twice and junior hoe four times	122	109	—13

The season was very adverse as the monsoon failed for the fourth time successively. The yields obtained were very poor and erratic. The experiment will be conducted for two more years to get conclusive results.

(ix) *Manurial experiment*.—The experiment was conducted this season for the fourth time. The object of the experiment is to determine the optimum and economic dose of potash and phosphoric acid to be applied to the groundnut crop. The details and the results of the experiment are given in Table XVI.

TABLE XVI.—Groundnut manurial experiment—1951-52 Rainfed season.

Object—To determine the optimum and economic dose of potash and phosphoric acid to be applied to the groundnut crop.
Field—F 11-(a) (Area—0.71 acre).
Previous crop—Groundnut.

Treatments—
No cattle manure } × { 0 levels } × { 0 levels }
 } × { 1 of } } × { 1 of }
 } × { 2 K2O } × { 2 P2 O5 } = 32 treatments.
Cattle manure } × { 3 } } × { 3 }
 } × { 4 } } × { 4 }

Dosage—
Cattle manure to supply 100 lb. of nitrogen per acre or 5 tons.
Potassium sulphate to supply 25 lb. of K2 O per acre or 1 cwt.

Potassium sulphate to supply 50 lb. of K2 O per acre or 1 cwt.
Potassium sulphate to supply 75 lb. of K2 O per acre or 1½ cwt.
Superphosphate to supply 20 lb. of P2 O5 per acre or 1 cwt.
Superphosphate to supply 40 lb. of P2 O5 per acre or 2 cwt.
Superphosphate to supply 60 lb. of P2 O5 per acre or 3 cwt.

Lay out—Randomized blocks replicated four times.
Size of plot—Gross—28' × 8'
Net—24' × 4½'.

Strain used—TMV. 3 groundnut.
Sown on 23rd August 1951.
Harvested on 31st January 1952.

Groundnut—Manurial Experiment—1951-52 Rainfed season.

Serial number and treatments.	Acre yield in lb.	Percentage on control.	Whether 'Z' test satisfied or not. (P=0.05).
1 (Control) no manure	347	100.0	
2 K1	492	141.8	
3 K2	418	120.5	
4 K3	541	155.5*	
5 P1	422	121.6	
6 P2	469	135.2	
7 P3	487	140.4*	
8 K1 + P1	382	110.1	
9 K1 + P2	480	138.3*	
10 K1 + P3	424	122.2	
11 K2 + P1	444	127.9	
12 K2 + P2	469	135.2	
13 K2 + P3	433	124.8	
14 K3 + P1	487	140.4*	
15 K3 + P2	455	131.1	
16 K3 + P3	560	161.4*	
17 CM	456	131.1	
18 CM + K1	558	160.8*	
19 CM + K2	480	138.3*	
20 CM + K3	462	133.1	
21 CM + P1	561	161.7*	
22 CM + P2	451	130.0	
23 CM + P3	567	163.4*	
24 CM + K1 + P1	444	127.9	
25 CM + K1 + P2	427	123.0	
26 CM + K1 + P3	371	106.9	
27 CM + K2 + P1	411	118.4	
28 CM + K2 + P2	429	123.6	
29 CM + K2 + P3	577	166.3*	
30 CM + K3 + P1	382	110.1	
31 CM + K3 + P2	563	162.3*	
32 CM + K3 + P3	550	158.5*	
Standard error	66.6	13.4	
Critical difference	130.8	37.7	

* Treatments which have yielded significantly higher than control.

The yield differences between different manurial treatments attained the level of significance. The following 13 treatments have given significantly higher yield than the unmanured plot.

CM + K2 + P3, CM + P3, CM + K3 + P2, CM + P1, K3 + P3, CM + K1, CM + K3 + P3, K3, K1, P3, K3 + P1, CM + K2 and K1 + P2.

The cattle manure applied plots in general have yield better than the plots which did not receive the manure. In the previous years the yield differences were not statistically significant. But the beneficial effect of cattle manure was always pronounced.

To find out the effect of the manurial treatments on the quality of the produce, quality studies were carried out. The results are summarised in Table XVII.

TABLE XVII.—Groundnut—Manurial experiment—1951-52 Rainfed season—Qualitative determinations.

Treatment.	Shelling percentage.	Natural test weight of		Number of kernels per lb.
(1)	(2)	One Madras measure of Pods.	Half Madras measure of Kernels.	(5)
1 Control	76.2	685	583	1,188
2 K 1	77.1	670	583	1,186
3 K 2	75.6	668	579	1,244
4 K 3	74.4	667	583	1,229
5 P 1	75.5	666	583	1,280
6 P 2	75.8	672	580	1,267
7 P 3	76.1	678	576	1,136
8 K 1 + P 1	75.0	676	579	1,263
9 K 1 + P 2	76.7	674	580	1,265
10 K 1 + P 3	76.3	684	582	1,221
11 K 2 + P 1	76.6	684	583	1,247
12 K 2 + P 2	75.9	678	585	1,184
13 K 2 + P 3	75.7	685	584	1,222
14 K 3 + P 1	73.4	672	585	1,271
15 K 3 + P 2	74.3	670	579	1,278
16 K 3 + P 3	74.6	685	582	1,224
17 CM	75.5	668	583	1,152
18 CM + K 1	76.7	677	582	1,160
19 CM + K 2	76.4	674	590	1,269
20 CM + K 3	76.5	668	581	1,283
21 CM + P 1	76.7	667	582	1,234
22 CM + P 2	76.1	671	582	1,233
23 CM + P 3	75.7	679	586	1,222
24 CM + K 1 + P 1	77.3	693	589	1,248
25 CM + K 1 + P 2	76.2	670	581	1,246
26 CM + K 1 + P 3	77.2	691	587	1,225
27 CM + K 2 + P 1	76.8	674	593	1,228
28 CM + K 2 + P 2	76.4	681	583	1,265
29 CM + K 2 + P 3	77.2	663	581	1,250
30 CM + K 3 + P 1	76.8	695	582	1,238
31 CM + K 3 + P 2	76.5	675	585	1,219
32 CM + K 3 + P 3	76.2	783	579	1,250

The difference in the quality of the produce from the different treatments is not marked. But there is an indication that the produce from cattle manure applied plots has in general better filling and thereby giving a slightly higher shelling outturn.

The experiment will be repeated for one more year.

(x) *Groundnut cotton mixed cropping experiment.*—An experiment was laid out this season with the following objects:—

(a) To find out the cotton strain suited to this tract, and

(b) to find out the proper time when the cotton should be sown as a mixture with groundnut.

Three cotton strains, viz., Co. 2, MU. 1 and 881 F. were tested and the sowings were done along with that of spreading groundnut and at the time of first weeding of groundnut. The germination of cotton was fair in the plots where it was sown along with groundnut and it was poor in plots where it was sown at the time of weeding groundnut. As the rainfall during the season was deficient and ill-distributed, the cotton crop was a failure. Very poor yields were obtained, and it was not possible to determine the best strain suited to the tract. But the disadvantages of sowing cotton when the groundnut plants are 3 to 4 weeks old have been well brought out. The groundnut crop was also below average. The yield data obtained are presented in Table XVIII.

TABLE XVIII Groundnut, cotton mixed cropping experiment—1951-52 Rainfed season.

Treatments.	Groundnut and cotton sowing at the same time.		Cotton sowing at the time of weeding groundnut.	
	Groundnut yield per acre.	Cotton yield per acre.	Groundnut yield per acre.	Cotton yield per acre.
Groundnut pure (TMV. 3)	524	..	605	..
Groundnut + 881 F.	645	30	524	6
Groundnut + Co. 4 B 40	524	20	565	7
Groundnut + Co. 2	484	33	565	7

(xi) *Irrigated (summer) season trials.*—Work on the irrigated groundnuts was taken up on an intensified scale from the summer season, both at this station and at the Agricultural Research Station, Palur, as per the instructions of the Director of Agriculture, Madras. The following experiments have been laid out this season on this station:—

(a) *Yield trials.*—Fourteen bunch and 21 spreading selections have been put under preliminary yield trials in five separate series, with TMV. 2 as control for the bunch and local and TMV. 4 for the spreading selections. The germination was fair but subsequent growth was not satisfactory due to severe drought and lack of adequate irrigation facilities. The crop is still on the field.

(b) *Groundnut ragi and cotton mixed cropping experiment.*—To find out the economics of raising mixed crops of groundnut cotton and ragi an experiment was started this year with the following treatments:—

- | | |
|--------------------|--------------------------------|
| (1) Groundnut pure | (4) Ragi + cotton |
| (2) Cotton pure | (5) Ragi + groundnut |
| (3) Ragi pure | (6) Ragi + groundnut — cotton. |

Groundnut was dibbled in ragi plots when the latter put forth heads. Cotton was sown just after transplanting ragi in rows three feet apart. The growth and setting of grains in ragi were good and good yields have been obtained. The cotton and groundnut crops are still in the field.

At the Agricultural Research Station, Palur, the following trials have been laid out:—

(c) *Field trials.*—A trial was laid out with five bunch pure lines, viz., TMV. 2, A.H. 4111, 4218, 4515 and 6481. The crop has just been harvested.

(d) *Groundnut ragi and cotton mixed cropping experiment.*—The experiment has been duplicated at this Research Station with the same objects.

(e) *Groundnut irrigation experiment.*—To determine the optimum number of irrigations to be given to the groundnut crop an experiment has been started this season with the following treatments commencing from first flowering:—

- (1) Irrigating every 10 days.
- (2) Irrigating every 15 days.
- (3) Irrigating every 20 days.
- (4) Irrigating every 25 days.

The growth of this crop is satisfactory. The crop is still on the field.

(xii) *Mechanical cultivation of groundnut*—(a) *Harvest.*—Mechanical harvest of groundnuts was tried on the station during the year. A slightly curved Guntaka blade six feet long hitched behind a 'John Deere' tractor was tried for lifting the plants. As the working was found satisfactory an area of about 40 acres was harvested with the implement.

Data regarding the area covered, cost of working, etc., were gathered. It was found that 7.2 acres were harvested in six hours which works to roughly 10 acres a day. The cost of covering an acre with the attachment was Rs. 3-12-6 as against Rs. 5-13-0 for executing the same work with bullock-drawn implements. During this season the soil at the time of harvest was very hard due to the failure of rains and country ploughs had to be worked before passing H.M. Guntaka. Even under these difficult conditions the tractor drawn implement worked satisfactorily. The only difficulty experienced was due to the vines getting twined round the blade unless removed by manual labour. This is proposed to be got over next season by the use of a number of short blades fitted with coulters.

(b) *Picking.*—The Ransomes Peanut Picker (minor) was obtained in the year 1948 and was tested at every harvest season from then. As the working was not satisfactory the manufacturers suggested change of the set of drum bars and pegs. The picker with the new set of closely pitched drum bars and concave was tried during the year. In the light of experience gained in previous years, minor adjustments were made and other precautions like thorough drying of the vines before feeding and regulation of the speed of the drum were taken. The results were satisfactory and the percentage of unpicked pods was only eight. The percentage of picking could be further increased by feeding the vines twice. It was found that vines from an area of 3.5 acres required 2½ hours for stripping of the pods by the machine and the total quantity collected was about four bags. Thus in a working day of eight hours the produce from an area of 10 acres could be harvested with the machine.

As a result of the stripping in the machine, it was found that some of the pods were found to be damaged. Such pods are naturally unfit for seed purposes and the percentage of such pods was 10.8. It is proposed to conduct trials further with some more adjustments so that the efficiency of the machine could be improved.

(xiii) *Pests and diseases.*—'Surul-poochi' (*Stomopteryx nerteria*) appeared in a mild form on the groundnut crop during September. The second brood was very severe and the bunch groundnut was very much affected. With the advent of heavy showers the pest disappeared.

'Tikka' leaf-spot disease (*Cercospora personata*) was observed on the crop in the second fortnight of October and was severe in November when wet weather prevailed.

No other pest or disease was noted on the crop during the year.

B. *Gingelly*—(i) *General.*—Gingelly was raised both during the cold weather (December 1951—March 1952) and summer (March 1952—June 1952) seasons.

The cold weather gingelly crop was a failure this season as the north-east monsoon ceased by the end of November and the months of December and January were rainless. After the harvest of bunch groundnut, an area of 11.41 acres was sown to the three strains of gingelly, but the crop failed to establish. During the

second week of December and early in January 1952 gingelly consisting of both bulk and experimental units was sown in an area of 3.56 acres. The crop in the later sown area was maintained with great difficulty by giving an occasional irrigation. The crop was poor and the following are the yields obtained:—

TMV. 1	..	..	..	..	70 lb. per acre.
TMV. 2	..	..	..	..	147 lb. per acre.
TMV. 3	..	..	..	..	77 lb. per acre.

The irrigated crop was raised in an area of 4.71 acres during the summer season. The sowing was taken up in stages as and when irrigation facilities became available. The sowing of experimental units was taken up in the middle of March 1952, and completed by the middle of April 1952. Due to severity of the summer and due to lack of adequate irrigation facilities the crop is not in a satisfactory condition.

(ii) *Cold weather crop*—(a) *General*.—The bulk crop sown in 11.41 acres failed completely due to the absence of seasonal rains. The experimental units were raised in an area of 0.49 acre. The germination was good but a severe attack of shoot webber pest (*Antigastra catalaunalis*) soon after germination completely destroyed the crop in spite of dusting with DDT. Resowing was done wherever material was available and the crops maintained with occasional irrigations. The spacing trial could not be laid out this season.

(b) *Replicated row tests*.—Seventeen selections were compared with the local gingelly in single rows replicated four times. Consequent on the failure of the first sowing only 14 selections could be multiplied for repeating the trial next season.

(c) *Row tests*.—Twenty-four single plants were sown in single rows with a row of the local gingelly as control after every two selections. For want of seed material these could not be resown after the failure of the first sown crop.

(d) *Varieties*.—Twenty-two cold weather varieties and 18 'Pyru' varieties were raised in small plots. Single plant selections numbering 25 with desirable economic characters have been made. They will be put under row test next cold weather season.

(e) *New varieties*.—Five new strains obtained from Bombay, Uttar Pradesh and Madhya Pradesh were raised in small observation plots and studied in detail. The strain from Bombay and Uttar Pradesh appear promising as they possess desirable characters like short duration, 4-8 loculed capsules and white seeds. The strains from Madhya Pradesh are of a long duration and will be tried during the next rainfed season to test their suitability to this season.

(f) *Hybridization*.—The F₁ progenies of crosses made during 1950-51 cold weather season were raised along with their parents and studied in detail. Twenty single plant selections have been made for further observation.

(iii) *Summer (irrigated crop), 1951*.—The results of trials conducted during the 1951 summer season, which could not be included in the last year's report due to delayed harvest, are now presented.

(a) *Replicated row tests*.—Twenty-seven selections which out-yielded their adjoining controls in the row tests were put under replicated row tests with local as control. The yield data were statistically scrutinised and it was found that the yield difference did not satisfy the 'Z' test.

(b) *Row tests*.—Seventy-eight selections made from varieties selfed types and progenies of crosses were sown in single rows with a check row of local gingelly after every two selections. Thirty-two selections were found to give higher yields than the control.

One hundred and five selections made during the rainfed season from new varieties were also put under row tests with local as control. Twenty-six selections among these out-yielded their adjoining controls.

(c) *New selections*.—Single plant selections numbering 50 from F₂ progenies of crosses and 25 from varieties were made during the season. They will be put under row tests next season.

(iv) *Summer (irrigated crop—1952 season)*.—The area under this crop had to be restricted due to lack of adequate irrigation facilities. Sowing of experimental units was taken up rather late, i.e., in the middle of March as and when the fields were got ready and irrigation facilities were available. Though the germination and initial growth was promising, setting of capsules was not satisfactory and the plants began to wither. Adequate irrigations could not be given as the water-supply has dwindled. The wilt disease was very severe this season and plants were found to dry up in patches. The attack of shoot-webber (*Antigastra catalaunalis*) was mild and was controlled by dusting DDT at proper time.

(a) *Comparative yield tests of selections*.—Two series of yield trials were laid out this season. In the first series two selections, viz., S.I. 1/5 (Local) and S.I. 957/2 (Karur) were compared with TMV 1, TMV 3 and local gingelly for the fourth time. In all the previous years the yield differences did not satisfy the 'Z' test. In the second series, four colour grades, viz., black, dark brown, brown and red brown isolated from TMV 1 gingelly were compared with TMV 1 and local gingelly for the fifth time. In the first two years the type with red brown seeds yielded better than the local. In the third year the yield differences were not statistically significant and the types with dark brown, red brown and black seeds gave significantly higher yields than local.

The stand and growth of the standing crop of the selections is good. But the setting of capsules is not satisfactory and the plants are prematurely drying up. The crop is just being harvested.

(b) *Preliminary yield trials*.—Two strains obtained from Bombay and Uttar Pradesh and four selections from varieties were put under preliminary yield trials in two separate series for the first year. In the first series where the strains were compared with TMV 1, TMV 3 and local gingelly, the germination and growth were satisfactory in the initial stages. Later due to severe wilt attack the plants dried up in patches. The strain from Uttar Pradesh was early and the other from Bombay was similar to TMV 2. The trial will be repeated during the cold weather season.

In the second series, the stand and growth of the plants are good. But the plants are drying up prematurely due to want of irrigation. The crop is being harvested.

(c) *Observations on single plant selections*.—(1) *Row tests*.—Fifty single plants from progenies of crosses and 25 from varieties have been sown in single rows with a check row of local gingelly after every two selections.

(2) *Replicated row tests*.—Forty-six selections which yielded higher than their adjoining controls in last years' row tests have been put under replicated row tests in two series with the local gingelly as control. All the plants in two replications of each series have been selfed to maintain the purity.

(d) *Seed multiplication of selections*.—Nineteen selections have been sown in small plots to obtain sufficient seed materials for advancing them to further trials.

(e) *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 F₁ and F₂ progenies of earlier crosses were raised along with their parents and studied in detail.

(f) *Seed multiplication of varieties and types*.—The existing collection of 107 varieties suited for the season and 86 selfed types were raised in small plots.

They were studied in detail and the required number of plants seld to obtain pure seed material.

(g) *Spacing trials*.—The experiment started in 1947-48 with the object of determining the economic spacing to be adopted for the irrigated crop of gingelly was repeated this summer season for the fifth time. The method of layout and the treatments were the same as in previous years. Germination and growth were good in the early stages. Later due to the severe summer conditions and lack of adequate irrigation the crop began to wilt and came up for harvest prematurely. The yields obtained were poor. The data were statistically analysed and the results are given in Table XIX.

TABLE XIX.—Gingelly—Spacing trials—1952 Summer.

Object—To determine the economic spacing to be adopted for gingelly under irrigated conditions		Spacings.	Plot size.	} Net size—30' x 6' or 1/242 acre.
Field—F-3 b Area—0.32 acre.		1' x 1'	36' x 9'	
Previous crop—Pillipesara.		1½' x 1½'	36' x 9'	
Manuring—10,000 lb. of farm yard manure per acre.		2' x 2'	36' x 10'	
Treatments—		Layout—Randomized blocks replicated six times.		
Spacings.		Sown on—15th March 1952.		
Plot size.		Harvested—9th June 1952.		
6" x 6"	36' x 9'	} Net size—30' x 6' or 1/242 acre.		
9" x 9"	36' x 9'			
Treatments.	Mean acre yield in lb.	Percentage on general mean.	Whether 'Z' test satisfied or not (P = 0.05).	
1 6" x 6"	45	60.8	Yes.	
2 9" x 9"	79	106.8		
3 1' x 1'	93	125.7		
4 1½' x 1½'	86	116.2		
5 2' x 2'	67	90.6		
General mean	74	100.0		
Standard error	8.6	11.8		
Critical difference (P = 0.05)	25.3	34.1		

Conclusion—

3, 4, 2, 5, 1.

1950-51—Not significant.

1949-50—Crop failed.

1948-49—Not significant.

1947-48—3, 2, 1, 4, 5.

The differences in the yield of gingelly due to the different spacings adopted were statistically significant. The spacing 1' x 1' has resulted in significant increased yields over the spacings, 2' x 2' and 6" x 6". The spacing 6" x 6" has given the lowest yield.

The yield differences did not attain the level of significance in two of the previous years when the experiment was conducted. In one year the crop failed. In the first year of the experiment, the spacing 1' x 1' has given significantly increased yields over the spacing 1½' x 1½' and 2' x 2'.

To find the effect of spacing on growth, flowering and fruiting, study of the different phases was undertaken. Daily counts of flowers, growth and capsule measurements were taken for 30 plants in each treatment. The data gathered are given in Table XX.

TABLE XX.—Gingelly—Spacing trials—1952 Summer.

Effect on spacing on the economic characters (average of 30 plants).

Particulars.	Spacings.				
	6" x 6"	9" x 9"	1' x 1'	1½' x 1½'	2' x 2'
1 Height of plants in cms	58.0	58.8	57.7	61.7	60.8
2 Number of flowers produced per plant	38	62	96	128	156
3 Number of capsules set per plant	18	32	49	66	91
4 Percentage of setting	47.4	51.6	51.0	51.6	58.3
5 Duration in days	83	84	87	89	92
6 Acre yield in pounds	45	79	93	86	67

As in previous years, wider spacings produced more flowers and capsules per plant and prolong the duration. The trial will be repeated next season also to get conclusive data.

(h) *Pests and diseases*.—The shoot webber caterpillar (*Antigastra catalanalis*) was noticed in a severe form during the cold weather season. Repeated dusting with D.D.T. and hand picking of the caterpillars kept the pest under control. During the summer season the pest attack was surprisingly mild unlike in previous year.

Wilt disease was noticed on the crop in a severe form during the year.

C. *Castor*.—(i) *General*.—On receipt of 0.49 inches of rain on 14th August 1951 sowings were commenced on 15th August 1951 but had to be discontinued the same day for want of sufficient moisture in the soil. They were resumed on 22nd August 1951 following a fall of 0.86 inches of rain on 21st August 1951 and completed in three days. A total area of 9.27 acres was sown to the crop. The conditions were ideal for sowing even though the season commenced late. But the dry weather that prevailed immediately after affected the germination of the first sown units badly. Gaps were filled up but the stand of the crop could not be improved much. The initial growth of the plants was stunted but later rains resulted in satisfactory growth of the crop. The plants were in full bloom during second half of October and November months. Setting of capsules was somewhat affected in the early types on account of the rainy weather that prevailed during the period. Subsequent dry weather was helpful in satisfactory setting of capsules in medium and late types. The harvest of capsules was first commenced during the latter part of December 1951 and completed by the end of March 1952. The plants were removed from the field in the month of May 1952, immediately after a shower. The yield of the crop was poor owing to late sowings and unfavourable seasonal conditions that existed during the crop period. The yields recorded for the strains grown on a bulk scale are as follows:—

Register number of strains.	Acre yield of beans in lb.
TMV. 1 (R. C. 59-8-1)	478
TMV. 2 (R. C. 59-2-1-1)	487
TMV. 3 (R. C. 215)	607

(ii) *Comparative yield trials*.—Three series of comparative yield trials were laid out during the year. In the first series, three selections from the progenies of a cross between "Namakkal" and "Kumbakonam" varieties were compared for the second year with two of the established strains, viz., TMV. 1 and TMV. 2. In the second series the "South African" variety was compared with all the three strains for the second year. In the third series, five selections from the progenies of a cross between "Namakkal" and "Kumbakonam" were compared with TMV. 1 and TMV. 2 for the first time. The details of layout of the trials and the analysis of the yield data, together with the qualitative determinations are presented in Table XXI.

TABLE XXI.—Castor—Comparative yield trials—1951-52 Rainfed season.

Object	To compare the yield performance of 8 selections from a cross and a variety from South Africa with the standard strains.		
	Series I.	Series II.	Series III.
Fields	B2	B5	B4
Area in acre	0.94	0.75	0.75
Previous crop	Groundnut.		
Manuring	5,000 lb. of town rubbish per acre.		
Layout	Randomized blocks replicated 6 times in Series I and II and 4 times in Series III.		

Treatments	..	..	..	..	..	3 selections and two strains TMV 1 and TMV 2.	R. C. 1077 S. A. variety, TMV 1, TMV 2 and TMV 3.	Five selection and two strains TMV 1 and TMV 2.
Plot size	..	..	..	..	..	Gross 69' x 15'	66' x 15'	66' x 21'
	..	..	..	..	..	Net 63' x 9'	60' x 9'	60' x 15'
	..	..	..	..	..	or	or	or
	..	..	..	..	..	in acres 1/76.8	1/80.6	1/48.4
Spacing	..	..	..	..	..	1 1/2 x 1 1/2' for R.C. 1077 and 3' x 3' for the rest.		
Sown on	..	..	..	..	..	15 Aug. 1951	15 Aug. 1951	15 Aug. 1951
Harvested From	..	..	..	..	..	18 Jan. 1952	21 Nov. 1951	10 Dec. 1951
To	..	..	..	..	..	14 Mar. 1952	13 Mar. 1952	15 Jan. 1952

Series I.

Selections.	Acres yield in pounds.	Percentage on control.	Whether 'Z' test satisfied or not (P=0.05).
TMV. 1	620	70.4	Yes.
TMV. 2 (Control)	881	100.0	
R.C. 1074 (x 99/48)	953	108.1	
R.C. 1075 (x 99/188)	1,052	119.3	
R.C. 1076 (x 99/203)	1,075	122.0	
Standard error	103	11.7	
Critical difference (P = 0.05)	304	34.4	

Conclusion—

R.C. 1076, R.C. 1075, R.C. 1074, TMV 2, TMV 1

Series II.

Selections.	Acres yield in lb.	Percentage on control.	Whether 'Z' test satisfied or not P=0.05.
TMV. 1	696	77.6	Yes.
TMV. 2 (Control)	897	100.0	
TMV. 3	689	76.8	
R.C. 1077 (variety from South Africa)	44	4.9	
Standard error	73	8.1	
Critical difference (P = 0.05)	221	24.6	

Conclusion—

TMV. 2, TMV. 1, TMV. 3, R.C. 1077.

Series III.

Selections.	Acres yield in lb.	Percentage on control.	Whether 'Z' test satisfied or not (P=0.05)
TMV. 1	312	82.1	No.
TMV. 2 (Control)	380	100.0	
R.C. 1078 (x 99/22)	406	106.9	
R.C. 1079 (x 99/43)	440	115.8	
R.C. 1080 (x 99/44)	402	105.8	
R.C. 1081 (x 99/97)	347	91.3	
R.C. 1082 (x 99/172)	433	114.0	
Standard error	47.8	12.6	

Qualitative determination on the variety and selections.

Selections.	Duration in months.	Number of beans per lb.	Natural test weight of one Madras measure of beans in gm.
TMV. 1	6 1/2	1,787	1,166
TMV. 2	7	1,333	1,116
TMV. 3	8	1,251	1,102
R.C. 1074	5 1/2	1,653	1,114
R.C. 1075	5 1/2	1,586	1,117
R.C. 1076	5 1/2	1,438	1,113
R.C. 1077	4 1/2	2,460	855
R.C. 1078	5 1/2	1,635	1,227
R.C. 1079	5 1/2	1,723	1,141
R.C. 1080	5 1/2	1,523	1,121
R.C. 1081	5 1/2	1,543	1,131
R.C. 1012	5 1/2	1,409	1,046

In the first series, the differences in yield between the selections attained the level of significance. All the three selections are on a par with TMV. 2. But two selections have given 19 per cent and 22 per cent increase in yield over TMV. 2. The three selections are also shorter in duration by about a month to a month and a half than the standard strains. In the last year's trial the yield differences did not attain the level of significance but the three selections gave increased yields over the standard strains. The selections will be tried for the third time next year.

In the second series the difference in yield between the 'South African' variety and the strains proved statistically significant. The 'South African' variety has given significantly lower yields than the standard strains as in the last year. But it is a very short duration variety (4 1/2 months) with non-spiny and non-dehiscent capsules, forming a good basic material for breeding work. This is the second year of trial. The yield and the duration of the variety show that the comparison of this variety with the three standard strains, which are longer in duration and higher yielders is defective. So this trial will be dropped from next season.

In third series, five selections from the progenies of a cross between 'Namakkal' and 'Kumbakonam' were tried for the first time with the standard strains, namely, TMV. 1 and TMV. 2. The yield difference between the selections did not attain the level of significance. But two selections, viz., R.C. 1079 and R.C. 1082 have given nearly 15 per cent increased yield over TMV. 2. All the selections are shorter in duration by about a month to a month and a half than the standard strains. The selections will be tried again.

(iii) Preliminary yield trials.—Fifteen selections obtained from the progenies of a cross were compared with one of the established strains, i.e., TMV. 2. The details of layout, the results of statistical scrutiny and those of the qualitative determinations are given in Table XXII.

TABLE XXII.—Castor—Preliminary yield trials of selections—1951-52—Rainfed season.

Object—To compare the 15 selections from a cross between Namakkal variety and Kumbakonam variety with the strain T.M.V. 2. (control)	Treatments—Fifteen selections and TMV. 2.
Field—B1 Area—1.14 acre.	Size of plot—66' x 9' gross.
Previous crop—Groundnut.	63' x 3' or 1/230.5 acre nett
Manuring—5,000 lb. of Tindivanam town rubbish per acre.	Spacing—3' x 3'
Layout—Randomized blocks replicated four times (4 x 16.)	Sown on—15th August 1951.
	Harvested from—17th December 1951 to 10th February 1952.

Selections.	Acre yield in lb.	Percentage on control.	Whether 'Z' test satisfied or not ($P = 0.05$).
TMV. 2	993	100.0	
99/11	1204	121.3	
99/38	850	85.6	
99/92	1658	167.0	
99/117	1265	127.5	
99/231	1091	109.8	
99/235	1450	146.1	
99/240	1701	171.3	
99/244	979	99.6	Yes.
99/246	773	77.8	
99/254	1113	112.0	
99/257	1227	123.6	
99/284	1394	139.4	
118/1	1288	129.7	
118/2	1148	115.6	
1004/8	1330	133.9	
Standard error	344.2	12.2	
Critical difference	120.9	34.7	

Conclusion—

99/240, 99/92, 99/235, 99/284, 1004/8, 118/1, 99/117, 99/257, 99/11, 118/2, 99/254, 99/231, TMV. 2, 99/244

99/38, 99/246.

Qualitative determinations on selections.

Selections.	Duration in months.	Number of beans per lb.	Natural test weight of 1 Madras measure of beans in gm.
TMV. 2	7	1,320	1,119
99/11	6	1,424	1,127
99/38	5½	1,577	1,082
99/92	5½	1,330	1,078
99/117	5½	1,741	1,127
99/231	5½	1,609	1,138
99/235	5½	1,472	1,093
99/240	5½	1,417	1,076
99/244	6	1,635	1,133
99/246	5½	1,606	1,107
99/254	6	1,573	1,120
99/257	6	1,691	1,119
99/284	5½	1,606	1,105
118/1	5½	1,470	1,134
118/2	5½	1,472	1,136
1004/8	5½	1,529	1,103

The yield differences on statistical analysis, were found to attain the level of significance. Out of these selections only four selections have given significantly higher yields than the control, viz., TMV. 2 while others were on a par with it. The four selections along with the desirable ones from this year's replicated row tests will once again be put under preliminary yield trials during the coming season. All the four selections are also shorter in duration than the control by about a month to a month and a half.

(iv) *Replicated row tests of selections.*—Fourteen selections from the progenies of a cross between 'Namakkal' and 'Kumbakonam' were compared with TMV. 1, the strain with the shortest duration. The yield differences among the selections tried did not attain the level of significance. However, eight selections have given increased yield over the control. Further these are also shorter in duration than TMV. 1 by about three to four weeks. The size of the beans in all of them is bigger than that of TMV. 1 and the weight of beans per unit volume is less in the former than that of the latter. These will be carried over to the preliminary yield trials during the coming rainfed season. The summary of the results of the statistical analysis and qualitative determinations are presented in Table XXIII.

TABLE XXIII.—*Castor*—Replicated row tests of selections 1951-52 Rainfed season.

Object—To test the yields of 14 selections with one of the standard strains TMV. 1.
Field No.—D. 7 A. Area—0.29 acre.
Previous crop—Groundnut.
Manuring—5000 lb. of Tindivanam town rubbish per acre.
Layout—Randomized blocks replicated 4 times (4×15)

Treatments—14 selections from progenies of crosses and TMV. 1.
Size of plot—57' × 3' or 1/254.7 acre nett.
Spacing—3' × 3'.
Sown—22nd August 1951.
Harvested—from 21st December 1951 to 20th February 1952.

Selections.	Acre yield in lb.	Percentage on control.	Whether 'Z' test satisfied or not ($P = 0.05$).
TMV. 1	414	100.0	
99/296	453	110.5	
314	345	84.1	
321	453	110.5	
326	344	83.9	
334	422	102.9	
339	442	107.8	
365	372	90.7	No.
378	668	162.9	
393	304	74.1	
405	395	96.3	
409	458	111.7	
422	436	106.3	
425	416	101.4	
453	539	131.5	
Standard error	47	11.4	

Qualitative determinations on selections.

Selections.	Duration in months.	Number of beans per lb.	Natural test weight of one Madras measure of beans in grammes.
TMV. 1	6	1870	1,130
99/296	5½	1476	1,096
314	5½	1735	1,081
321	6	1607	1,086
326	5½	1505	1,082
334	5½	1547	1,064
339	5½	1736	1,100
365	5½	1066	1,069
378	5½	1625	1,026
393	5½	1739	1,129
405	5½	1541	1,110
409	5½	1836	1,113
422	5½	1564	1,020
425	5½	1677	1,084
453	5½	1658	1,114

(v) *Purity studies.*—Ninety-two selections made from the progenies of a cross between 'Namakkal' and 'Kumbakonam' and varieties were sown in single rows for testing their purity and yielding ability. From a detailed study of their morphological and economic characters, thirty-seven of them were found to combine purity with high yield. They will be compared with the standard strains under replicated conditions during the next season.

One hundred selections with desirable economic characters, namely, short duration, profuse branching, and long-fruit cluster were made from progenies of crosses and varieties. These will be observed carefully for purity and yield next season.

(vi) *Hybridization.*—Six new crosses were effected between the three established strains and the 'South African' variety and one of the ornamental types of castor with green double bloom stem and yellow capsules with the following objects in view:—

- (1) To reduce the duration of the existing strains.
- (2) To impart distinct colour to the strains for easy identification in ryot's fields and
- (3) To study the inheritance of the number of nodes on the main stem to the first inflorescence.

The hybrid seeds along with the selfed seeds of the parents were gathered to raise the first generation next season.

The F₁ progenies of five crosses made last season between the three standard strains and the short duration 'South African' variety and the ornamental type (green, double bloom stem and yellow capsules) were grown and studied with their parents.

The duration, the general height and the number of nodes of the progenies were intermediate between those of the parents. The data are given below :—

	♀ Parent TMV 1	Cross 137 F ₁ (Hybrid)	Parent R.C. 1077 ♂
Plant height in Cms	83	75	45
Duration in months	6½	6½	4½
Number of nodes	21	17	12
	TMV 2	Cross 138	R.C. 1077
Plant height in Cms	125	80	60
Duration in months	7	6½	4½
Number of nodes	24	19	14
	TMV 3	Cross 139	R.C. 1077
Plant height in Cms	154	89	51
Duration in months	8	7	4½
Number of nodes	25	17	13

The F₁ progenies and the parents were selfed and the selfed seeds obtained have been stored carefully for further observations and selection in the F₂ generation.

The F₂ progenies of crosses made earlier to evolve short duration and high yielding strains were also raised and studied along with their parents. Thirty single plants with promising economic features have been selected for further study of their purity and yielding ability.

(vii) *Inbred types*.—One hundred and thirty-three inbred types isolated from varieties were grown 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. Sample of beans from each type will be drawn and sent to Coimbatore for estimating the oil and free fatty acids contents. Nine single plants with promising economic characters have been selected for further tests of purity and yield. The descriptions of the inbred types studied have been tabulated with a view to preparing key for their classification.

(viii) *Ornamental types of castor*.—The eight ornamental types of castor evolved on this Station were grown and eight pounds of selfed seeds gathered.

(ix) *Maintenance of vigour and purity of strains*.—With the object of maintaining the vigour and purity of the three established strains, namely, TMV. 1, TMV. 2 and TMV. 3 outstanding type plants selected from each of them were sown in progeny row trials in isolated blocks. Nine selections from TMV. 1, ten from TMV. 2 and seven from TMV. 3 were tested. Out of them, 3 selections from TMV. 1 and 3 from TMV. 3 recorded increased yields over their respective means even though the yield differences were not statistically significant. The yield differences among the selections of TMV. 2 attained the level of significance with one promising selection, viz., TMV. 2/3 giving an acre yield of 722 lb. (48.3 percent increase over control). The produce of these high yielding selections have been pooled out for further multiplication and distribution. Outstanding type plants have again been selected from the bulk crop of the three strains so as to continue the work. The summary of the results of the statistical analysis of the yield data of these selections are presented in Table XXIV.

TABLE XXIV.—Castor—Progeny row trials—1951-52 Rainfed season.

Object	To test the vigour and purity of the selections in the three established strains.		
	TMV 1	TMV 2	TMV 3
Fields	G 5 and 12	F 1	F 13
Area in acres	1.21	1.02	0.71
Manuring	5,000 lb. of town rubbish per acre		
Layout	Randomised blocks replicated 6 times	6 times	6 times
Treatments	9 selections	10 selections	7 selections
Plot size	69' x 3' net or 1/210.4 acre	69' x 3' net or 1/210.4 acre	69' x 3' net or 1/210.4 acre
Spacing	3' x 3'	3' x 3'	3' x 3'
Sown on	22 August 1951	23 August 1951	22 August 1951
Harvested From	17 January 1952	17 January 1952	18 January 1952
To	14 February 1952	To 10 March 1952	25th April 1952

TMV 1			
Selections.	Acre yield in lb.	Percentage on general mean.	Whether 'Z' test satisfied or not (P = 0.05)
TMV 1/1	401	93.7	
2	419	97.9	
3	426	99.5	No.
4	379	88.6	
5	406	94.9	
6	463	108.1	
7	447	104.4	
8	506	118.2	
9	399	93.2	
General mean	428	100.0	
Standard error	58.7	13.7	

TMV 2			
Selections.	Acre yield in lb.	Percentage on general mean.	Whether 'Z' test satisfied or not (P = 0.05)
TMV 2/1	524	107.6	
2	567	116.4	
3	722	148.2	
4	395	81.1	Yes.
5	441	90.5	
6	466	95.7	
7	453	93.0	
8	551	113.2	
9	400	82.3	
10	355	72.9	
General mean	487	100.0	
Standard error	62.9	12.9	
Critical difference (P = 0.05)	179.2	36.8	
Conclusion.—			

TMV 2/3, 2, 8, 1, 6, 7, 5, 9, 4, 10

TMV 3			
Selections.	Acre yield in lb.	Percentage on general mean.	Whether 'Z' test satisfied or not (P = 0.05)
TMV 3/1	783	129.0	
2	607	100.0	
3	485	79.9	No.
4	628	103.5	
5	717	118.1	
6	563	92.7	
7	464	76.4	
General mean	607	100.0	
Standard error	95	15.7	

Pests and diseases.—Consequent on the uneven distribution of rains received, the incidence of pests and diseases on this crop was somewhat severe during the year under report.

The castor semi-looper (*Achoea janata*) caterpillars appeared twice first in October and again in November-December. The infestation in the first instance was mild but the second attack was severe. The caterpillars appeared in large numbers soon after the rains in the month of November in some fields in B Block and continued till the end of December. The pest was effectively controlled by hand picking the caterpillars and dusting Gammexane D. 120 at the rate of 20 lb. per acre. Dusting was done twice in almost all the badly affected fields.

During November-December tobacco caterpillars (*Prodenia litura*) appeared along with the semi-looper caterpillars. This pest was kept under check by timely hand-picking.

Biological control of semi-looper pest.—The Government Entomologist, Coimbatore, conducted an experiment to control the semi-looper with *Trichogramma* parasite. Eggs of *Trichogramma* were released at different intervals. Semi-looper egg and caterpillar counts were taken periodically. The experiment was conducted in the bulk crop of the three strains.

Jassids (*Tettigoniella spectra*).—During the month of December 1951 there was a severe attack of jassid (*Tettigoniella spectra*) on the crop. The plants in general and leaves in particular were badly affected by this pest. Almost all the units were the victims of this pest. The crop presented a very pale and sickly appearance. Dusting of DDT. 5 per cent was resorted to and the treatment was effective in controlling the pest. This year, unusually, there was severe jassid infestation.

Red spider mite (*Tetranychus telarius*).—Stray cases of this pest were noticed during November and December during the cold weather. The dusting of Gammexane for controlling the semilooper, was also effective for this pest.

Fruit borer (*Dichocrosis punctiferalis*).—Very stray incidence of the fruit borer was noticed affecting the capsules towards the end of February 1952 when the harvest was almost over and the damage done to this pest was light.

4. Other crops—(i) Fodder grasses—(a) Napier grass.—This fodder crop was continued in field No. F. 14 (b) in an area of 0.29 acre. To make room for planting water grass, the crop in field No. F. 14 (a) was removed during the early part of the year. The slips thus obtained were used for filling up gaps in field No. F. 14 (b). The crop was manured twice in the course of the year at 20 cart-loads of compost per acre each time. The first manuring was done in August 1951 and the crop earthed up. The second manuring and earthing up was done during the later part of May 1952. Only one irrigation could be given to this fodder grass during the summer months due to the paucity of water in the wells. Eight cuttings were taken during the year and average acre yield of green fodder obtained was 10,415 lb.

(b) **Guinea grass.**—This fodder crop was continued in field No. F-12 (b) in an area of 0.23 acre. It received the same manurial and cultural operations as Napier grass. Only one irrigation could be given to this crop also. Ten cuttings were taken during the year. The average acre yield of green fodder obtained per acre was 16,937 lb.

(c) **Thin Napier grass.**—The crop in field E-3 was continued and its cultivation extended to E-4 during the year (total area 0.52 acre). The latter field was given necessary ploughings, manured with 20 cart-loads of farmyard manure and laid out into ridges and furrows. Slips obtained from the Agricultural Research Station, Nilesiwar, were planted in September 1951. The crop in field No. F-3 received the cultural and manurial treatments as for Napier grass. Two irrigations were given during the summer months. As the demand for seeds of this grass is great no cuttings were taken and the entire crop allowed to set seeds. Twenty pounds of seeds have been collected for distribution.

(d) **Water grass.**—The grass was raised in field No. F-14 (a) in an area of 0.27 acre. The field after the requisite preparatory cultivation was manured with farmyard manure at 20 cart-loads per acre. Slips of water grass were planted in ridges in September 1951. This grass also received the same manurial and cultural operations as the other fodder grasses. Only one irrigation was given during the year due to want of irrigation facilities. Subsequent growth was not satisfactory.

(e) **New fodder grasses.**—Three fodder grasses, viz., *Cenchrus ciliaris*, *Cenchrus setigerus* and *Panicum antidotale* were planted along with water grass (*Brachiaria mutica*) in field No. F-5 in an area of 0.26 acre to compare their relative performances in this tract as per the instructions of the Government Systematic and Lecturing Botanist, Coimbatore. The field was first ploughed well and manured with compost at 20 cart-loads per acre. Ridges and furrows were drawn and the seedlings of the three grasses along with the slips of water-grass were planted during the middle of October. The first cutting was taken on 29th December 1951 and the second on 2nd March 1952. Only two irrigations could be given during summer months due to the paucity of irrigation water. The trial was discontinued as per the instructions of the Director of Agriculture, Madras. The following table gives the acre yield of fodder obtained:—

		Acre yield in lb.	
		First cutting.	Second cutting.
1	Water grass— <i>Brachiaria mutica</i>	4,200	3,860
2	<i>Cenchrus setigerus</i>	3,429	2,629
3	<i>Cenchrus ciliaris</i>	2,971	1,571
4	<i>Panicum antidotale</i>	880	700

(f) **Pillipesara.**—*Pillipesara* was sown in fields No. E-2, F-3 (a) and (b) (0.90 acre). The fields were ploughed twice, manured with farmyard manure at 20 cart-loads per acre and worked in with Junior Hoe. *Pillipesara* seed was sown in these fields soon after the receipt of the monsoon rains at 30 lb. per acre. The germination and the subsequent growth of the crop were very poor due to the failure of the seasonal rains. Hence only a poor yield of 947 lb. of green fodder per acre was obtained. The fodder was cut periodically and fed to cattle.

(g) **Fodder cholam.**—Co. 1 cholam was sown in fields F-2, 15, 16, E-7 and 'Uttukuttai' (2.48 acres). The fields were ploughed thrice and manured with compost at 10 cart-loads per acre. With the receipt of the rain the sowings were begun in August 1951 and continued in stages. The first cutting was taken on 25th October 1951 from 'Uttukuttai'. Thereafter the fodder was cut to the extent required and fed to cattle daily. On an average 12,270 lb. of green fodder was obtained from an acre. Besides 323 lb. of seeds were collected from these fields.

(ii) **Vegetables.**—Vegetables like bendai, tomato, brinjals, ash-gourd, pumpkin, Vellarimathan, snake-gourd, bitter-gourd, lab-lab and New Era cow-pea were raised in fields F-4, 7, E-6, Quarters site II, III and IV (1.20 acres). The fields were ploughed till good tilth was obtained. Farmyard manure was applied at 20 cart-loads per acre. The fields were laid out into ridges and furrows for sowing these vegetables. As in the last year considerable difficulty was experienced in growing and the subsequent maintenance of these vegetables due to the partial failure of the rains and the limited water-supply available from the wells. Consequently production of both green vegetables and seeds were low.

(a) **Bendai.**—American long green variety was raised in an area of 0.40 acre soon after the receipt of rains in the month of August 1951. The crop was weeded and hoed four times. Six irrigations were given during the cropping period. The entire crop was left for seed and only off types were harvested as green vegetables. Twenty pounds of seeds were collected from this crop.

(b) *Tomato*.—This vegetable was grown in an area of 10 cents in field No. F-7. Due to the unfavourable seasonal conditions the crop did not come up well. Only 40 lb. of fruits were collected.

(c) *Cow-pea*.—New Era cow-pea was raised in an area of 0.30 acre in Quarters site IV during this year. Cow-pea seeds were sown at the rate of 15 lb. per acre late in August 1951. 12 lb. of seeds and 28 lb. of green pods were harvested from the area.

(d) *Ash-gourd and pumpkin*.—These vegetables were sown in pits in field No. F-4 (1.8 cents). Seeds were sown at the rate of 4 to a pit early in September 1951. The crop came up well. One hundred pounds of ash-gourd and 150 lb. of pumpkin were obtained as vegetables. These were sold after extracting the seeds from them. Thus $\frac{1}{2}$ lb. of seeds from each of the two vegetables have been obtained. The acre yield of pumpkin and ash-gourd works out to 8,333 lb. and 5,334 lb. respectively.

(e) *Nileshwar cucumber*.—The vegetable was also raised in field No. F-7 in an area of $1\frac{1}{2}$ cents. The seeds were sown late in August 1951. The germination and early growth were very satisfactory. The crop came to flowering in about 38 days after sowing. The first harvest was taken nearly two months after sowing. One hundred and ten fruits weighing 240 lb. were harvested during the year. This works out to an acre yield of 16,000 lb. Half a pound of seeds were extracted. On an average a fruit weighed 3 lb. The fruit was displayed during the Farmers' Day Celebration where it attracted much attention.

(f) *Vellarimathan*.—This vegetable was cultivated in field No. F. 4 in an area of 1 cent. The seeds were sown early in September 1951. The germination and growth were satisfactory. The first flowering was observed 53 days after sowing. The first harvest was taken nearly eleven weeks after sowing. Twenty-seven pounds of fruits were harvested from the area. A ripe fruit on an average weighed two pounds. Quarter pound of seeds of this vegetable was collected.

(g) *Snake-gourd*.—Extra long variety was grown in quarters Site II. Seeds were sown in the middle of August 1951. This vegetable came to bearing early in September. The fruits were as long as 8 feet. Most of the fruits were allowed to set seeds only. One pound of seeds was collected during the year.

(h) *Bitter gourd*.—Eight varieties of bitter gourd received from the Oil-seeds Specialist, Coimbatore, were grown alternately with lab-lab in quarters Site II during the middle of August 1951.

All the varieties were allowed to set seeds. The description and performance of seven varieties are given hereunder:—

(i) *Aduthurai*.—Early, vigorous, spiny, whitish green in colour, with 9 prominent ribs, fruits medium sized, each weighing about 4 oz. good yielder.

(ii) *Bangalore I*.—Late variety, not very vigorous, spiny, ribs not very prominent, white in colour, big-sized fruits weighing $4\frac{1}{2}$ oz. each, good yielder.

(iii) *Nandyal*.—Early, vigorous, fruits very spiny with 8 prominent ribs, dark green in colour, small fruits weighing $1\frac{1}{2}$ oz. each, good yielder.

(iv) *Bangalore II*.—Late variety, poor growth, has smooth long white fruits, fruits big-sized weighing $4\frac{1}{2}$ oz. each, medium yielder.

(v) *Coimbatore*.—Late type, very vigorous growth, produces spiny whitish green fruits, medium sized fruits weighing 4 oz. each, medium yielder.

(vi) *Pochas*.—Very early type, poor growth, bears small sized, spiny, dark green fruits with prominent ribs, fruits very small sized, weighing only 1 ounce each, poor yielder.

(vii) *Nandyal*.—Late variety, not a very vigorous type, bears fruits which are very spiny, and dark green in colour, medium sized fruits, weighing 2 ounce each, poor yielder.

(viii) *Kumbakonam*.—This did not germinate.

Aduthurai and one of the Bangalore varieties appear suited to the tract.

(iii) *Root crops*—(a) *Sweet potato*.—Setts of four varieties of sweet potato were obtained from the Agricultural Research Station, Pattambi, and planted in an area of 8.4 cents in field F-9. The field was well ploughed and manured with farm-yard manure at 20 cart-loads per acre. Setts were planted during the middle of October and the harvest was done in the first week of February. The crop was given two hoeings and four irrigations. A short description of the four varieties is given in the following paragraphs:—

(1) *I.B. 55*.—Not a very vigorous type, earliest, free from pests and diseases, tubers elongated and red in colour, medium sized, weighing 4 oz. each, soft and sweet pulp with a purple tinge, gave 5,095 lb. of tubers and 7,190 lb. vines per acre.

(2) *V. 12*.—Vigorous type, free from pests, tubers brown in colour, of medium size, weighing 4 oz. each, pulp white in colour, gave an acre yield of 9,286 lb. of tubers and 10,238 lb. of vines.

(3) *V. 10*.—Of average growth, tubers spindle shaped and pinkish in colour, big-sized, tubers, each weighing $\frac{1}{2}$ lb. to $\frac{3}{4}$ lb., pulp tinged with pink colour and sweet to taste, gave 11,048 lb. of tubers and 7,190 lb. of vines per acre.

(4) *V. 8*.—Of average growth, tubers spindle shaped, white in colour, big-sized tubers, weighing $\frac{1}{2}$ lb. each, pulp soft and sweet, gave 14,000 lb. of tubers and 10,752 lb. of vines per acre.

The crop has been raised again during the summer season mainly for seed purposes.

(b) *Tapioca*.—Valencia variety was grown in an area of 0.25 acre in field No. E-8. The field was ploughed well till good tilth was obtained and manured with farm-yard manure at 20 cart-loads per acre. Setts were planted early in September and gaps were filled up subsequently. The crop was given two hoeings. Four irrigations were given to the crop during the summer months. A poor yield of 1,488 lb. of tubers was obtained from an acre. The low yield is due to the late planting of the crop and the unfavourable seasonal conditions that prevailed during its cropping period.

(iv) *Paddy*.—In order to step up the production of foodcrops and also to increase the revenue of the station, a larger area was planted to paddy this year than last year. The additional water-supply made available by the deepening of all the three wells in H. block greatly helped to cope up with the increased area. Fields Nos. H. 13 to 17, F-6, 10, 12a (2.32 acres) were first sown to sunnhemp and the resulting green stuff incorporated *in situ* at 5,000 lb. of green matter per acre. The fields were puddled and manured with compost at 30 cart-loads per acre. After a basal dressing with superphosphate at 2 cwt. per acre seedlings of GEB. 24 paddy were transplanted during the first and second week of October 1951. One month after planting, ammonium sulphate was applied as a top dressing at 1 cwt. per acre. The fields in H. block were given adequate irrigations where as those in F. block could not be given the same number of irrigations. Two weedings were done during the cropping period. An average yield of 2,733 lb. of grain and 4,246 lb. of straw were obtained from an acre. The entire quantity of seed-paddy was transferred to the local Agricultural Demonstrator.

(v) *Coconuts*.—Thirty-two seedlings of a few selected exotic varieties, 22 of the West Coast variety and 40 of the Tall $\times$ Dwarf hybrid seedlings were obtained from the Agricultural Research Station, Nileshwar, and planted on 1st November 1951 in pits at 20 feet apart on the banks of *Uttukuttai*. All the seedlings established themselves in spite of the most unfavourable weather conditions that prevailed during the year. The seedlings were weeded twice and manured with ammonium sulphate at 1 ounce per plant in irrigation water.

The coconut plants in the quarter site IV did not bear during this year due to continuous low rainfall for the past six years.

(vi) *Fruit plants*.—(a) Cheeni-budded grafts behind the residential quarters are not coming up satisfactorily. The trees were manured with farm-yard manure at 200 lb. superphosphate at 2 lb. per tree in the month of September 1951 and incorporated by digging. The trees were pot-watered during the summer months. Fruit-fall disease was noticed and was controlled by timely spraying of Planofix. Of the nine standing trees, two dried up during the summer months. Three hundred and forty-seven pounds of *Sathgudi* fruits were harvested from the remaining seven trees. The fruits were under-sized and poor in juiciness.

(b) *Sapota*.—The three sapota trees remained unproductive during this year also. These trees were not manured in order to induce them to set fruits.

(c) *Malta lemon*.—The five surviving Malta lemon plants in quarters site IV are in satisfactory condition. Fifty rooted cuttings were obtained from Nileshtar and were planted in quarters site IV. Of those 41 plants are surviving now. These plants were manured with farm-yard manure and superphosphate at 75 lb. and 2 lb. per plant respectively and incorporated by digging.

(d) *Lemons*.—Six lemon plants from each of Rajahmundry, villa franca; Lisbon, Eureka, Genoa and Italian varieties were obtained from the Fruit Research Station, Kodur, and planted in quarters site I. The plants have not put on appreciable growth in spite of the best attention bestowed.

(e) *Jack*.—One Singapore and two local variety trees planted in 1947 are coming up satisfactorily in quarters site IV. The former has put on very good growth and flowered during the year but all the flowers have shed. One local variety tree also flowered for the first time during the year and set two fruits.

(vii) *Miscellaneous crops*.—(a) *Gliricidia maculata*.—One thousand six hundred seedlings of *Gliricidia* were planted on the station along the footpath, boundary line, etc. Only about 60 per cent of these have established. The 286 old trees are coming up well. Sixteen pounds of seeds were collected from them. A total of 15,000 cuttings were also taken for planting on the station and distribution in the district.

(b) *Sesbania speciosa*.—One thousand four hundred seedlings were planted along field bunds during the year. Only 50 per cent of these survived. Sixty-eight pounds of seeds were collected from these plants.

(c) *Prosopis juliflora*.—Seeds of this fence tree were sown all round the farm boundary soon after the receipt of rains in the month of September. Two hundred and fifty seedlings were also planted in places where seeds failed to germinate well. The hedge along the menials' quarters has come up well and 75 lb. of pods were collected from this during the year.

(d) *Horsegram*.—The local variety of horsegram was raised during the winter in quarters site IV and 'Uttukuttai' in an area of 0.40 acre. Due to the failure of rains only 58 lb. of grain were obtained from an acre.

5. *Compost*.—All farm waste like groundnut shell, castor shell, gingelly stalks, etc., were composted during the year. The compost pits were given a turning whenever it was possible to do so. Materials like groundnut and castor shell did not decompose well for want of sufficient moisture. One hundred and twenty cart-loads of compost were obtained during the year.

6. *Works*.—The sanctioned items of work relating to the deepening of F-3-a, F-17, E-6, and H-6 wells, erection of an engine shed near H-13 well, construction of water hydrant in quarters site II, layout of a road connecting G and H blocks, annual repairs to non-residential buildings and the replacement of wooden fence posts with R.C. posts were taken up and finished at a total cost of Rs. 4,955. The work relating to the connection of the power bore near H-13 well to the main well was completed during the year.

7. *Seed distribution*.—The following seed materials were distributed during the year :—

					LB.
Groundnut pods	..	..	..	TMV. 1	3,247
Do.	..	..	..	TMV. 2	9,636
Do.	..	..	..	TMV. 3	19,990
Do.	..	..	..	TMV. 4	1,747
Do.	..	..	..	TMV. 5	235
Selections for trials	..	..	..	..	148
Total	..	..	..	..	35,003

Groundnut kernels	..	..	..	..	244
Gingelly	..	..	..	TMV. 1	273
Do.	..	..	..	TMV. 2	444
Do.	..	..	..	TMV. 3	608
Total	..	..	..	..	1,325

Castor	..	..	..	..	TMV. 1	576
Do.	..	..	..	..	TMV. 2	1,656
Do.	..	..	..	..	TMV. 3	688
Total	..	..	..	..	..	2,920

						LB.
Bendai seeds	..	..	..	..	..	11
New Era cow-pea seeds	..	..	..	..	..	3.3
Lab-lab seeds	..	..	..	..	..	0.4
Vegetable seeds (miscellaneous)	..	..	..	..	..	7.0
Paddy seeds (GEB 24)	..	..	..	..	..	4,960
CO. 11 Fodder chulam seeds	..	..	..	..	..	95
Chulam seeds (Local)	..	..	..	..	..	20

						NOS.
Tomato seedlings	..	..	..	..	..	900
Brinjal seedlings	..	..	..	..	..	1,300
Chillies seedlings	..	..	..	..	..	12
Vegetable seed packets	..	..	..	..	..	150

						BUNDLES.
Paddy seedlings	..	..	..	..	..	350
Ragi seedlings	..	..	..	..	..	60

						NOS.
Moringa cuttings (Jaffna variety)	..	..	..	..	..	4
Gajanimma seedlings	..	..	..	..	..	9

II. "40. Agriculture—D. Agricultural demonstration and propaganda—(ii) Seed multiplication scheme"—

	RS.	A.	P.
Pay of establishment	660	0	0
Dearness allowance	264	0	0
House rent allowance	42	0	0
Office contingencies	Nil.		
Total ..	966	0	0
Other charges—			
Dead stock	Nil		
Working expenses	1,262	0	3
Total ..	1,262	0	3
Grand total ..	2,228	0	3

III. "40. Agriculture—G. Agricultural Experiments and Research—sss. Scheme to carry out large scale trials with insecticides and fungicides on groundnut"—

	RS.	A.	P.
Pay of establishment	3,135	10	0
Travelling allowance	85	15	0
Dearness allowance	1,088	6	0
House rent allowance	144	1	0
Total ..	4,454	0	0
Other charges—			
Lease amount and purchase of deadstock	4,442	4	0
Working expenses	6,324	5	0
Other contingencies	341	7	0
Cost of chemicals	1,106	0	0
Purchase of deadstock	1,752	9	0
Total ..	13,966	9	0
Grand total ..	18,420	9	0

IV. "40. g. Agriculture—Agricultural Experiments and Research—Excluding Post-war Reconstruction—S. Scheme to run six zonal nucleus seed farms of improved strains of groundnut and castor (1st July 1951 to 31st December 1951).

	RS.	A.	P.
Pay of establishment	600	0	0
Dearness allowance	144	0	0
Travelling allowance	9	10	0
	753	10	0
Other charges—			
Working expenses	1,618	3	3
Lease amount and purchase of deadstock	3,004	2	0
	299	9	9
Total ..	4,921	15	0
Grand total ..	5,875	9	0

Receipts.

"XXIX. A. Agriculture—Agricultural Receipts"—

	RS.	A.	P.
Agricultural Stations	6,544	14	0
Miscellaneous	1,847	6	0
Rent on buildings	24	0	0
Total ..	8,416	4	0
Value of seeds transferred to departmental officers ..	13,113	2	6
Grand total ..	21,529	6	6

APPENDIX III.

COST OF CULTIVATION OF OILSEED CROPS IN THE AGRICULTURAL RESEARCH STATION, TINDIVANAM DURING 1951-52 RAINFED SEASON.

Name of the crop.	Preparatory cultivation.	Manures and chemical.	Seeds and sowing.	After cultivation.	Harvest.	Total expenses.	Yield.	Value.	Profit.
	RS.	RS.	RS.	RS.	RS.	RS.	LB.	RS.	RS.
Station—									
Groundnut	24	22	49	20	29	144	593	198	54
Gingelly	13	8	7	25	7	60	147	92	32
Castor	16	26	8	15	18	83	541	203	120
Seed Multiplication Scheme—									
Groundnut	6	14	50	15	14	99	348	116	17

ANNUAL REPORT OF THE AGRICULTURAL RESEARCH STATION, KOILPATTI, FOR 1951-52 (FASLI YEAR 1361).

1. *Season.*—The statement of rainfall for the year with weekly totals and the number of rainy days is presented in Table I. Similar figures for the previous year are also given. Besides average weekly rainfall for the previous 10 years and 47 years are also furnished in the table.

TABLE I.—Statement of rainfall at the Agricultural Research Station, Koilpatti,
for 1951-52 (fasli 1361).

for 1951-52 (Jan 1952)

Months.	Week.	1951-52.		1950-51.		Average for ten years ending 1951-52.		Average for 47 years ending 1951-52.	
		Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.
South-west monsoon.									
June ..	7-13	0.04	..	..	..	0.06	0.5	0.13	0.5
	14-20	..	..	..	..	0.12	0.1	0.10	0.2
	21-27	..	..	..	..	..	..	0.14	0.2
June-July ..	28-4	1.05	1	..	..	0.19	0.3	0.14	0.5
	5-11	..	..	0.10	1	0.22	0.2	0.14	0.4
	12-18	0.02	..	..	..	0.01	..	0.24	0.5
July-August ..	19-25	..	..	..	..	0.21	0.4	0.18	0.5
	26-1	..	..	0.09	..	0.24	0.4	0.17	0.4
	2-8	..	..	..	..	0.70	0.7	0.30	0.5
August-September.	9-15	1.05	2	..	..	0.45	0.9	0.42	0.7
	16-22	0.70	1	1.32	2	0.41	0.6	0.42	0.9
	23-29	0.03	..	0.07	..	0.52	0.8	0.50	0.9
August-September.	30-5	0.04	..	0.13	1	0.27	1.0	0.39	1.1
	6-12	..	..	..	..	0.61	0.7	0.60	1.0
	13-19	1.05	3	..	..	0.64	1.3	0.63	1.2
Total ..	20-26	0.47	1	0.30	1	0.34	0.9	0.52	1.3
		4.45	8	2.01	5	4.99	8.8	4.92	10.8
North-east monsoon.									
September-October.	27-3	0.04	..	0.59	3	0.80	1.6	0.73	1.5
	4-10	0.01	..	..	..	0.90	1.6	1.06	1.8
	11-17	0.58	2	1.02	3	0.99	2.0	1.55	2.7
November ..	18-24	0.53	2	3.03	3	2.28	2.6	2.01	2.9
	25-31	0.46	2	..	..	1.60	2.9	1.86	3.2
	1-7	1.51	3	0.31	1	1.28	2.4	2.02	3.3
November-December.	8-14	3.91	3	0.78	1	2.30	2.9	1.91	3.0
	15-21	2.81	4	0.06	..	1.72	2.5	1.57	2.4
	22-28	0.08	..	0.07	..	0.55	1.4	1.08	2.0
November-December.	29-5	1.09	2	..	..	0.68	1.8	1.17	2.2
	6-12	..	..	..	..	0.88	1.8	0.67	1.4
	13-19	..	..	0.46	2	1.05	1.7	0.68	1.3
December-January.	20-26	..	..	0.30	1	0.13	0.3	0.24	0.6
	27-3	0.08	..	..	..	0.39	0.8	0.47	0.9
	4-10	0.11	..	..	..	0.05	0.4	0.24	0.8
December-January.	11-17	..	..	0.90	1	0.18	0.5	0.37	0.8
	18-24	0.12	..	..	..	0.09	0.3	0.13	0.6
	25-31	0.02	..	..	..	0.25	0.6	0.34	0.6
Total ..		11.40	16	7.50	15	16.12	27.9	18.10	32.0
Hot weather period.									
February ..	1-7	..	..	..	..	0.08	0.2	0.24	0.5
	8-14	0.05	..	..	..	0.15	0.2	0.21	0.5
	15-21	0.47	1	..	..	0.67	0.5	0.19	0.3
March ..	22-28	1.49	3	..	..	0.39	0.9	0.25	0.6
	1-7	..	..	..	..	0.19	0.5	0.12	0.3
	8-14	..	..	..	..	0.05	0.2	0.17	0.5
March-April ..	15-21	0.67	1	..	..	0.29	0.7	0.29	0.7
	22-28	..	..	0.77	2	0.44	0.8	0.34	0.7
	29-4	..	..	0.97	2	0.59	1.4	0.45	1.1
April-May ..	5-11	1.28	2	0.39	2	0.57	1.7	0.63	1.3
	12-18	1.21	3	4.05	5	1.93	2.2	1.18	1.8
	19-25	0.14	1	0.74	2	0.51	1.1	0.60	1.4
May-June ..	26-2	..	..	0.30	2	0.24	0.5	0.72	1.3
	3-9	..	..	1.60	2	0.83	1.2	0.68	1.3
	10-16	..	..	..	..	0.50	0.9	0.37	1.1
May-June ..	17-23	0.10	1	0.40	1	0.39	0.9	0.45	1.0
	24-30	..	..	0.96	2	0.54	0.7	0.39	1.1
	31-6	..	..	..	..	0.05	0.2	0.14	0.4
Total ..		5.89	12	10.18	20	8.41	14.8	7.42	15.9
Grand total ..		21.24	38	19.69	40	29.52	51.5	30.44	58.7

N.B.—Only rainfall of ten cents and above counted for rainy days.

The year under report had a total rainfall of 21.24 inches which is lower than the normal rainfall of this station. The average for the past 10 years is 29.52 inches. The deficit in rainfall was due to the partial failure of the north-east monsoon rains and also the hot-weather showers. During the south-west monsoon period the rainfall recorded was 4.45 inches which is almost the normal rainfall for the period (i.e., 4.9"). The rainfall was uniformly distributed throughout the period. In the north-east monsoon a total of 11.04 inches of rain was received, as against the average of 16.12 inches. The monsoon was late and the rainfall was low. The rainfall during the hot weather period was 5.39 inches as against the average of 8.41 inches. As the south-west monsoon was normal the garden land crops were benefited during the period. Due to the late receipt of the north-east monsoon, the three major rainfed crops of the tract, *karunganni cotton*, *cumbu* and *irungu cholam* could be sown only during the month of November 1951—the proper time of sowing being October. This late sowing acted adversely on all the three crops. The *irungu cholam* was the least affected and it gave an acre yield of 4,610 lb. of straw per acre as against the normal yield of 5,000 lb. per acre. The *cumbu* gave an acre yield of 300 lb. of grain as against the normal yield of 400 lb. per acre. The cotton crop produced a poor yield of 280 lb. of kapas per acre as against the normal yield of 450 lb. per acre. There was no distinct first and second flush in the cotton crop due to the late sowings. All these yields although poor for the station are nearly double as compared to the yields obtained in the lands round-about as a result of better husbandry practised on this station. In the gardenland the drought affected all the crops adversely to a certain extent. To sum up the partial failure of north-east monsoon and hot weather rains, affected all the crops adversely.

2. *Introduction.*—The main activities of this Research Station are centred round the improvements of the three crops of this tract, viz., *karunganni cotton*, *cumbu* and *irungu cholam* (for fodder) in the black-soil area under rainfed conditions. In the gardenland of the red soil area irrigated *cholam* and irrigated *ragi* are being studied. The introduction and trial of other food and fodder crops, grasses and fruit tree seedlings and hedge plants, are also being done within the limited means of this station. Hybridization work in poultry between the more suited imported breed, the Rhode Island red and the desi breed, the Indian game was continued and the F_2 generation was raised. Agronomic experiments dealing with rainfed crops are in progress. The results achieved during this year are discussed under three heads (i) Crop Research; (ii) Agronomic Research, and (iii) Miscellaneous studies.

I. CROP RESEARCH.

3. *Cotton.*—Breeding work on the rainfed cotton is being done by the Assistant Cotton Specialist, Karunganni scheme. The existing Kurunganni strain K. 2 has staple length of 15/16 inches and suits the tract well. The strain is spreading rapidly in Madurai, Ramanathapuram and Tirunelveli districts. Breeding work to improve its quality and yield has resulted in four economic cultures possessing staple length of one inch combined with a high ginning percentage 34. These cultures are in the district trial stage.

4. *Cholam (Irrigated) Sorghum subglabrescens.*—Trials of the *Vellai cholam* strain K. 2 in the districts of Ramanathapuram and Tirunelveli have confirmed the suitability of the strain to both the districts in the *Thai pattam* (January sowings) and *Chitrai pattam* (April sowings). The yield trial conducted during 1951 summer included the three economic cultures K.S. 285, K.S. 288 and K.S. 296/4 which have been isolated at this Research Station. Besides these three selections the two Coimbatore strains Co. 9 and Co. 12 and two economic selections A.S. 8155 and A.S. 8159 were also added. The control used was the local strain Cholam K. 2. Due to restricted water supply the trial was laid out in non-replicated plots. The two selections K.S. 288 and K.S. 296/4 gave higher yields than the control, cholam K. 2. The economic worth of these two selections is being

pursued by sowing them in replicated yield trials during 1952. The yield behaviour of the *vellai cholam* trial is given in Table II.

TABLE II.—*Vellai Cholam*—Observation trial (1951-52).

- 1 Field number—7-B.
- 2 Variants—Eight (K.S. 285, K.S. 288, K.S. 296/4, Co. 9, Co. 12, A.S. 8155, A.S. 8159 and K. 2).
- 3 (a) Layout—Randomized plots—Observation plots.
- (b) Number of replications—Observation plots.
- (c) Manure applied—Cart loads 10 tons F.Y.M.
- 4 Area of each plot—Net—20 × 20 links.
Gross—24 × 24 links.
- 5 Date of sowing—3rd April 1951.
- 6 Seed rate—15 lb. per acre.
- 7 Date of harvest—5th and 9th July 1951.

Number and selection.	Calculated acre yield of grain.		
	Replicated yield trial 1949-50.	Replicated yield trial 1950-51.	Observational trial 1951-52.
(1)	(2)	(3)	(4)
	LB.	LB.	LB.
1 K. 2 (Control)	3,358	1,113	2,290
2 K.S. 285	3,543	800	1,100
3 K.S. 288	3,414	925	2,415
4 K.S. 296/4	3,648	969	2,375
5 Co. 12	..	800	1,950
6 Co. 9	..	..	1,415
7 A.S. 8155	..	..	1,950
8 A.S. 8159	..	..	1,250
F. Value	3.05	..	..
"F" Test	Satisfied.	Not satisfied.	..
S.E.	3.04	6.65	..
C.D.	355	..	..

1949-50—

Conclusion—

K.S. 296/4, K.S. 285, K.S. 288, K. 2, K.S. 295/4, K.S. 297/1.

Eleven new samples were also tried in observation plots during 1951 summer season with the strain cholam K. 2 as control. None of these proved better than the control and were rejected.

5. *Ragi (Irrigated—Eleusine coracana) Gaertn—Pure-line selections.*—The strain Ragi K. 1 has been found suitable to the Madurai, Ramanathapuram and Tirunelveli districts. Although a good yielder, it has a slight defect, that it lodges at the time of maturity. Ragi K.R. 4 an economic purple pigmented non-lodging type was compared with Ragi K-1 along with another economic selection Ragi 76 during 1950-51. Although both the selections recorded lesser yields than the control the differences were not found to be significant. The trial was repeated during the current year. During this year both the selections have recorded higher yields than the control. During this year also, the differences were not significant showing thereby that both the selections are on a par with the control. Since the selection K.R. 4 has the added advantage of the non-lodging habit, it is to be tried in the districts to find out its suitability or otherwise for the tract. The results of the yield trial are given in Table III.

TABLE III.—*Ragi (Irrigated) Comparative yield trial—(1951-52).*

- 1 Field number—7-B.
- 2 Variants—Three (K.R. 4; K.R. 76; K. 1).
- 3 (a) Layout—Randomized plot.
- (b) Number of replications—Eight.
- (c) Manure applied—20 cart loads (10 tons) per acre.
- 4 Size of plot—Net—45 × 23 links.
Gross—50 × 23 links.
- 5 Date of sowing nursery—16th August 1951.
- 6 Date of transplanting—12th and 13th September 1951.
- 7 Date of harvest—13th and 14th December 1951.

Selection number..	Calculated acre yield of grain.		
	1949-50.	1950-51.	1951-52.
(1)	(2)	(3)	(4)
	LB.	LB.	LB.
K-1 (Control)	2,175	2,818	2,529
K.R. 76	2,488	2,735	2,837
K.R. 4	..	2,637	2,769
"F" test	Not satisfied.	Not satisfied.	Not satisfied.
S.E.	0.88	18.04	1.72

AGRI. STN.—22A

In row yield trials 40 single plant cultures from four families were tested for their economic worth with the strain Ragi K. 1 as control. Twelve of these cultures gave a higher yield than control but was not significant. These twelve selections would be further tested for their yielding capacity.

Hybridisation.—As already reported the strain Ragi K. 1 although gives a higher yield has an economic disability in its lodging habit at the time of maturity. To get over the defect the strain was crossed with an economic type K.R. 4 which possesses non-lodging habit also. The F. 4 generation was studied during the year 1951 with 46 single plant cultures in replicated row-yield trials with Ragi K. 1 as control. Eighteen selections gave a higher yield than the control but the increase in yield were not significant. Among the rest, 22 selections were on par with the control although they recorded lower yields. Among these economic 40 selections 30 were found to segregate either for botanical characters or lodging habit. The 10 non-lodging pure breeding economic types would be advanced to the next stage of replicated trials during the 1952 season.

Time of sowing.—To find out the optimum time of sowing the main season Ragi "a Time of sowing experiment" was started during the year 1950-51. The trial was observational in nature. Nurseries were sown at weekly intervals, commencing from the first week of August and the seedlings transplanted when 25 days old. All the four sowings recorded almost similar yield indicating that the nursery can be raised throughout the month. During the year 1951-22 the sowings were done at fortnightly intervals commencing from July and ending with September. This trial was also observational in nature. The yield of grain indicated once again that the nurseries raised during August gave the highest yield and the yield gets reduced when the nurseries are sown earlier or later. The details of the yield are given in Table IV.

TABLE IV.—Ragi—Time of sowing experiment (1951-52).

Number.	Nursery sown on	Transplanted on	Harvested on	Duration in days.	Calculated acre yield.	
					Grain	Straw (green).
(1)	(2)	(3)	(4)	(5)	(6)	(7)
I.	1 July 1951.	25 July 1951.	15 Nov. 1951.	137	1,585	29,270
II.	15 July 1951.	10 Aug. 1951.	4 Dec. 1951.	142	1,341	25,731
III.	1 Aug. 1951.	25 Aug. 1951.	Do.	126	1,921	25,829
IV.	15 Aug. 1951.	10 Sep. 1951.	20 Dec. 1951.	127	2,012	27,560
V.	1 Sep. 1951.	25 Sep. 1951.	Do.	111	1,768	23,750
VI.	15 Sep. 1951.	10 Oct. 1951.	10 Jan. 1952.	117	1,220	34,146

Result of 1950-51.

Number.	Nursery sown on	Harvested on	Duration in days.	Calculated acre yield.	
				Grain.	Straw (Green)
(1)	(2)	(3)	(4)	(5)	(6)
I.	2 Aug. 1950.	15 Dec. 1950.	136	2,901	17,098
II.	9 Aug. 1950.	Do.	129	2,654	17,160
III.	16 Aug. 1950.	Do.	122	2,593	21,049
IV.	23 Aug. 1950.	Do.	115	2,640	22,345

6. *Cumu (Rainfed)*—*Pennisetum typhoides*.—As already stated the *cumbu* crop was very poor due to the severe drought that prevailed during the year under report. Seven economic cultures which had given higher yield than the strain *cumbu* K. 1 were tested in replicated yield trial. The trial was a failure due to poor setting of grain. A set of ten and another set of twenty-two economic cultures which were sown in progeny row yield and preliminary yield trials also did not give any result due to the poor setting of grain consequent on the drought.

Production and trial of hybrid-cumbu.—To find out the suitability or otherwise of the two hybrid *cumbu* strains X-1 and X-2 an extensive trial was laid out with the two strains along with the strain *cumbu* K-1, in this tract. The control used was the local. The trial was laid out in adjacent observation plots with an area of 10 cent each.

The rainfed *cumbu* occupies nearly 3-2 lakhs of acres of this tract. (Tirunelveli district 1-7 lakhs, Ramanathapuram 1-1 lakhs, and Madurai 0-4 lakhs.) The distribution in the various taluks was also studied and it was found that the main zone of distribution of the entire tract is situated in the two adjacent taluks of Koilpatti and Sattur belonging to the Tirunelveli and Ramanathapuram districts respectively. The intensity of the area defuses into the adjacent taluks of Sankarankoil and Srivaikuntam of the Tirunelveli district and Aruppukottai, Paramakudi and Mudukulathur taluks of Ramanathapuram district. A small zone of rainfed *cumbu* cultivation is situated in the Dindigul taluk of the Madurai district which is adjacent to the Coimbatore district. Observation plots were laid out in the above mentioned eight taluks in a total of eighteen centres. Due to the drought that prevailed in that tract the *cumbu* crop was a partial failure in some places and total failure in the others.

In the Dindigul taluk strain *cumbu* K-1 has given the highest yield as compared with the local as well as the two hybrid strains. In the Ramanathapuram district out of the nine centres tried only in four centres the crop came up. The indications are strain X-2 and K-1 do well in this tract.

In the Tirunelveli district out of the seven centres tried two were failures. The other five indicated that strain X-2 and K-1 suit the tract. The details of yield of all the trials are given in Table V.

TABLE V.—Results of the observation plots of X-1, X-2 and K-1 and Local in the Madurai, Ramanathapuram and Tirunelveli districts during (1951-52).

Name of districts.	Name of taluks.	Centres of the trial plots.	Calculated acre yield of grain.				Remarks
			X-1.	X-2.	K-1.	Local.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			LB.	LB.	LB.	LB.	
Madurai ..	Dindigul ..	Thavasimadai ..	285	302	428	314	K-1 fares well
	Rajakapatti ..	Periadalpatti ..	128	93	209	119	....
Ramanathapuram ..	Sattur ..	Muthalapuram ..	88	81	85	95	....
		Marneri ..	Do.	Do.	Do.	Do.	....
	Paramakudi ..	Kannadakudi ..	180	360	800	120	X-2 fares well
		Perambalur ..	Do.	Do.	Do.	Do.	....
	Aruppukottai ..	Mallankinar ..	285	425	375	275	X-2 fares well
		M. Reddiapatti ..	210	171	285	228	K-1 fares well
	Mudukulathur ..	Vennivayakal ..	Do.	Do.	Do.	Do.	....
		Sinkapulupatti ..	Do.	Do.	Do.	Do.	....
Tirunelveli ..	Koilpatti ..	A.R.S. Red soil ..	114	86	87	87	....
		A.R.S. Black soil ..	45	35	59	52	....
		Kumarsapuram ..	302	303	442	312	....
		Duraisampuram ..	405	419	446	510†	....
		Othupatti ..	Do.	Do.	Do.	Do.	....
	Sankarankoil ..	Manalur ..	260	300	230	270	X-2 fares well
	Srivaikuntam ..	Tholappanai ..	Do.	Do.	Do.	Do.	....

The trial is to be repeated during 1952-53 season to study the behaviour of the strains during the normal year.

* Yield not recorded.

† Local is also K-1 which was distributed during the previous years.

Previous trials conducted have indicated that strain cumbu K-1 when crossed with certain Coimbatore types gave higher yield than both the parents in the hybrid stage. To study this indication in a greater detail, a large number of crosses were made between the strain K-1 and types from other places to study whether they manifest hybrid vigour. Seven hybrids, viz., K-1 × Co. 1, K-1 × Co. 2, K-1 × Co. 3, K-1 × M.S. 5640, K-1 × M.S. 5794, K-1 × P.T. 504, and K-1 × P.T. 808/3 were tested in row yields with cumbu K-1 as control during the year 1950-51. During that year the results were not significant. The same crosses were produced and were again tested during the year under report in preliminary yield trials in the red soils under irrigated conditions. The crop came up well because of the assured water-supply and one combination K-1 × P.T. 504 gave a significantly higher yield over the strain cumbu K-1. The same trial was repeated in the black-soil under rainfed conditions. In spite of poor setting the combination K-1 × P.T. 504 has given the highest yield among the combinations, although the yield is statistically on a par with the strain cumbu K-1. The economics of this combination would be further pursued.

Eight high yielding selections from Coimbatore P.T. 248/3, P.T. 818/10, P.T. 819/6, P.T. 827/6, P.T. 833/2 P.T. 834/2, P.T. 835/6 and P.T. 840/9 were raised during the current year and crosses were effected among these selections and the two Koilpatti strains cumbu K-1 and cumbu K-2. Besides, they were also intercrossed among themselves. In total 26 combinations of crosses were made and the worth of these combinations would be tested during the ensuing season.

A variety of cumbu known as *Kullan cumbu* with a duration ranging from 80 to 90 days is raised under irrigation in this tract. Because of its short duration and its ability to produce a good yield when sown during any month of the year, it is a popular garden land crop. A beginning was made to evolve a pure line selection for this variety and twelve economic cultures have been isolated. Their further economics would be studied during the ensuing season.

7. *Irungu cholam* (Rainfed) *Sorghum dochna*.—All the trials that were laid out with Irungu cholam were partial failures due to the severe drought that prevailed during the year. The trials were centred over A.S. 7081 the extracted type of a cross between Irungu cholam of this tract and the Periamanjai cholam of Coimbatore. The suitability of this new selection as a grain crop and as a fodder crop was tested in observation plots of 10 cents each and the calculated acre yield is given below:—

Selection number and seed-rate.	Calculated acre yield in lb.	
	Grain	Straw (green).
1 A.S. 7081 15 lb. seed-rate	550	5430
2 A.S. 7081 80 lb. seed-rate	305	7742
Irungu K-1 60 lb. seed-rate	103	7110

N.B.—The normal seed-rate for irungu cholam for fodder is 60 lb. per acre. Since A.S. 7081 has bolder grains, a heavier seed-rate has been used to obtain the same stand as that of Irungu cholam.

The above trial indicates that the Periamanjai Irungu gives a higher yield of grain and fodder than Irungu cholam K-1 as a fodder crop even during droughty years. As a grain crop it has given a fair yield of 550 lb. of grain per acre. This indicates that the new selection has every chance of replacing the Irungu cholam of this tract.

To find out the optimum seed-rate for the Periamanjai Irungu both as a grain as well as a fodder crop the following bulk trial was laid out, each variant

occupying an area of 10 cents. Irungu cholam with the seed-rate of 60 lb. per acre was included as the control for the experiment.

Selection number.	Seed-rate per acre. lb.	Calculated acre yield.	
		Grain in lb.	Straw (green) lb.
1 A.S. 7081	10	430	3,450
2 Do.	20	400	4,820
3 Do.	30	255	4,780
4 Do.	40	170*	4,940
5 Do.	50	230	6,260
6 Do.	60	265	8,220
7 Do.	70	130	7,140
8 Do.	80	115	8,110
9 Irungu cholam K 1	60	155	7,076

* Ununiform plot.

Since the year was droughty the *Periamanjai Irungu* had not the maximum opportunity to show its worth. However it can be seen that it has fared definitely better than the *Irungu cholam* even during droughty years. The trial would be repeated during the ensuing season to get at definite results.

A comparative trial was laid out with the *Periamanjai Irungu* selection A.S. 7081 and the *irungu* strain K-1 seed-rate used in both the selections were 60 lb. per acre. The crop was a partial failure due to the drought and no significant difference was observed between the two selections. The details of yield is given in Table VI.

TABLE VI.—*Periamanjai Irungu* (Rainfed) comparative yield trial (1951-52).

1 Field number	24-A.
2 Variants	Two (A.S. 7081 and Irungu K-1).
3 (a) Layout	Randomized plots.
(b) Number of replications	Twelve.
(c) Manure applied	Five cart loads (2½ tons) Farm yard manure.
4 Area of each plot—	
Nett	25 × 100 links.
Gross	35 × 110 links.
5 Date of sowing	1st November 1951.
6 Seed-rate	60 lb. per acre.
7 Date of harvest	14th and 15th February 1952.
8 Duration	107 days.

Selection.	Calculated acre yield in lb.	
	Grain.	Straw.
(1)	(2)	(3)
K-1	139	8,630
A.S. 7081	154	8,910
F. test	Not satisfied.	Not satisfied.
S.E.	0.72	8.52

Improvement of grain size in periamanjai irungu.—When the bulk heads of periamanjai irungu were examined they found to exhibit variation in grain size. Since bolder grains are preferred, selection work within this type was taken up for the improvement of grain size. One hundred earheads which had bolder grain as judged by eye-sight were picked from a bulk filed. The average earhead weight was 70 grams and the mean hundred gram weight was 2.5 grams. Thirty-eight (38) single plant heads which recorded a higher weight than 70 grams with a hundred grain weight ranging from 2.5 to 2.9 grams were selected for further work. The work is in progress.

8. *Minor millets*.—Six *varagu* (*Paspalum scrobiculatum*) samples and two *samai* *Panicum miliare* samples from the Millet Specialist, Coimbatore, were tried

in observation plots, to find out the suitability of these minor millets to the tract. Due to the drought that prevailed the *varagu* crop recorded a very poor yield ranging from 30 to 90 lb. of grain per acre and the *samai* crop was a total failure. These minor millets would be tested again during the ensuing season.

II. AGRONOMIC RESEARCH.

9. *General*.—Large scale agronomic experiments have been made on this Research Station in the blacksoil area under rainfed conditions. These studies were of a non-replicated nature during the earlier years and were laid out in replicated randomized plots during the later years, the results of these experiments led to the following definite conclusions:

(i) The Karunganni cotton crop should form one of the rotation crops, to have an economic cropping system, the other two being cumbu and irungu cholam.

(ii) The rainfed cotton responds to heavy nitrogenous manuring of 20 to 100 lb. N. level per acre. This manure can be applied either in the form of ammonium sulphate or groundnut cake. The cotton yield was increased by nearly 38 per cent when it was manured at 40 N. level and this dose was found to be the most economic as judged by the profit realized. A beneficial residual effect on the succeeding millet crop was also felt to an extent of increasing the grain and straw yield by nearly 20 per cent.

(iii) The *irungu cholam* crop reduces the yield of the succeeding crop of *cumbu* or cotton by about 15 per cent. This depression of yield is popularly termed as "cholam effect". Of all the methods, which were tried to mitigate this "cholam effect", growing indigo as a mixed crop with *irungu cholam* and incorporating the indigo crop by ploughing it in the same field was found to be the most economic ameliorative method.

(iv) Among the various mixed crops tried, *coriander*, *horsegram* and *groundnut* (bunch variety) affected the yield of cotton the least and might lend themselves to economic cropping.

(v) Ploughing the lands immediately after the harvest of the cereals increased the yields of succeeding crop as compared to late ploughing. Regarding depth of ploughing, a deep ploughing was found to be unnecessary to any cropping in this tract. A shallow ploughing for cotton and the top-mulching for cereals was found to be enough for production of a normal crop.

Fresh agronomic experiments were planned in 1947-48 to further the knowledge already gained and also to find out ways and means to make use of this knowledge in a practical manner. Six different experiments were conducted during the year and are detailed below. A review of the results for the past four years was made and three of these experiments were concluded as they had given definite results or there was no necessity for continuing them. As already stated the year under report was a droughty one, and all the three main crops, namely, cotton, cumbu and irungu cholam recorded reduced yields. In cotton there was no definite first and second flush and the total yield was taken for analysing the agronomic experiments.

10. *New cultural experiments*.—This experiment was commenced in the year 1948-49 in field No. 23 and is to continue for 12 years. The object of the experiment is to determine the optimum preparatory cultivation necessary for the three important dry land crops of the tract, viz., cotton, cumbu and irungu cholam taking into consideration side by side the rotation of these crops also. The lay out is of the "split plot" design where rotation forms the main treatment and the various cultural operations form the sub-treatments.

The crops were sown during the first week of November. The germination was good. The yield data of the various cultural treatments with regard to the three crops, cumbu, irungu cholam and cotton were analysed statistically. The analyses

did not show significant difference between the various cultural treatments. The results are presented in Table VII.

TABLE VII.—*New cultural experiments—1951-52 (fourth-year of trial).*

Crops experimented upon—		Date of harvest—	
Cotton K-2.		Irungu harvest—13th March 1952.	
Cumbu K-1.		Cumbu harvest—27th February 1952.	
Irungu cholam K.1.		Cotton picking—29th March to 10th June 1952.	
Field number—23.		Layout—Split plot design.	
Previous crops—Cotton, cumbu and irungu cholam as mentioned in the rotational treatments stated below.		Replications—4.	
Manure—No manure for cotton; 5 cart-loads of farmyard manure per acre for irungu; 10 cart-loads of farmyard manure per acre for cumbu.		Size of plot—	
Date of sowing—		Main plot—29.7 cents.	
Irungu and cumbu—3rd November 1951.		Sub-plot—Gross, 4.95 cents.	
Cotton—9th November 1951.		Net, 3.46 cents.	

Main treatments (rotation).				
Variants.	First year.	Second year.	Third year.	Fourth year.
A	Cotton ..	Cotton ..	Cholam ..	Cotton ..
B	Cotton ..	Cholam ..	Cotton ..	Cumbu ..
C	Cholam ..	Cotton ..	Cumbu ..	Cotton ..
D	Cotton ..	Cumbu ..	Cotton ..	Cholam ..

1. Sub-treatments (cumbu and irungu crops)—

(a) Country plough—Two to three times.

(b) R.E. Guntaka—Two to three times.

(c) No cultivation except weeding.

(d) Country plough—Twice after rains in June-July followed by Cooper No. 11 once after rains in September.

(e) Cooper No. 11—Twice, once in June-July and again after rains in September.

(f) Cooper No. 11—Once after first soaking rains in June to September.

Yield of cumbu grain and irungu straw.

Treatments.	Cumbu grain (main treatment C).		Irungu straw (main treatment A).	
	Acre yield in lb.	Percentage over control.	Acre yield in lb.	Percentage over control.
(a) Country plough, three times	278	115	3,721	107
(b) R.E. Guntaka, three times	248	103	3,251	93
(c) No cultivation (control)	242	100	3,488	100
(d) Country plough twice and Cooper once ..	299	124	3,625	104
(e) Cooper No. 11, twice	222	92	3,745	108
(f) Cooper No. 11, once	298	123	3,799	109
Standard error	2.25		17.66	
Significance by 'F' test	No.		No.	

2. Cotton crop—Sub-treatments—

(a) Country plough—Four to six times.

(b) R.E. Guntaka—Four to six times.

(c) No cultivation except weeding.

(d) Country plough—Twice after rains in April to July followed by Cooper No. 11 once after rains in September.

(e) Cooper No. 11—Twice once in April to July and again after rains in September.

(f) Cooper No. 11—Once after first soaking rains in April to September.

Yield of kapas of cotton.

Treatments.	Cotton after cholam (main treatment B).		Cotton after cumbu (main treatment D).	
	Acre yield in lb.	Percentage over control.	Acre yield in lb.	Percentage over control.
(a) Country plough 4	320	121	897	115
(b) R.E. Guntaka 4	331	125	907	89
(c) No cultivation except weeding	264	100	844	100
(d) Country plough twice and Cooper 11 once ..	356	97	867	107
(e) Cooper 11 twice	322	122	873	108
(f) Cooper 11 once	302	114	848	101
Standard error	2.07		1.52	
Significance by 'F' test	No.		No.	

Results of the previous years.

A. Cumbu.				
Acres yield of cumbu grain—lb.				
Treatments.	1948-49.	1949-50.	* 1950-51	
(1)	(2)	(3)	(4)	
(a) no cultivation (control)	477	443	21	
(b) R.E. Guntaka (3) times	454	430	22	
(c) Cooper plough (once)	488	406	58	
(d) Cooper plough (twice)	397	468	88	
(e) Country plough (twice) and Cooper plough once ..	518	443	81	
(f) Country plough (thrice)	478	461	86	
Significant or not	No.	No.	No.	No.

* Droughty year and hence recorded poor yields.

B. Irungu cholam.

Treatment.	Acre yield of Irungu cholam straw in lb.		
	1948-49.	1949-50.	* 1950-51.
(1)	(2)	(3)	(4)
(a) No cultivation (control)	9,032	5,376	470
(b) R.E. Guntaka (3 times)	8,820	4,835	985
(c) Cooper once	8,562	5,838	908
(d) Cooper twice	9,021	5,592	578
(e) Country plough (twice) and cooper (once)	9,376	6,156	547
(f) Country plough (thrice)	9,108	5,535	560
Significant or not	No.	No.	No.

C. Cotton.

Treatments.	Acre yield of cotton yield in lb.					
	1948-49.		1949-50.		* 1950-51.	
(1)	After cumbu.	After Irungu.	After cumbu.	After Irungu.	After cumbu.	After Irungu.
(2)	(3)	(4)	(5)	(6)	(7)	(8)
(a) No cultivation (control)	431	430	478	339	96	245
(b) R.E. Guntaka (4 times)	398	377	527	397	128	259
(c) Cooper plough 11 (once)	433	396	472	322	252	334
(d) Cooper plough 11 (twice)	403	412	508	416	192	277
(e) Country plough twice and Cooper plough 11 (once).	504	508	605	379	223	298
(f) Country plough (4 times)	495	514	507	374	257	315
Significant or not	Yes.	Yes.	No.	No.	Yes	No.

* Droughty year and hence recorded poor yields.

11. *New rotation experiment.*—This experiment was started in the year 1947-48 in field No. 20 with 16 treatments. The object of the experiment was not only to determine the best rotation for the tract but also to study the physico-chemical properties of soil with reference to the different systems of cropping. Soil samples were taken before and after crop growth from depths of 0-5", 6-12", 12-24", 24-36" and the physico-chemical properties were studied in collaboration with the Government Agricultural Chemist. The samples were drawn till 1949-50. Further drawing of samples could not be done owing to the retrenchment of the special staff. But the experiment was continued on till the current year to find out a complete cycle in the different systems of rotation. A joint discussion was made with the Cotton Specialist, Millet Specialist, and the Government Agricultural Chemist, Coimbatore, on this experiment with the data so far obtained. From the discussions it was derived that for the purpose of advocating proper rotation to be followed, the practice of growing cumbu-cotton is the best. In areas where irungu cholam is grown followed by cotton the practice of mixing indigo with irungu, to neutralize to some extent the ill-effect of irungu, may be recommended. This has been taken up as an item of propaganda in the districts of Tirunelveli and Ramanathapuram where irungu cholam is usually cultivated for fodder. Therefore, it is no longer necessary to continue this experiment for finding out the best rotation and also for counteracting the ill-effect of *irungu cholam*. The above findings advocated, are based on previous experiments and the present experiment has been discontinued as the staff for the physico-chemical study of soil has been retrenched. The results of the experiment for the year is presented in Table VIII.

TABLE VIII.—New rotation experiment—1951-52.
(Fifth year of trial.)

Crop experimented upon—	Variants 16—
	(1) Cotton (permanent).
Cotton K-2.	(2) Cotton and blackgram (permanent).
Cumbu K-1.	(3) Cotton followed by Irungu and indigo.
Irungu Cholam K-1.	(4) Cotton and blackgram followed by Irungu and indigo.
Field No.—20.	(5) Cotton followed by cumbu.
Previous crops—	(6) Cotton followed by cumbu and indigo.
Cotton, Irungu, cumbu in accordance with the treatments mentioned below.	(7) Cumbu (permanent).
Manure—Nil.	(8) Cumbu and indigo (permanent).
Date of sowing—4th November 1951.	(9) Cumbu followed by cotton.
Date of harvest—	(10) Cumbu and indigo followed by cotton.
Cumbu—26th February 1952.	(11) Irungu (permanent).
Irungu—1st March 1952.	(12) Irungu and indigo.
Cotton picking—24th March 1952 to 9th June 1952.	(13) Irungu followed by cotton.
Layout—Randomized blocks.	(14) Irungu and indigo followed by cotton.
Replications—4.	(15) Irungu and indigo followed by cotton and blackgram.
Size of plot—	(16) Cotton followed by Irungu.
Gross, 3.27 cents.	
Nett, 1.50 cents.	

Yield of cumbu grain, irungu straw and cotton kapas.

Treatments.	Cumbu grain.		Irungu straw.		Cotton kapas.	
	Acre yield in lb.	Percentage on control.	Acre yield in lb.	Percentage on control.	Acre yield in lb.	Percentage on control.
1	..	..	..	..	126	100
2	..	..	..	..	193	153
3	..	..	..	..	241	192
4	..	..	..	..	246	195
5	..	..	..	..	271	215
6	..	..	..	..	209	166
7	458	100	..	..	..	..
8	408	89	..	..	..	..
9	379	83	..	..	..	..
10	325	71	..	..	..	..
11	..	..	6,762	100	..	..
12	..	..	6,092	90	..	..
13	..	..	4,412	65	..	..
14	..	..	4,208	62	..	..
15	..	..	3,554	53	..	..
16	..	..	..	..	275	218
Standard error	0.80	..	10.47	..	0.61	..
Significance by 'F' test	No.	..	Yes.	..	Yes.	..
Critical difference	..	..	1,092	16	59	47
Conclusion—	11, 12, 13, 14, 15, 16, 5, 4, 3, 6, 2, 1.					

Results of the previous years.

A. Cotton.

Treatments.	Acre yield of cotton kapas in lb.		
	1948-49.	1949-50.	1950-51.*
(1)	(2)	(3)	(4)
(1) Cotton (permanent)	660	216	57
(2) Cotton + black-gram (permanent)	313	118	62
(3) Cotton after Irungu + Indigo	602	285	365
(4) Cotton + black-gram after Irungu + Indigo	351	111	330
(5) Cotton after cumbu	671	234	309
(6) Cotton after cumbu + Indigo	697	340	155
(7) Cotton after Irungu	647	231	549
Significant or not	Yes.	Yes.	Yes.
Critical difference	63	85	85
Conclusion—	6, 5, 1, 7, 3, 4, 2, 6, 3, 5, 7, 1, 2, 4, 7, 3, 4, 5, 6, 2, 1.		

B. Cumbu.

Treatments.	Acre yield of cumbu grain in lb.		
	1948-49.	1949-50.	1950-51.*
(1)	(2)	(3)	(4)
(1) Cumbu permanent	569	517	127
(2) Cumbu + Indigo (permanent)	712	563	31
(3) Cumbu after cotton	627	542	23
(4) Cumbu + Indigo after cotton	644	487	25
Significant or not	No.	No.	Yes.
Critical difference	..	..	63
Conclusion—C-3.	1, 2, 4, 3.		

C. Irungu cholam.

Treatments.	Acre yield of Irungu straw in lb.		
	1948-49.	1949-50.	1950-51.*
(1)	(2)	(3)	(4)
(1) Irungu (Permanent)	7,958	7,783	3,133
(2) Irungu + Indigo (permanent)	8,404	5,533	1,125
(3) Irungu after cotton	8,479	6,333	533
(4) Irungu + Indigo after cotton	8,983	5,750	407
(5) Irungu Indigo after cotton + Black-gram	8,283	4,583	600
Significant or not	No.	No.	Yes.
Critical difference	..	..	723
Conclusion—	1, 2, 5, 3, 4.		

* Droughty year and hence recorded poor yields.

12. *Indigo cereal mixture experiment.*—Irungu cholam produces a depressing after-effect on the succeeding crops. Previous experiments have indicated that. This bad after-effect is removed by mixing and sowing indigo with irungu cholam and ploughing-in the resultant indigo crop after the harvest of the *irungu*.

This experiment was started in the year 1947-48 to determine the seed-rate of indigo that should be used (8 and 12 lb. per acre) and the time of ploughing-in the resultant indigo crop (early in April-May or late in August-September). This experiment is being run in duplicate fields 17 and 19. During the year in field No. 17 the cereal crops were sown while in Field 19 the after-effect of the various treatments of the previous year was studied on cotton. No significant differences were found between the various treatments. This experiment was concluded in consultation with the Cotton Specialist, Millet Specialist, and the Government Agricultural Chemist as it had given the results for which the experiment was started. The results are as below. During years of drought this mixed cropping does not give any significant result. In years of normal rainfall, 12 lb. seed-rate of indigo and early ploughing-in of the resultant crop has been found to neutralize the 'cholam effect'. This experiment has been discontinued. The result of this year's trial is presented in Table IX.

TABLE IX.—Indigo cereal mixture experiment—1951-52 (fifth year of trial.)

Crops experimented upon—Irungu K-1, cumbu K-1 and cotton K. 2.	Date of harvest—
Field Nos.—17 and 19.	Irungu—16th February 1952.
Previous crops—Irungu and cumbu in field No. 19 as mentioned in the treatments; and cotton in field No. 17.	Cumbu—16th February 1952.
Manure—Nil.	Cotton picking—5th April to 15th June 1952.
Date of sowing—	Layout—Randomized plots.
Irungu—2nd November 1951.	Replications—Six.
Cumbu—2nd November 1951.	Size of plot—Gross 1.66 cents; Nett—0.75 cents.
Cotton—9th November 1951.	Variants—8.
Crop treatments.	Ploughing treatments.
1 Cholam and indigo 8 lb.	Early. Late.
2 Cholam and indigo 12 lb.	A E
3 Cholam pure	B F
4 Cumbu pure	C G
	D H

Yield of cumbu grain, irungu straw and cotton kapas.

Treatments.	Field No. 17.		Field No. 19.	
	Cumbu grain.		Irungu straw.	
	Acre-yield in lb.	Percentage on control.	Acre-yield in lb.	Percentage on control.
Early ploughing—				
A	..	..	2,544	105
B	..	..	2,511	103
C	..	..	2,428	100
D	..	..	..	..
Late ploughing—				
E	..	..	2,911	120
F	..	..	3,155	130
G	..	..	2,772	94
H	..	..	..	..
Standard error	245	84	..	..
Significance by 'F' test	..	..	403	0.33
	..	..	No.	No.

N.B.—Statistics not worked as both are the same treatment as far as cumbu is concerned.

Results of the previous years.

Treatments.	Acre yield of cotton kapas in lb.		
	1948-49.	1949-50.	* 1950-51.
I Early ploughing—			
A. 1. Irungu cholam plus indigo 8 lb.	..	..	..
B. 2. Irungu cholam plus indigo 12 lb.	..	..	..
C. 3. Irungu cholam, pure	..	..	..
D. 4. Cumbu, pure	..	..	..
II Late ploughing—			
E. 1. Irungu cholam plus indigo 8 lb.	..	..	..
F. 2. Irungu cholam plus indigo 12 lb.	..	..	..
G. 3. Irungu cholam, pure	..	..	..
H. 4. Cumbu, pure	..	..	..
Significant or Not	..	..	..

* Droughty year and hence recorded poor yields.

13. Cereal indigo mixture experiment with super-phosphate.—This experiment is a corrective experiment for the 'cholam effect' and was started in the year 1948-49. The object is to find out whether addition of super-phosphate at 30 lb. P₂O₅ per acre along with the mixed cropping of the indigo would increase the

efficiency of the indigo crop in mitigating the 'cholam effect.' Besides ammonium sulphate at 30 lb. N. level is added during the next season in one-half of each plot to the succeeding crop of cotton to study the cumulative benefit of all these treatments.

The experiment is run in two fields Nos. 17 and 29. During the year under report in field No. 17 the cereals were raised and a uniform crop of cotton was sown in field No. 29 over the entire experimental area where the cereals were raised during the previous season. In field No. 17 there was no significant difference between the pure crop and that of the mixture showing thereby that the mixture does not pull down the yield significantly.

The results of the previous years were discussed jointly with the Millet Specialist, Cotton Specialist, and the Government Agricultural Chemist, Coimbatore, and it was found that the trend of the result achieved so far indicates that the ill effect of irungu cholam on the succeeding cotton crop can be completely mitigated if P₂O₅ is applied to the irungu crop and ammonium sulphate to the cotton crop. If this finding is confirmed a very practical solution for mitigating the 'cholam effect' would be available for adoption.

The results obtained did not give any conclusive result due to the drought that prevailed. In the cereals in field No. 17 the addition of P₂O₅, although tended to increase the yield, the increase was found to be not significant. In field No. 29 the difference in yield of cotton was found to be significant in various treatments. The results show that (a) the 'cholam effect' was not felt during the current year, as cotton after irungu has given statistically equal yield as cotton after cumbu; (b) the addition of Nitrogen alone tends to give a higher yield, and a combination of Nitrogen and P₂O₅, exerts a better influence and (c) the indigo crop does not seem to increase the yield of the succeeding crop. The results are presented in Table X.

TABLE X.—Cereal indigo mixture experiment with superphosphate, 1951-52 (fourth year of trial).

Crops experimented upon—		Cotton—20th April to 7th June 1952, in field No. 29.	
Irungu K. 1 } in field No. 17.		Layout—Randomized blocks.	
Cumbu K. 1 } in field No. 29.		Replications—Four.	
Field Nos.—17 and 29.		Size of plot—Gross—4.36 acres.	
Previous crops—Irungu and Cumbu in field No. 29 as mentioned in the treatment and Cotton in field No. 17.		Net area of each (half of the plot: 1.01 acres).	
Manure—Superphosphate at 30 P ₂ O ₅ level and in field No. 17 as detailed in the treatments below and ammonium sulphate at 30 N. level in field No. 29 applied to one-half of each plot.		Variants—Ten.	
Date of sowing—2nd November 1951.		1 Sorghum plus indigo + 0 lb. P ₂ O ₅ /per acre.	
Field No. 17 on 9th November 1951.		2 Sorghum plus indigo + 30 lb. P ₂ O ₅ /per acre.	
Date of harvest—Field No. 29, 9th November 1951.		3 Cumbu plus indigo + 0 lb. P ₂ O ₅ /per acre.	
Cumbu—19th February 1952. } in field No. 17.		4 Cumbu plus indigo + 30 lb. P ₂ O ₅ /per acre.	
Irungu—20th February 1952. }		5 Sorghum only.	
		6 Sorghum plus 39 lb. P ₂ O ₅ per acre.	
		7 Cumbu only.	
		8 Cumbu plus 30 lb. P ₂ O ₅ per acre.	
		9 Indigo only.	
		10 Indigo plus 30 lb. P ₂ O ₅ /per acre.	

Yield of cumbu grain irungu straw and indigo grain in field No. 17.

Treatments.	Cumbu grain.		Irungu straw.	
	Acre yield in lb.	Percentage on control.	Acre yield in lb.	Percentage on control.
1 (a) Sorghum plus indigo + 0 lb. P ₂ O ₅ ..	..	..	3,310	103
(b) Do. do. do.	..	..	3,657	114
2 (a) Do. do. + 30 lb. P ₂ O ₅ ..	..	..	3,744	117
(b) Do. do. do.	..	..	3,855	120
3 (a) Cumbu plus Indigo + 0 lb. P ₂ O ₅ ..	232	118	..	..
(b) Do. do. do.	272	138	..	..
4 (a) Do. do. + 30 lb. P ₂ O ₅ ..	313	158	..	..
(b) Do. do. do.	322	163	..	..
5 (a) Sorghum only ..	..	..	3,205	100
(b) Do. do. do.	..	..	3,564	111
6 (a) Sorghum + 30 lb. P ₂ O ₅ ..	..	..	3,793	118
(b) Do. do. do.	..	..	3,498	109
7 (a) Cumbu only ..	198	100	..	..
(b) Do. do. do.	160	82	..	..
8 (a) Cumbu + 30 lb. P ₂ O ₅ ..	210	107	..	..
(b) Do. do. do.	210	107	..	..
9 (a) Indigo only ..	..	..	..	..
(b) Do. do. do.	..	..	..	..
10 (a) Indigo + 30 lb. P ₂ O ₅ ..	..	..	..	..
(b) Do. do. do.	..	..	..	..
Standard error	..	0.33	..	3.47
Significance by 'F' test	..	No.	..	No.

Yield of cotton in lb. —Field No. 29 (after effect of cereal Indigo experiment with superphosphate.)

Treatments.	Without nitrogen.		With nitrogen (M).	
	Acre-yield in lb.	Percentage on control.	Acre-yield in lb.	Percentage on control.
1 Sorghum plus indigo + 0 lb. P2 O5 per acre.	255	95	275	102
2 Sorghum plus indigo + 30 lb. P2 O5 per acre.	252	94	309	115
3 Cumbu plus indigo + 0 lb. P2 O5 per acre.	227	84	249	93
4 Cumbu plus indigo + 30 lb. P2 O5 per acre.	275	102	288	107
5 Sorghum only (control)	289	100	284	108
6 Sorghum 30 lb. + P2 O5	306	114	308	114
7 Cumbu only	269	100	258	95
8 Cumbu plus 30 lb. P2 O5	274	102	283	108
9 Indigo only	245	91	291	108
10 Indigo 30 lb. P2 O5	254	94	253	94
Standard error	..	0.32	..	..
Significant by 'F' test	..	Yes.	..	..
Critical difference	..	..	..	17
Conclusion—	6M, 6M, 8M, 9M, 4M, 5M, 1M, 4, 8, 5, 7, 7M, 1, 10, 10M, 2, 3M, 9, 3.			

NOTE.—M represents that half of the plot is manured with ammonium sulphate at 3° N. level.

14 (a) *Cotton mixed cropping trials.*—This experiment was laid out in 1947-48 to study the effect of growing pulses mixed with cotton. Prior trials indicated that only coriander, groundnut (bunch variety) and horsegram affected the yield of cotton the least. During the year 1950-51 the experiment was a failure and was repeated during the current year in two fields one after irungu cholam in field No. 21 and the other after cumbu in field No. 18.

Due to drought that prevailed during the year, the groundnut, horsegram and coriander did not give any yield. Although mixed cropping tended to decrease the yield of cotton the decrease in yield was found to be not significant statistically. The yield data is given in Table XI.

TABLE XI.—Cotton mixed cropping trials—1951-52 (fifth year of trial).

Crops experimented upon—		Date of harvest—cont.	
Cotton K. 2.		Picking cotton 26th March to 5th June 1952.	
Coriander, groundnut and horsegram as mixtures.		Field No. 21 Harvesting the pulses crop 12th February to 8th March 1952.	
Field Nos. 18 and 21.		Picking cotton—28th March to 10th June 1952.	
Previous crops—Cumbu in 18 and irungu in 21.		Layout—Randomized blocks.	
Manure—Nitrogen at 40 N. level.		Replications—Four.	
Date of sowing—		Size of plot—Gross 4.7 cents.	
Field No. 18 sown on 9th November 1951.		Nett—2.7 cents.	
Field No. 21 sown on 8th November 1951.		Variants—Four.	
Dates of harvest—		1 Cotton pure.	
Field No. 18 harvesting of pulses crops—13th February to 10th March 1952.		2 Cotton and groundnut.	
		3 Cotton and horsegram.	
		4 Cotton and coriander.	

Yield of cotton kapas after irungu and cumbu.

Treatments.	Field No. 18 (after cumbu).		Field No. 21 (after irungu).	
	Acre-yield in lb.	Percentage on control.	Acre-yield in lb.	Percentage on control.
1 Cotton pure (control)	380	100	222	100
2 Cotton and groundnut	331	103	212	95
3 Cotton and horsegram	308	81	165	74
4 Cotton and coriander	358	94	188	85
Standard error	..	1.18	..	0.76
Significance by 'F' test	..	No.	..	No.

(b) *Evolving a high yielding bunch groundnut variety suitable for mixed cropping with cotton.*—Cotton pulses mixed cropping trials conducted during the previous years indicated the suitability of groundnut in forming an ideal mixture with cotton as it affected the yield of cotton the least. During the year 1949-50 five selections were found to give a higher yield than the strain TMV. 2 which is usually grown as the mixed crop at this Research Station. Due to drought that prevailed during the year 1950-51 the economics of the five selections picked out could not be evaluated. This necessitated the trial to be repeated, during the year

1951-52 in observation plots of 4 cents each. The crop was sown during November 1952 and was manured with a mixture of ammonium sulphate and groundnut cake at 30 lb. N. level. During the year also the crop was almost a failure and the yield data is presented below.—

Selection number.		Calculated acre yield of pods.	
		LB.	
1 A.H. 4111		..	50
2 A.H. 6481		..	43
3 A.H. 4218		..	44
4 TMV. 2 (control)		..	38
5 A.H. 4515		..	25

15. *Borax experiment on cotton.*—This experiment was started in the year 1948-49 to find out whether application of Boron would give increased yields of cotton. Doses of 10, 20, 30 and 40 lb. of Boron was applied in the form of boric acid with no Boron as control. The three previous years' trials did not show any significant increase in the yield of cotton. The trial during the current year also was in line with the previous years' findings that Boron has no effect in increasing the yield of cotton in the black-soils of Koilpatti under rainfed conditions. This experiment has been discontinued. The result is presented in Table XII.

TABLE XII.—Borax experiment on cotton (third year of trial).

Crop experimented upon—Cotton K-2.		Layout—Randomized blocks.	
Field No.—29.		Replications—Four.	
Previous crop—Cotton.		Size of plot—Gross—1.65 cents.	
N.B.—The experiment was laid in the same dose of Boron applied to the plots as in the previous year to study the cumulative benefit if any.		Net—0.75 cents.	
Manure—Borax in the form of boric acid.		Variants—Five.	
Date of sowing—9th November 1951.		A. 0 lb. of borax per acre.	
Date of harvest—31st March to 15th June 1952.		B. 10 lb. Do.	
		C. 20 lb. Do.	
		D. 30 lb. Do.	
		E. 40 lb. Do.	

Yield of cotton kapas.						Acre-yield in lb.	Percentage on control.
Treatment.							
A 0 lb. of borax per acre	..	..	..	..	..	233	100
B 10 lb. do.	..	..	..	..	..	268	115
C 20 lb. do.	..	..	..	..	..	251	108
D 30 lb. do.	..	..	..	..	..	310	133
E 40 lb. do.	..	..	..	..	..	236	102
Standard error	..	..	..	..	..	0.29	..
Significant by 'F' test	..	..	..	..	..	No.	..
Note.—1 lb. of borax = 2/3 lb. of boric acid.							

Results of the previous years.

Treatments.	Acre yield of cotton kapas in lb.		
	1948-49.	1949-50.	1950-51.*
A. 0 lb. boric acid/acre	364	463	70
B. 10 lb. do.	420	524	65
C. 20 lb. do.	405	537	91
D. 30 lb. do.	368	540	93
E. 40 lb. do.	360	580	91
Significant or not	No.	No.	No.

* Droughty year and hence recorded poor yields.

III. MISCELLANEOUS STUDIES.

A. Rainfed-crops.

16. *Safflower.*—Five types of Safflower C.T. 11, C.T. 38, C.T. 60, C.T. 63 and C.T. 66 were sown in an area of 10 cents each in field No. 21 during the second week of November 1950. The crop came up well and in spite of the late-sowings

and the drought that prevailed in the tract, it has given the following encouraging yields. The seed-rate used was 10 lb. per acre and the crop was not manured.

Selection number.	Calculated acre yield. LB.
1 C.T. 66	630
2 C.T. 11	458
3 C.T. 63	415
4 C.T. 60	393
5 C.T. 38	385

Regarding the previous trial of the crop these five selections gave only yields ranging from 14 to 29 lb. during the year 1950-51 as the year was very droughty. During the year 1949-50 only C.T. 63 was tried which gave an acre yield of 625 lb. of grain per acre.

17. *Blackgram*.—Selection No. 212 from the Pulses Specialist, was tried during the current year over an area of 10 cents and gave a calculated acre yield of 37 lb. per acre. The low yield is only due to the drought of this season. The crop was manured with ten cart-loads of farm-yard manure per acre and the seed-rate used was 8 lb. per acre.

18. *Greengram*.—Selection No. 62 received from the Pulses Specialist was grown on area of 10 cents. This crop was also affected adversely by the drought and gave a calculated acre yield of 88 lb. per acre. The crop was sown during the second week of November. The seed-rate used was 8 lb. per acre and the field was manured with ten cart-loads of farm yard-manure per acre.

19. *Bengalgram*.—Two selections from the Pulses Specialist, N.P. 2 and No. 482 were sown in two cents observation plots mixed with cotton in field No. 21. The crop was sown during the second week of November and was not manured. The seed-rate used was 15 lb. per acre. The crop had a good germination but could not stand the drought of the season and completely failed.

20. *Paddy varieties*.—Two selections of semi-dry paddy TKM. 1 and TKM. 2 from Tirurkuppam Research Station were sown in the black-soil along with a dry-land variety of paddy from Ramanathapuram which is called by the name Kuliadichan. During this year also the crop was a total failure due to the drought that prevailed in the tract.

B. Irrigated Crops.

21. *Sweet potato*.—The three economic local types of sweet potato were again studied in observation plots during the year under report along with nine selections received from the Paddy Specialist, Coimbatore. The yield behaviour of all the selections is given below. The area occupied by each variety was one cent and the cuttings planted on 19th September 1951. The manure applied was 40 cart-loads of farm-yard manure per acre.

Sweet Potato Trials (Agricultural Research Station, Koilpatti).

Serial number and Name of variety. (1)	Calculated acre yield of tubers in lb..			
	1948-49. (2)	1949-50. (3)	1950-51. (4)	1951-52. (5)
1 Bhadrakali light purple	12,455 *	25,812	11,159	16,167
2 Seelanthi Chuvalai	28,206	25,101	10,449	13,410
3 Bhadrakali deep orange	..	21,703	10,254	12,469
4 B. 219	..	..	8,262	14,721
5 V. 2	..	..	..	13,017
6 V. 12	..	..	..	11,963
7 B. 196	..	..	11,589	9,876
8 V. 6	..	..	..	7,653
9 I.B. 22	..	..	..	5,402
10 V. 10	..	..	..	3,864
11 B. 4304	..	..	3,535	2,438
12 B. 4004	..	..	5,321	1,684

* Impure bulk.

The above table indicates that Bhadrakali light purple has maintained a high yield consistently and can be distributed as the variety of the tract. Among the new types tried B. 219 and V.2 have given encouraging results and have to be tested further.

22. *Potato*.—Twenty-nine types of potato sent by the Director, Potato Research Institute, Patna, were tried in small plots 9' x 1' 6" (ten tubers planted in rows 1' 6" apart with 9" distance from tuber to tuber). The crop was sown on 6th November 1951 and harvested on 13th January 1952 and was manured with 336 lb. in each of ammonium sulphate and superphosphate. The crop was constantly sprayed with D.D.T. and Bordeaux mixture to keep the plants free from pests and diseases. The yield details of the 29 types are as below :—

Potato trials.			
Serial number and name of type.	Calculated acre yield of tubers in lb.	Serial number and name of type.	Calculated acre yield of tubers in lb.
1 Alpha	11,093	16 Darjeeling Red round ..	4,437
2 Eignheiner	10,689	17 O. N. 1193	3,832
3 S. Chacouse	10,084	18 O. N. 2145	3,630
4 Erd-gold	9,681	19 Ideal	3,429
5 Sneewer S. 56	5,245	20 O. N. 1202	3,429
6 Voran	8,471	21 Ari	3,429
7 O. N. 2236	6,656	22 Sathai	3,227
8 Craig's defiance	6,454	23 Hybrid 27	2,652
9 O. N. 2186	6,454	24 O. N. 1219	2,420
10 Delware	6,454	25 Lambri	2,017
11 Saskia	5,849	26 Sirteema	2,017
12 Industrie	5,849	27 Up-to-date	1,815
13 O. N. 249	5,042	28 O. N. 1996	1,412
14 Bintje	5,042	29 O. N. 2878	101
15 Furor	4,840		

A study of this yield behaviour indicates that certain types of potato might prove economic even under Koilpatti conditions. Fresh seeds of all the types that have given good yield would be obtained from the Director, Potato Research Institute, Patna, and tried during the ensuing season.

23. *Brinjal*.—Three economic selections Nos. 108, 67 and 99 were tested in observation plots of three cents each. The local mixture was used as control. Two selections from Wynaad, Wynaad 1 and 2 were also included in the trial. The crop was manured with farmyard manure at 40 cart loads per acre. The crop was sown in nursery on 12th November 1951, was transplanted on 9th December 1951 and were pulled out on 4th June 1952. The acre yield is given below :—

Serial number and selection number.	Number of picking.	Calculated acre yield of tender fruits in lb.
1 Koilpatti 67	9	28,642
2 Do. 108	9	28,327
3 Do. 99	9	21,800
4 Local mixture	10	19,675
5 Wynaad 2	8	5,256
6 Do. 1	9	5,050

The above table shows that the local selections Nos. 67 and 108 have a bright future in the tract and all to be tested in district trials.

24. *Chillies*.—Five economic selections from Guntur were tried in observation plots. The local was the control and each plot occupied an area of three cents and was given manures at 40 cart-loads of farm yard manure per acre. The crop was sown on 27th September 1951, was transplanted on 4th November 1951 and was pulled out on 8th April 1952. It was observed that the Guntur selections were

earlier than the local by nearly one month and this accounted mainly for their reduced yields. They may prove useful in places where there is scarcity of water. The yield behaviour is given below :—

Serial number and selection number.	Number of picking.	Calculated acre yield in lb.
1 Local	8	6,183
2 Bogra	5	3,229
3 G. 1	5	2,258
4 No. 1402	5	2,213
5 Kendavapura Duba	5	1,667

27. *Fodder grasses*.—Permanent fodder grasses under irrigation were studied for the fourth year in succession. A total area of 58 cents was occupied by these grasses and the yield data is given below :—

Serial number and name of grass	Acre yield of grass in lb.	Number of cuttings.
1 Kolukkattai grass (<i>Cenchrus ciliaris</i>)	92,550 *	10
2 Buffalo grass (<i>Bracharia mutica</i>)	99,825	9
3 Guinea grass (<i>Panicum maximum</i>)	91,495	11
4 Australian grass (<i>Panicum antidotale</i>)	61,733	9

* The grass had to be renovated during the year under report and missed one cutting.

Besides the four grasses two other economic grasses Blue buffel (*Cenchrus ciliaris*) and Gautemala grass (*Tripascum laxum*) were also tried in observation plots and recorded an acre yield of 60,120 lb. and 72,010 lb., respectively.

26. *Fruit trees*.—In the small orchard area (0.27 acre) in Field No. 5 twelve Sathugudi, nine acid limes and three lemons and one Hawaiian citron have established well. One Nepali lemon and the Hawaiian citron have come to full bearing.

27. *Cattle*.—Three breeding bulls, two Scindhi and one Murrah buffalo were maintained throughout the year. The Scindhi bulls Nos. 44 and 337 made 118 services (50 and 68 respectively) and of these 108 were on outside animals. The Murrah buffalo performed 189 services on outside animals. There were five cows in milk by the end of the year. A total 14,052 lb. of milk was received working out to an average of 7.7 lb. per cow per day. A maximum yield of 16.0 lb. per day was recorded by cow No. 6. There were fourteen calves at the beginning of the year and six were born during the year making the total to twenty. Of these three calves were sold and two reached the adult stage. There were six pairs of works bullocks at the beginning of the year and one pair was purchased during February 1952 making the total to seven at the close of the year.

28. *Poultry*.—Only one breed of poultry was maintained. The Rhode Island Red breed was continued to be maintained. A flock of four cocks and 20 hens were maintained and 2,681 hatching eggs were distributed during the year. The average laying per bird was 162 eggs per year.

The hybrid birds of the cross between the Rhode Island Red and the Indian game bird have given encouraging results. The cocks and the hens weighed on an average 7 and 5 lb. respectively, thus recording a higher body weight than both the parents. Regarding their laying capacity seven hybrid hens which commenced to lay only during January and February have laid an average of 80 eggs for the six months which works out to 160 per year which is the same as that of the Rhode Island Red breed. Besides, they have not exhibited the brooding habit. An F. 2 generation is being raised to fix a hardy egg-cum-meat production breed suitable for South Indian conditions.

29. *Increasing the income of the station*.—The Agricultural Research Station, Koilpatti, has been in existence for the past fifty years. It consists of two blocks,

the black-soil (106 acres) and the red-soil block (11.2 acres). Steps taken during the current year for increasing the income are given below :

I. *Improvement of irrigation facilities*.—(a) *Red soil area*.—A beginning was made by increasing the water-supply by tapping water directly from the bore-hole in well No. 9. By this method (which was suggested by the Director of Agriculture) a continuous supply of water can be obtained for all the 24 hours giving a discharge of nearly 3,600 gallons of water per hour. Previously the well was able to command about 1½ acres during the summer. After the pumping was taken up directly from the bore-hole an area of nearly 5 acres is being commanded by this in garden lands. The Director of Agriculture has ordered a wider bore-hole to be driven to augment the supply as soon as departmental boring set is available. Besides a place has been marked by the Director of Agriculture which is expected to give copious supply of water and a bore-hole will be drilled as soon as the departmental boring set is made available. By this, the entire red soil area of 11 acres can be converted into garden lands.

(b) *Black-soil area*.—In the black-soil area a trial well was dug on the spot fixed by the Director of Agriculture. A depth of 32 feet was excavated. A good supply of water was tapped but the water was found to be brackish. It has been seen in the wells round about that even in black-soils when a spring is tapped after a hard granite layer, it is found to contain invariably sweet water. Till the 32nd feet depth no hard granite layer was met with. The Director of Agriculture has ordered the work to be stopped and a bore-hole to be drilled as soon as the departmental boring set is made available. As per the Director of Agriculture's orders, an area of nearly 1½ acres is being cultivated with the help of the water obtained at the present from this trial well. This also is bound to step up the income received.

II. *Raising live fence*.—In the red soil area a live fence of *Prosopis juliflora* existed in more than half the length of the borders. The live fence was completed and gaps were filled. Due to drought that prevailed during the year the plants are stunted. They are expected to shoot up during the north-east monsoon rains and give a fence all round the red soil area.

In the black-soil area, no live fence existed and *Prosopis juliflora* was sown all round the 2 mile border of this block. Due to drought all the seedlings are stunted but the plants are expected to shoot up during the ensuing north-east monsoon rains. It is expected that a formidable live hedge would be made in the course of three years with the help of this hedge plants.

III. *Adjusting cropping programme so as to reduce fallows*.—In the garden land area, at no time a land was allowed to remain fallow during the year 1951–52 and the cropping scheme for the year 1952–53 has also been formulated on the same basis. When the interval was too short to raise any grain or money crops the land was sown with quick growing green manure and the resultant crop ploughed in. In dry land only a single crop can be grown. Hence to increase the income from this area, a larger area of the money crop, cotton, was grown.

IV. *Miscellaneous*.—The yield of the entire cropping has been increased by judiciously increasing the manuring. A quantity of 58,238 lb. of green leaves were collected and composted. Besides more than 1,000 cart-loads of tank silts were collected and were applied to the fields direct or along with the compost. It is proposed to keep up this drive during the succeeding years also.

In the black-soil area cotton crop is receiving nitrogenous manures for the past three years in the form of ammonium sulphate or groundnut cake at 40 lb. N. level per acre. It has been found in experiments and in practice that this 40 lb. nitrogen gives an increased yield of nearly 37 per cent of cotton kapas besides increasing the yield of the subsequent millet crop by nearly 20 per cent. By this manuring also, which is a new practice the income has been stepped up.

In spite of all these methods the increase in income is not marked as the year was a droughty one. The crops in the garden and area did not get adequate irrigation and the crops in the rainfed area were partial failures.

30. *General*.—Seeds of improved strains were distributed from this station and the details are presented in Appendix I. The economics of the three principal crops of the station is presented in Appendix II. It will be seen from the appendix that Irungu cholam has given a fair profit during this droughty year. The cotton did not give a good yield as many of the bolls were shed during April rains. The financial statement of this Research Station for the year under report is given in Appendix III.

AGRICULTURAL RESEARCH STATION, KOILPATTI,
12th September 1952.

B. W. X. PONNAIYA,
Superintendent.

(Controlling Officer.)

T. S. FRANCIS,
Deputy Director of Agriculture, Madurai.

APPENDIX I.

SEEDS AND PLANTS DISTRIBUTED DURING 1951-52.

Serial number and description.		Quantity.
I. SEEDS—		
A. Cotton—		
Strain K. 2.	.. .. .	LB. 5,583
B. Millets—		
(a) Vellai cholam—K. 2 cholam	.. .. .	1,366
(b) Irungu cholam—K. 1 cholam	.. .. .	1,585
(c) Rainfed cumbu—Cumbu K. 1	.. .. .	3,782
(d) Irrigated ragi strain—Ragi K. 1	.. .. .	2,530
C. Vegetables		23 lb. and 916 packets.
D. Miscellaneous—		
(a) Prosopis seed	.. .. .	467
(b) Kapok seed	.. .. .	7
(c) Papaya seed	.. .. .	7,470
II. GRASS SLIPS—		
(a) Guinea grass slips	.. .. .	4,540
(b) Buffalo grass slips	.. .. .	250

APPENDIX II.

COST OF CULTIVATION AND PROFITS REALIZED PER ANNUM OF THE PRINCIPAL CROPS.

Serial number and name of the crop.	Cost of cultivation per acre.	Value of the produce per acre.	Profit.	Loss.
	RS.	RS.	RS.	
1 Karunganni cotton	83	101	18	..
2 Cumbu	29	30	1	..
3 Irungu cholam	43	64	21	..

The cumbu and Karunganni cotton recorded very poor yields due to drought.

APPENDIX III.

STATEMENT OF CHARGES AND RECEIPTS (JULY 1951-JUNE 1952).

Receipts.

	RS.
Agriculture—Agricultural Stations—	
Agricultural stations	4,656
Sale of lint and seed	7,624
Miscellaneous	331
Rent on building	29
Recovery of over payments	..
Total	12,640

Charges.

40-C. Agriculture—Agricultural Experimental Farms—	
A. Agricultural stations—	
Pay and allowances of staff—	
Pay of officer and staff—	
Permanent	9,288
Temporary	938
Allowances—	
Dearness allowance	3,415
Travelling and other compensatory allowances	1,003
Total	14,644
Contingencies—	
Capital outlay	2,966
Working expenses	20,980
Dearness allowance to menials	4,325
Other contingencies	864
Petty construction and repairs	2,796
Total	31,931
50. D. Civil works—	
Taxes and annual repairs to residential buildings	243

ANNUAL REPORT OF THE RICE RESEARCH STATION, AMBASAMUDRAM, FOR 1951-52 (FASLI 1361).

This is the fifteenth annual report of the Rice Research Station, Ambasamudram, relating to the fasli year 1361 (1951-52).

2. *Season.*—The year under report recorded 35.31 inches of rain in 59 rainy days as against the preceding year's rainfall of 43.18 inches in 54 rainy days and the ten-year average of 40.65 inches in 58.8 rainy days. The rains received during the south-west monsoon were 4.9 inches in 14 rainy days and this quantity was more than previous year's rainfall and the ten-year average for the south-west monsoon by 2.14 inches and 1.99 inches respectively. The 22.71 inches of rain in 36 rainy days recorded during the north-east monsoon were less than the north-east monsoon rains recorded in the previous year and the ten-year average by 8.03 inches and 4.72 inches respectively. Again, the summer months of 1951-52 recorded 7.69 inches in 9 rainy days, which were less than the preceding year's rainfall and the ten-year average by 2.61 inches and 7.71 inches respectively. The receipt of less rains in the north-east monsoon and more rains in the south-west monsoon than the normal was not felt in any way, while the lesser rains recorded during the summer months were reflected in the relatively poorer preparation of the lands for the *Kar* crop in the coming year. The water-supply in the channel was steady, ample and uninterrupted throughout the year. On the whole, the year 1951-52 can be said to be normal as far as paddy cultivation in and around the Rice Research Station, Ambasamudram, was concerned. The rainfall data are given in Table I.

TABLE I.—*Rainfall statement.*

TABLE 1.—Rainfall statement.							
		1951-52.		1950-51.		Average of past ten years.	
Month.	Week.	Rain in inches.	Rainy days.	Rain in inches.	Rainy days.	Rain in inches.	Rainy days.
South-west monsoon.							
June	7-13	1.07	4	0.86	2	0.49	1.5
	14-20	0.49	1	..	..	0.10	0.3
	21-27	0.50	1	..	..	0.26	0.8
June-July	28-4	..	..	0.12	1	0.22	0.5
	5-11	..	..	..	..	0.16	0.6
	12-18	..	..	..	..	0.13	0.3
July-August	19-25	0.84	4	0.30	3	0.14	1.0
	26-1	0.08	..	0.43	3	0.13	0.7
	2-8	..	..	0.45	2	0.20	0.5
	9-15	..	..	..	..	0.07	0.4
	16-22	..	..	..	..	0.08	0.3
August-September	23-29	..	..	..	..	0.11	0.5
	30-5	..	..	..	..	0.13	0.3
	6-12	..	..	0.58	2	0.12	0.5
	13-19	0.57	2	0.03	..	0.18	0.4
	20-26	1.36	2	..	..	0.40	0.6
Total for the south-west monsoon		4.91	14	2.77	13	2.92	9.2
North-east monsoon.							
September-October	27-3	4.70	5	1.01	2	0.44	0.9
	4-10	..	..	0.33	1	0.50	0.8
	11-17	..	..	3.98	2	1.72	2.2
	18-24	1.72	4	0.32	1	1.92	2.3
	25-31	0.16	1	0.05	..	2.34	2.5
November	1-7	0.74	3	..	..	1.74	2.6
	8-14	7.03	6	3.82	4	3.33	3.6
	15-21	1.65	3	2.61	3	3.21	3.6
	22-28	1.03	2	0.26	1	1.78	2.8
	29-5	1.71	3	..	..	1.92	2.5
November-December.	6-12	..	..	0.29	1	1.80	1.9
	13-19	0.41	3	9.86	3	2.50	2.5
	20-26	..	..	4.15	2	1.04	1.4
	27-3	0.41	1	0.03	..	0.81	1.0
December-January	4-10	2.51	3	0.35	1	0.64	1.1
	11-17	..	..	3.53	2	0.74	1.0
	18-24	0.46	1	0.15	1	0.14	0.5
	25-31	0.18	1	..	..	0.77	1.6
	Total for north-east monsoon		22.71	36	30.74	24	27.48	34.2

Month.	Week.	1951-52.		1950-51.		Average of past ten years.	
		Rain in inches.	Rainy days.	Rain in inches.	Rainy days.	Rain in inches.	Rainy days.
Hot weather period.							
February	1-7	..	..	..	..	0.21	0.8
	8-14	..	..	..	..	0.36	0.5
	15-21	0.55	1	..	..	0.65	0.7
	22-29	0.38	2	..	..	0.56	0.9
March	1-7	..	..	0.39	1	0.32	0.6
	8-14	..	..	..	..	0.10	0.3
	15-21	0.30	1	..	..	0.65	0.9
	22-28	..	..	0.77	1	0.65	0.8
March-April	29-4	..	..	0.52	2	1.23	1.4
	5-11	0.53	1	0.75	2	0.81	1.9
	12-18	5.43	3	3.99	4	1.58	1.7
	19-25	..	..	0.16	1	0.28	0.6
April-May	26-2	..	..	0.32	1	0.11	0.4
	3-9	..	..	0.91	2	0.48	0.7
	10-16	..	..	0.19	1	0.41	0.6
	17-23	..	..	0.02	..	0.42	0.7
May-June	24-30	0.50	1	0.07	..	0.77	0.8
	31-6	..	..	1.58	2	0.71	1.6
Total for hot weather period ..		7.69	9	9.67	17	10.30	15.4
Grand total for the year ..		35.31	59	43.18	54	40.65	58.8

3. *Paday*—*Kar* or *first crop*.—As usual, water was received in the irrigation channel on the first of June 1951 and sowings for the *Kar* or first crop were started on the second of June in the area that was kept well prepared and manured. This nursery area received cattle manure at 10,000 lb. per acre as basal dressing and the seedlings raised therein were top dressed with ammonium sulphate at 100 lb. per acre about ten days before they were pulled out. The sowings were brought to a close on the 17th of June 1951. On the whole, 1,077 beds, including experimental lots, were sown in nine batches. The transplant fields, wherein no green manure crop was grown, were given two ploughings with iron (Cooper 11) plough and four to six ploughings with the wooden plough before water was let in and green leaf at 4,000 lb. per acre was trampled in. The fields, wherein green manure was grown, were given two wet ploughings with Cooper 11 iron plough, worked once with puddling implement and green leaf at 6,000 lb. per acre was trampled in. In addition to the green leaf, all the fields received superphosphate at 100 lb. per acre at planting and a top dressing of ammonium sulphate at 100 lb. per acre, in two doses, about 30 days and 45 days after planting. The *Kar* plantings were started on the 28th of June 1951 and finished on the 28th of July 1951. The various items that were planted during the *Kar* or first-crop season were as follows:—

Particulars.	Number of units planted.
Comparative yield trials	196
Single plant selections, seed multiplication lots and type collections	916
Manurial and cultural experiments	134
Observation plots	14
Bulks	11
Total ..	1,271

The acre yields recorded from the bulk crops during the *Kar* or first-crop season are given in Table II.

TABLE II.—Yield of strains in bulk fields.

Variety or strain.	Area planted in acres.	Acre yield in pounds.	
		Average.	Maximum.
ASD. 1	5.19	3,519	4,234
ASD. 2	0.54	2,556	2,556
ASD. 3	0.24	3,384	3,384
ASD. 7	0.57	3,426	3,426
ASD. 8	0.47	3,008	3,008
ASD. 9	0.48	2,975	2,975
Co. 13	0.54	3,509	3,509
Co. 23	0.26	3,891	3,891
Basumathi	0.35	2,617	2,617
Total area including that occupied by experiments.	12.09	3,114	..

(a) *Pure line selection work*—(1) *Seenganni*.—The 212 single plant selections that were made during the preceding year were in study plots with ASD. 8 as the standard. Based upon the performance of these, 97 selections were taken for further work in the next year, discarding the rest.

(2) *Maikuruvai*.—From among the 163 single plant selections that were made in the last season, and which were now grown in study plots, 49 selections were chosen for further work in the coming year.

(3) *Banku*.—In 1950-51, about 350 single earhead selections were brought from Srivilliputtur, in addition to bulk samples from four different villages of the same taluk. The bulk samples were put under an yield trial and there was no difference among the various samples. These bulk samples as well as the single earhead selections were grown separately and from them 248 and 63 single plants respectively were selected for further work.

(b) *Observation of a variety of paddy from Araku valley*.—A new variety of paddy by name *Ninnidhan* was grown side by side with the local first crop varieties (ASD. 1, 2 and 3). The duration of this *Ninnidhan* was more than that of ASD. 1, ASD. 2 and ASD. 3 by about 21 days, 25 days and 7 days, respectively. Thus it was found not suitable for growing in this locality in the first crop season. The yield of *Ninnidhan* could not be recorded as the crop had to be cut down before it matured in order to prepare the field for the second crop. In grain size, duration and vegetative characters, it resembled *Jeeragasamba*.

(c) *Hybridization work*—(1) *Yield trial with the cross progenies of ASD. 1 and other local short-duration varieties*.—Twelve selections from among the progenies of (multiple) crosses between the local varieties were put under comparative yield trial in two series and the data recorded are given in Table III.

TABLE III.—Yield trial with ASD. 1 cross-progenies.

Sown—11th June 1951.
Planted—7th July 1951.
Harvested—13th October 1951.

Plots—20' x 4'.
Planting—6" x 6"
Layout—7 x 4 randomized blocks.

Cultures.	Acre yield in pounds.	Yield expressed as		Flowering duration in days.
		Per cent on standard.	Per cent on mean.	
(1)	(2)	(3)	(4)	(5)
9695	3,718	102.2	106.8	79
9698	3,918	107.7	112.6	83
9707	3,321	91.3	95.4	81
9713	3,475	95.5	99.8	79
10646	3,121	85.8	89.6	77
10700	3,203	88.0	92.0	77
ASD. 1	3,638	100.0	104.4	83
Mean	3,482	95.7	100.0	..
Standard error	114	Satisfied.	8.274	..
Critical difference (P = 0.05)	339	9.811	9.725	..

Cultures.	Acre yield in pounds.	Yield expressed as		Flowering duration in days.
		Per cent on standard.	Per cent on mean.	
(1)	(2)	(3)	(4)	(5)
9886	4,361	113.0	107.1	81
10623	4,302	111.5	105.6	83
10648	4,081	105.7	100.2	83
8316/2	4,155	107.0	102.0	83
10100	3,807	93.7	93.5	83
10186	3,963	102.7	97.3	83
ASD. 1	3,859	100.0	94.0	88
Mean	4,072	105.5	100.0	..
'Z' test		Not sat. sfed.		
Standard error	158	4.105	3.89	..
Conclusion—(for the first set only).				
9698, 9.95, ASD. 1, 9713, 9707, 10700, 10646.				

In the first group, none was better than the standard and the results from the second series did not satisfy the 'Z' test. From the above, six selections that happen to be earlier than ASD. 1 will be compared against ASD. 7 in the next season, even though their yields happen to be not better than the standard ASD. 1.

(2) *Yield trial with the two hybrid cultures (3798 and 3800) from Coimbatore.*—The two hybrid selections, 3798 and 3800, received from the Paddy Specialist, Coimbatore, were compared with ASD. 1 and ASD. 7, for the second time, with the object of seeing whether these selections show less of unsetting than ASD. 1 and consequently more yield. The hybrids are from the following multiple crosses, made for improving the defective filling noticed in ASD. 1. Selection 3798 and 3800 are (1055 × 1205) × (1872 × 1055) × (1055 × 2104) × (1946 × 1055).

- 1055—Kar samba red (ASD. 1).
- 1205—Kar samba red early.
- 1872—Kar samba white.
- 1946—Kar samba white (ASD. 2) and
- 2104—Katti samba.

The results recorded from the yield trial are presented in Table IV.

TABLE IV.—Yield trial of kar hybrid cultures.

Variants.	Acre yield in pounds.	Yield expressed as			Flowering duration in days.
		Percentage on ASD. 1.	Percentage on ASD. 7.	Percentage on mean.	
3798	3,177	97.1	92.4	96.0	79
3800	3,350	102.3	97.4	101.3	77
ASD. 1	3,272	100.0	95.2	98.9	79
ASD. 7	3,438	105.1	100.0	103.9	75
Mean	3,309	101.1	96.4	100.0	..
'Z' test		Not satisfied.			
Standard error	74	2.273	2.163	2.248	..

The number of unset grains in each earhead was recorded, taking 200 earheads, at random, and the percentage of unsetting was worked out for each of the variants and they are as follows:—

Variants.	Mean per cent of unsetting.	'Z' test.	Standard error.	Critical difference.
3798	19.3 ± 0.943	Satisfied.	1.51	3.0
3800	18.0 ± 0.810	..	..	..
ASD. 1	15.1 ± 0.625	..	..	..
ASD. 7	15.8 ± 0.795	..	..	..

Conclusion—ASD. 1, ASD. 7, 3800, 3798.

In the preceding year, so far as yield was concerned, the results satisfied the 'Z' test and 3798 and 3800 were on a par with ASD. 1. The unsetting in 3798 and 3800 was definitely less than that noticed in ASD. 1 or ASD. 7. As there is

considerable difference between the results recorded in these two consecutive years, the trial will be repeated for one more season.

(3) *Yield trial with ASD. 1 × ASD. 3 cross progenies.*—Fourteen selections from among these cross progenies were under comparative yield trial with ASD. 1 and ASD. 3 as standards in two groups and the data that were gathered are presented in Table V.

TABLE V.—Yield trial of ASD. 1 × ASD. 3 cross progenies.

Selections.	Acre yield in pounds.	Yield expressed as			Flower- ing duration in days.
		Percentage on ASD. 1.	Percentage on ASD. 3.	Percentage on mean.	
(1)	(2)	(3)	(4)	(5)	(6)
7796	2,859	95.8	91.9	101.4	89
7802	2,873	96.4	92.5	102.1	86
7863	2,830	94.8	90.9	100.3	83
7867	2,703	90.5	86.8	95.9	83
7871	2,752	93.5	89.7	99.0	81
7906	2,819	94.5	90.5	100.0	83
10965	2,419	82.1	77.8	85.2	86
ASD. 1	2,844	100.0	95.9	105.9	77
ASD. 3	3,113	104.2	100	110.4	..
Mean	2,819	94.5	90.6	100.0	..
'Z' test			Sat. sfed.		
Standard error	85.8	3.009	2.837	3.186	..
Critical difference (P = 0.05)	262	8.782	8.425	9.296	..
7639	2,893	90.1	100.0	103.9	75
7815	2,400	75.0	82.8	86.0	77
7826	2,781	86.9	95.9	99.6	77
7914	2,439	76.2	84.2	87.4	77
7929	2,917	91.2	100.7	104.6	83
10804	2,732	85.4	94.3	97.9	83
10981	2,849	89.0	98.3	102.1	79
ASD. 1	3,200	100.0	110.4	114.7	79
ASD. 3	2,893	90.6	100.0	103.9	9.5
Mean	2,790	87.2	92.3	100.0	..
'Z' test			Satisfied.		
Standard error	80.2	2.507	2.768	2.875	..
Critical difference (P = 0.05)	234	7.314	8.070	8.389	..

Conclusions—

I series—ASD. 3, ASD. 1, 7802, 7796, 7863, 7906, 7871, 7867, 7815.

II series—ASD. 1, 7929, 7639, ASD. 3, 10981, 7826, 10804, 7914, 7815.

The results of the shedding tests conducted with these 14 selections are presented in Table VI.

TABLE VI.—Shedding in ASD. 1 × ASD. 3 progenies.

Selections.	Mean per cent of shedding.	'Z' test.	Standard error.	Critical difference
7796	13.4 ± 0.3905	Satisfied.	0.78	1.5
7802	17.1 ± 0.4639			
7863	13.4 ± 0.3475			
7867	10.5 ± 0.3548			
7871	11.8 ± 0.3526			
7906	11.2 ± 0.3548			
10965	12.7 ± 0.3296			
7639	10.9 ± 0.3357			
7815	10.5 ± 0.3603			
7826	13.5 ± 0.3448			
7914	8.1 ± 0.2720			
7929	12.0 ± 0.4357			
10804	13.9 ± 0.2602			
10981	15.1 ± 0.3352			
Conclusion—				
7796, 7802, 7863, 7867, 7871, 7906, 7914, 7929, 10965, 7796, 7863, 7826, 10804, 10981, 7802.				

It is seen that none of the above 14 cultures has yielded more than either of the standards even though there are variations in the shedding nature among them.

(d) *Manurial experiments—(1) Fused phosphate experiment.*—This experiment was started in the Kar or first crop season of 1950-51 with the object of

comparing the new form of phosphatic fertilizer supplied by Messrs. Parry & Co., with the ordinary superphosphate. The data collected are presented in Table VII.

TABLE VII.—Trial of fused phosphate.

Treatments—						
1	No manure (control).					
2	Green leaf (daincha) at 2,500 lb. per acre.					
3	Ammonium sulphate to supply 30 lb. N per acre.					
4	Green leaf 2,500 lb. and ammonium sulphate to supply 30 lb. N per acre.					
5	Green leaf 2,500 lb. and superphosphate to supply 30 lb. phosphoric acid per acre.					
6	Green leaf 2,500 lb. and fused phosphate to supply 30 lb. phosphoric acid per acre.					
7	Ammonium sulphate to supply 30 lb. N superphosphate to supply 30 lb. phosphoric acid per acre.					
8	Ammonium sulphate to supply 30 lb. nitrogen and fused phosphate to supply 30 lb. phosphoric acid per acre.					
9	Green leaf 2,500 lb., ammonium sulphate to supply 30 lb. nitrogen and superphosphate to supply 30 lb. phosphoric acid per acre.					
10	Green leaf 2,500 lb., ammonium sulphate to supply 30 lb. nitrogen and fused phosphate to supply 30 lb. phosphoric acid per acre.					

Sown on—4th June 1951.
Planted on—8th July 1951.
Harvested on—12th October 1951.

Plots—25' x 13'.
Planting—6" x 6" (doubles).
Layout—10 x 6 randomized blocks.

Treatment.	Acre yield in lb.		As percentage on control.		As percentage on mean.	
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	2,092	1,925	100.0	100.0	84.9	88.8
2	2,105	2,048	100.6	106.4	85.4	92.3
3	2,641	2,316	126.2	120.3	107.1	104.4
4	2,711	2,486	129.5	129.2	109.9	112.1
5	2,206	2,060	105.4	104.2	89.5	90.2
6	2,178	1,970	104.1	101.3	88.4	87.9
7	2,589	2,343	123.7	121.7	105.0	105.0
8	2,715	2,339	129.7	121.5	110.1	105.4
9	2,661	2,292	127.2	119.1	107.9	103.3
10	2,752	2,489	131.5	129.3	111.6	112.2
Mean	2,465	2,218	117.9	115.3	100.0	100.0
'Z' test			Satisfied.			
Standard error	59.7	71.1	2.86	3.70	2.42	3.21
Critical difference (P=0.05)	173	206	8.29	10.73	7.02	9.31

Conclusion—Grain 10, 8, 4, 9, 3, 7, 5, 6, 2, 1.

Straw 10, 4, 7, 8, 3, 9, 2, 5, 6, 1.

Once again it is seen that there is no difference between the fused phosphate and superphosphate, when both of them are applied on equal phosphoric acid basis.

(2) *Ammonium sulphate and superphosphate experiment.*—This experiment was started in 1949-50 second-crop season, with the object of seeding the effects of superphosphate and ammonium sulphate when applied alone and in combination with and without a dose of green leaf as basal dressing. The data gathered are given in Table VIII.

TABLE VIII.—Ammonium sulphate and superphosphate experiment.

Sown—4th June 1951.
Planted—9th July 1951.
Harvested—9th October 1951.
Variety—ASD. 1.

Plots—15' x 15'.
Planting—6" x 6" doubles.
Layout—Randomized blocks.
Replications—4.

Treatments—						
1	No manure (control).					
2	Green leaf at 5,000 lb. per acre.					
3	Superphosphate to supply 30 lb. phosphoric acid per acre.					
4	Ammonium sulphate at 50 lb. per acre.					
5	Green leaf at 5,000 lb. and superphosphate to supply 30 lb. phosphoric acid per acre.					
6	Super phosphate to supply 30 lb. phosphoric acid and ammonium sulphate at 50 lb. per acre.					
7	Green leaf at 5,000 lb. and ammonium sulphate at 50 lb. per acre.					
8	Green leaf at 5,000 lb. superphosphate to supply 30 lb. phosphoric acid and ammonium sulphate at 50 lb. per acre.					

Treatments.	Acre yield in pounds.		Yield expressed as per cent on		Yield expressed as per cent on	
	Grain.	Straw.	Per cent on control.	Per cent on mean.	Grain.	Straw.
Leaf	3,192	1,874	103.1	96.7	104.0	98.3
No leaf	2,950	1,937	100.0	100.0	96.1	101.6
Mean	3,070	1,905	104.1	98.4	100.0	100.0
'Z' test			Satisfied for grain only.			
Standard error	37.5	24.1	1.27	12.41	1.22	1.26
Critical difference (P=0.05)	110	..	3.79	..	3.59	..

Treatments.	Acre yield in pounds.		Yield expressed as per cent on			
	Grain.	Straw.	Per cent on control.		Per cent on mean.	
Ammonium phosphate	3,148	1,903	105.2	99.8	102.5	99.9
No ammonium phosphate	2,993	1,907	100.0	100.0	97.5	100.1
Mean	3,070	1,905	102.6	99.9	100.0	100.0
'Z' test			Not satisfied.			
Standard error	37.5	24.1	1.25	1.26	1.22	1.26
Critical difference (P=0.05)	110	..	3.63	..	3.59	..
Superphosphate	3,052	1,905	98.7	100.0	99.4	100.0
No superphosphate	3,091	1,905	100.0	100.0	100.7	100.0
Mean	3,070	1,905	99.3	100.0	100.0	100.0
'Z' test			Satisfied (for straw only).			
Standard error	37.5	24.1	1.21	1.26	1.22	1.26
Leaf + super phosphate	3,130	1,842	106.9	96.6	101.9	96.7
Leaf + no super phosphate	3,252	1,904	111.0	99.8	105.9	99.9
No leaf + super phosphate	2,973	1,967	101.5	103.1	96.8	103.2
No leaf + no super phosphate	2,927	1,907	100.0	100.0	95.4	100.1
Mean	3,072	1,905	104.9	99.9	100.0	100.0
'Z' test			Satisfied (for straw only).			
Standard error	53.1	34.0	1.81	1.78	1.73	1.73
Critical difference (P=0.05)	..	100	..	5.24	..	5.25
Leaf + ammonium sulphate	3,252	1,905	113.8	94.5	105.9	100.0
Leaf + no ammonium sulphate	3,128	1,840	109.2	93.2	101.7	96.6
No leaf + ammonium sulphate	3,040	1,908	106.3	94.2	99.0	99.7
No leaf + no ammonium sulphate	2,861	1,975	100.0	100.0	93.1	103.6
Mean	3,072	1,905	107.4	98.5	100.0	100.0
'Z' test			Satisfied (for grain only).			
Standard error	53.1	34.0	1.85	1.72	1.73	1.73
Critical difference (P=0.05)	..	100	..	5.06	..	5.25
Superphosphate + ammonium sulphate.	3,166	1,892	103.8	99.7	103.0	99.3
Superphosphate + no ammonium sulphate.	2,936	1,917	96.3	101.0	95.6	100.6
No superphosphate + ammonium sulphate.	3,130	1,913	102.6	100.8	101.9	100.9
No superphosphate + no ammonium sulphate.	3,051	1,898	100.0	100.0	99.3	99.6
Mean	3,072	1,905	100.7	100.4	100.0	100.0
'Z' test			Not satisfied.			
Standard error	53.1	34.0	1.74	1.79	1.73	1.78
Leaf + superphosphate + ammonium sulphate.	3,233	1,829	112.4	92.7	105.3	96.0
Leaf + superphosphate + no ammonium sulphate.	3,027	1,856	105.2	94.1	98.6	97.4
Leaf + no superphosphate + ammonium sulphate.	3,278	1,983	114.0	100.6	106.8	104.1
Leaf + no superphosphate + no ammonium sulphate.	3,226	1,825	112.1	92.6	105.1	95.8
No leaf + superphosphate + ammonium sulphate.	3,092	1,956	107.7	99.2	100.9	102.7
No leaf + superphosphate + no ammonium sulphate.	2,847	1,979	99.0	100.3	92.7	103.9
No leaf + no superphosphate + ammonium sulphate.	2,922	1,844	103.6	93.5	97.1	96.8
No leaf + no superphosphate + no ammonium sulphate.	2,877	1,972	100.0	100.0	93.7	103.5
Mean	3,071	1,905	106.8	96.6	100.0	100.0
'Z' test			Satisfied.			
Standard error	75.0	48.1	2.61	2.44	2.44	2.52
Critical difference (P=0.05)	221	142	7.67	7.17	7.18	7.43

The results recorded above lead to the same set of conclusions as those of the previous seasons, namely, nitrogen is a more important factor in influencing the yield of paddy than phosphoric acid; superphosphate does better in combination with green leaf or ammonium sulphate and superphosphate green leaf combination appears to be better than superphosphate ammonium sulphate or green leaf ammonium sulphate combination. With these findings, this experiment was concluded.

(e) *Observation Plots*—(1) *Summer ploughing versus no summer ploughing.*—As a preliminary measure to lay out a well designed experiment for testing the efficacy of the local practice of summer ploughing the paddy fields as preparatory cultivation for the *Kar* or first crop, a field was divided into six portions and in each

of these portions one of the following six treatments was observed with the acre yields noted against each. For the 'summer ploughed' portions, two ploughings with Cooper No. 11 iron plough and 6 ploughings with wooden plough were given.

	1951-52	1950-51
1 Fallowing without summer ploughing and no manure	2,789	2,854
2 Fallowing without summer ploughing and 5,000 lb. of cattle manure per acre.	3,255	3,483
3 Fallowing without summer ploughing and green leaf at 4,000 lb. per acre.	3,350	3,000
4 Summer ploughing and no manure	3,139	2,861
5 Summer ploughing and cattle manure at 5,000 lb. per acre ..	3,511	3,937
6 Summer ploughing and green leaf at 4,000 lb. per acre	3,540	3,820

Indications are in favour of summer ploughing and cattle manure. The results observed in both the years are more or less identical.

(2) *Niger oil cake groundnut oil cake ammonium sulphate*.—In another set of observation plots, the manurial value of niger oil cake was sought to be compared with that of groundnut oil cake and ammonium sulphate, when applied on an equal nitrogen basis and the following data were recorded with Co. 13 paddy:—

	LB./ACRE.
1 No manure (control)	4,087
2 Niger oil cake to supply 40 lb. N.	4,214
3 Groundnut oil cake to supply 40 lb. N.	4,239
4 Ammonium sulphate to supply 40 lb. N.	4,166

The order of superiority is groundnut oil cake, niger oil cake, ammonium sulphate and no manure. Similar observations were made in the preceding year also and the order of superiority was niger oil cake, groundnut oil cake, ammonium sulphate and no manure.

(f) *Stem borer control experiment*.—An experiment was started in 1950-51 second crop season, to see the effect of spraying DDT and BHC., in two different strengths, upon the incidence of stem borer on paddy. The experiment was repeated in 1951-52 first crop season also and the results recorded are given in Table IX.

TABLE IX.—*Stem borer control experiment.*

Sown—11th June 1951.
Planted—3rd July 1951.
Harvested—10th October 1951.
Variety—ASD. 1.

Plots—20' x 4'.
Planting—6" x 6" doubles.
Layout—Randomized blocks.
Replications—Six.

Treatments—

1 DDT. 0.1 per cent.
2 DDT. 0.2 per cent.
3 BHC. 0.1 per cent.
4 BHC. 0.2 per cent.
5 Control—(No treatment).

Treatments.	Acre yield in pounds.	Yield expressed as per cent on control.	Mean number of dead hearts per plot.
(1)	(2)	(3)	(4)
DDT. 0.1 per cent	3,068	99.4	96.8 ± 6.64
DDT. 0.2 per cent	3,178	103.0	73.2 ± 10.73
BHC. 0.1 per cent	3,213	104.1	55.0 ± 4.24
BHC. 0.2 per cent	3,118	101.0	47.8 ± 5.57
Control	3,086	100.0	63.3 ± 8.56
'Z' test		Not satisfied.	

Thus it appears that, although the results are not statistically significant, the plot sprayed with 0.2 per cent BHC. has less of stem borer attacked dead hearts. The results recorded in the previous season also were on the same lines as above and are practically identical.

4. *Pishanam or second crop*.—The *Pishanam* nurseries received a basal dressing of green leaves at 6,000 lb. an acre immediately after the *Kar* nurseries were pulled out and the puddle maintained till the time of sowing in September. The sowings were started on the seventh of September and brought to a close on the seventh of November after sowing 614 seed beds in 10 batches. The transplant fields were given 400 lb. of groundnut oil cake and 112 lb. of superphosphate per acre at planting and a top dressing of ammonium sulphate at 100 lb. per acre in two doses after 45 and 60 days from planting. The transplanting was commenced on 14th October 1951 and was brought to a close on 7th November 1951 after planting the following item:—

Particulars	Number of units planted.
Comparative yield trials	296
Single-plant selections, seed multiplication lots and type collections	458
Manurial and cultural experiments	134
Bulks	9
Total	897

The following acre yields were recorded from the bulk crops during the *pishanam* or second crop:—

Strains.	Area planted.	Acre yield in pounds.	
		Average.	Maximum.
(1)	(2)	(3)	(4)
	ACS.		
ASD. 4	0.57	1,861	1,861
ASD. 5	2.92	2,460	2,701
ASD. 6	1.39	2,218	2,833
Co. 12	0.41	2,549	2,549
Co. 23	0.56	1,856	1,856
GEB. 24	1.51	1,981	2,113
Co. 25	0.51	3,596	3,596
Total area planted including the area under experiments ..	13.65	2,254	

On the whole, the yields recorded from the bulk crops were only 50 to 75 per cent of the normal yield. on the station as well as outside, due to vagaries of season.

(a) *Pure line selections under yield trial*—(1) *Kolavalai*.—Two selections, 7195 and 7227 were under comparative yield trial with the unselected bulk as the standard. The consolidated figures showing the performance of these two selections during the year under report and the previous years are given in Table X.

TABLE X.—*Consolidated results of kolavalai selections.*

(1)	Selection 7195.	Selection 7227.	Remarks.
	(2)	(3)	(4)
1947-48	1,963	1,919	} Acre yield in pounds.
1948-49	3,550	2,959	
1949-50	3,188	3,181	
1950-51	3,310	3,188	
1951-52	3,429	3,077	
1947-48	122.0	128.7	} As per cent on standard.
1948-49	114.8	95.7	
1949-50	110.9	110.6	
1950-51	97.5	93.9	
1951-52	107.6	96.6	

	(1)	Selection 7195. (2)	Selection 7227. (3)	Remarks. (4)
1947-48	..	118.1	94.8	As per cent on mean.
1948-49	..	111.0	92.5	
1949-50	..	97.8	97.6	
1950-51	..	100.3	96.7	
1951-52	..	102.8	92.3	
1947-48	..	144	144	Flowering duration in days.
1948-49	..	155	148	
1949-50	..	138	138	
1950-51	..	134	132	
1951-52	..	144	141	

Conclusions—

1947-48—'Z' test was not satisfied.
 1948-49—7195, Kolavalai, 7227.
 1949-50—7195, 7227, Kolavalai.
 1950-51—Kolavalai, 7195, 7227.
 1951-52—7195, Kolavalai, 7227.

In the year 1950-51, there was unusually severe incidence of stem borer of paddy. Proposals were submitted for the release of the selection 7,195 as strain ASD. 10.

(2) *Arikiravi*.—Twenty pure line selections in this medium duration second crop variety, were under comparative yield trial in three groups, using the unselected bulk and selection 4,960 as the standards. The data recorded in this season are given in Table XI.

TABLE XI.—Results of arikiravi cultures under yield trial.

Sown—17th September 1951.
 Planted—25th October 1951.
 Harvested—9th March 1952.

Plots—20' x 4'.
 Planting—6" x 6" doubles.
 Layout—Randomized blocks.
 Replications—Four.

Selections. (1)	Acre yield in pounds. (2)	Yield expressed as per cent on		Flowering duration. (5)
		Arikiravi. (3)	General mean. (4)	
11094	2,745	89.2	99.2	122
11100	2,650	86.1	95.7	122
11113	2,523	82.0	91.2	119
11132	2,694	87.5	97.3	121
11155	2,619	85.1	94.7	123
11190	2,642	85.9	95.5	123
11246	2,929	95.2	105.9	123
4960	3,048	99.1	110.2	123
Arikiravi bulk	3,077	100.0	111.2	122
Mean	2,767	89.9	100.0	
'Z' test		Satisfied.		
Standard error	126.1	4.10	4.56	
Critical difference (P = 0.05)	368	11.96	13.29	

Selections. (1)	Acre yield in pounds. (2)	Yield expressed as per cent on		Flowering duration. (5)
		Arikiravi. (3)	General mean. (4)	
11077	3,276	105.2	110.2	123
11059	2,561	82.2	86.1	122
11141	2,459	79.0	82.7	123
11112	3,453	110.9	116.1	123
11159	2,774	89.1	93.3	122
11180	3,070	98.6	103.2	122
11180	2,671	85.8	89.8	123
11202	3,232	103.8	108.6	123
4960	3,114	100.0	104.7	122
Arikiravi bulk	2,974	95.5	100.0	
Mean		Satisfied.		
'Z' test		3.01	3.15	
Standard error	93.	8.78	9.19	
Critical difference (P = 0.05)	274			

Selection. (1)	Acre yield in pounds. (2)	Yield expressed as per cent on		Flowering duration. (5)
		Arikiravi. (3)	General mean. (4)	
8679	3,070	106.9	101.6	123
8689	3,261	113.6	107.9	122
8748	3,218	112.1	106.5	123
11154	2,752	95.9	91.7	123
11165	2,900	101.0	96.0	123
11209	2,900	101.0	96.0	123
4960	3,203	111.6	106.0	123
Arikiravi bulk	2,870	100.0	95.0	122
Mean	3,021	105.3	100.0	
'Z' test		Satisfied.		
Standard error	115.2	4.01	3.81	
Critical difference (P = 0.05)	339	11.80	11.21	

Conclusion—

Arikiravi—4960, 11246, 11094, 11132, 11100, 11190, 11155, 11113.

11112, 11077, 4960, Arikiravi 11160, 11159, 11202, 11089, 11111.

8689, 8748, 4960, 8679, 11165, 11209, Arikiravi, 11154.

Based upon the performance, the following ten selections have been tentatively chosen for further work:—

8679, 8689, 8748, 11077, 11094, 11112, 11160, 11165, 11209 and 11,246.

(3) *Varigarudansamba*.—Fresh samples were got from four taluks of Ramathapuram district, grown on the station and 340 single plants were selected for further work.

(4) *Sembuli*.—Selection work in this variety was continued and 492 single plant selections were made for further work.

(5) *Puluthipiratti*.—Seventy-two single plant selections were grown in study plots with ASD. 4 as the standard. None of the selections did better than the standard. It is proposed to grow all these selections once again in the next season, using *Puluthipiratti* unselected bulk as the standard.

(b) *Hybrid selections under yield trial*.—(1) *Progenies of CO. 14 x CO. 8*.—Eight selections from among the progenies of the cross between CO. 14 and CO. 8 were put under a comparative yield trial with ASD. 6 as the standard. The summary of results recorded during this season are presented in Table XII.

TABLE XII.—Trial of the progenies of the cross between CO. 14 and CO. 8.

Sown—13th September 1951.
 Planted—18th October 1951.
 Harvested—14th February 1952.

Plots—13' x 5'.
 Planting—6" x 6" doubles.
 Layout—Randomized blocks.
 Replications—Four.

Selections. (1)	Acre yield in pounds. (2)	Yield expressed on		Flowering duration (5)
		Per cent on standard. (3)	Per cent on mean. (4)	
8761	2,269	100.2	94.2	131
8769	2,571	113.6	106.8	126
8791	2,186	96.6	90.7	131
8778	1,985	87.7	82.4	132
8822	2,823	124.8	117.1	123
8827	2,655	117.2	110.2	131
8834	2,173	96.0	90.2	123
ASD. 6	2,755	121.7	114.4	127
Mean	2,409	106.4	100.0	
'Z' test		Satisfied.		
Standard error	133.8	5.91	5.55	
Critical difference (P = 0.05)	378	16.70	15.70	

Conclusion—8822, 8844, 8827, 8769, 8761, ASD. 6, 8791, 8834, 8778.

(2) *Kavunginpothala NX progenies*.—Selection 5,108 of ASD. 5 duration, which has been sent out for district trial, was found to have reached a homozygous state.

(c) *Varietal trial*—(1) *Trial of varieties from Cuttack*.—Two varieties, T. 90 and T. 1242 from the Central Rice Research Institute, Cuttack, were compared with ASD. 6 and Arikiravi 4960 in an yield trial. The yield data gathered are presented in Table XIII.

TABLE XIII.—Yield trial with Cuttack types.

Variants.	Acre yield in pounds.	Yield expressed as		Flowering duration in days.
		Per cent on standard.	Per cent on mean.	
(1)	(2)	(3)	(4)	(5)
T. 90	1906	58.5	67.8	92
T. 1242	3074	94.3	109.3	98
AKV. 4960	3002	92.1	106.9	123
ASD. 6	3260	100.0	116.0	128
Mean	2810	86.2	100.0	..
'Z' test		Satisfied.		
Standard error	173.8	5.33	6.18	..
Critical difference ($P = 0.05$)	524	16.06	18.63	..

Conclusion—ASD. 6, T. 1242, AKV. 4960, T. 90.

It is seen that T. 1242, with a duration 25 days less than that of Arikiravi and 30 days less than that of ASD. 6, stands on a par, in yield, with those two. In 1949-50, this yield trial was conducted with more or less identical results. It has been tentatively decided to try this T. 1242 in places where Arikiravi is grown in the districts.

(2) *Trial with long duration strains*.—For the third time in succession, this yield trial was conducted with the strains Co. 26, Co. 25, Co. 19, Co. 12, ASD. 6 and ASD. 5 to compare the merits of the newly released blast resistant strains (Co. 25 and 26) from Coimbatore. Once again Co. 25 has proved its superiority over the rest. The yield data recorded during this season are given in Table XIV.

TABLE XIV.—Yield trial on long duration strains.

Variants.	Acre yield in pounds.	Yield expressed as				Flowering duration in days.
		Per cent on ASD. 5.	Per cent on ASD. 6.	Per cent on Co. 12.	Per cent on mean.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
ASD. 5	2,840	100.0	116.1	100.7	99.2	102
ASD. 6	2,445	86.1	100.0	86.7	85.4	125
Co. 12	2,821	99.4	115.4	100.0	98.5	132
Co. 19	2,768	97.5	113.2	98.1	96.7	135
Co. 25	3,444	121.3	140.9	122.1	120.2	131
Co. 26	2,865	100.9	117.1	101.5	100.0	132
Mean	2,865	100.9	117.1	101.5	99.0	..
'Z' test			Satisfied.			
Standard error	118.1	4.18	4.83	4.19	4.12	..
Critical difference ($P = 0.05$)	339	11.94	13.87	12.01	11.84	..

Conclusion—Co. 25, Co. 26, ASD. 5, Co. 12, Co. 19, ASD. 6.

This trial will be concluded with this season.

Advantage was taken of this yield trial to see whether there is any difference in the resistance to stem borer exhibited by these strains of paddy. From the observations recorded, Co. 25, Co. 26 and Co. 12 appear to have greater resistance to paddy stem borer than the rest. The following data were gathered:—

Strains.	Mean number of dead hearts present per plot (13' x 5').	'Z' test.	Standard error.	Critical difference.
(1)	(2)	(3)	(4)	(5)
ASD. 5	61.63 — 3.318	..	..	..
ASD. 6	53.50 — 5.046	..	..	..
Co. 12	41.50 — 4.290	..	..	..
Co. 19	44.75 — 6.053	..	..	..
Co. 25	29.38 — 3.912	Satisfied.	9.6	19.4
Co. 26	31.63 — 2.889	..	..	..

Conclusion—Co. 25, Co. 26, Co. 12, Co. 19, ASD. 6, ASD. 5.

Similar observations made in the previous year enabled to draw the following conclusion:—

Co. 26, Co. 19, Co. 25, Co. 12, ASD. 6.

(d) *Manurial experiments—Fused phosphate experiment*.—This experiment was repeated for the fourth consecutive season with the object of comparing the new form of phosphatic fertilizer supplied by Messrs. Parry & Co. with the ordinary superphosphate. The data collected in the Pishanam season are presented in Table XV.

TABLE XV.—Results of the fused phosphate experiment.

Treatments—		Acre yield in pounds.		Yield expressed as	
(1)		Grain.	Straw.	Per cent on control.	Per cent on mean.
		(2)	(3)	(4)	(5)
1	No manure (control).	1,803	1,944	100.0	100.0
2	Green leaf at 2,500 lb. per acre.	1,948	2,011	108.3	103.5
3	Ammonium sulphate to supply 30 lb. nitrogen per acre.	2,388	3,049	132.4	156.9
4	Leaf at 2,500 lb. and ammonium sulphate to supply 30 lb. nitrogen per acre.	2,302	3,233	127.6	166.3
5	Leaf at 2,500 lb. and super phosphate to supply 30 lb. phosphoric acid per acre.	1,895	2,396	105.1	123.3
6	Leaf at 2,500 lb. and fused phosphate to supply 30 lb. phosphoric acid per acre.	1,898	2,111	105.2	108.6
7	Ammonium sulphate to supply 30 lb. nitrogen and superphosphate to supply 30 lb. phosphoric acid per acre.	2,411	2,932	133.7	150.9
8	Ammonium sulphate to supply 30 lb. nitrogen and fused phosphate to supply 30 lb. phosphoric acid per acre.	2,419	3,117	134.2	160.3
9	Leaf at 2,500 lb., ammonium sulphate to supply 30 lb. nitrogen and superphosphate to supply 30 lb. phosphoric acid per acre.	2,415	3,268	133.9	168.1
10	Leaf at 2,500 lb., ammonium sulphate to supply 30 lb. nitrogen and fused phosphate to supply 30 lb. phosphoric acid per acre.	2,314	3,016	128.3	155.2
Mean		2,180	2,708	120.9	139.5
'Z' test				Satisfied	
Standard error		127.6	190.0	7.07	9.77
Critical difference ($P = 0.05$)		370	551	20.51	29.32

Conclusions—

(Grain)—8, 9, 7, 3, 10, 4, 2, 6, 5, 1	1951-52 second crop.
(Straw)—9, 4, 8, 3, 10, 7, 5, 6, 2, 1	
(Grain)—10, 8, 4, 9, 3, 7, 5, 6, 2, 1	1951-52 first crop.
(Straw)—10, 4, 7, 8, 3, 9, 2, 5, 6, 1	
(Grain)—10, 4, 9, 8, 7, 3, 6, 2, 5, 1	1950-51 second crop.
(Straw)—10, 9, 7, 8, 4, 8, 6, 2, 5, 1	
(Grain)—9, 10, 8, 3, 4, 7, 5, 6, 2, 1	1950-51 first crop.
(Straw)—10, 4, 9, 3, 7, 8, 5, 6, 2, 1	

It is seen that the conclusions drawn in all the four seasons are more or less identical and they are that there is no difference between the two forms of phosphatic fertilizers when applied on equal phosphoric acid basis. With this finding this experiment will be concluded.

5. *Miscellaneous*—(a) *Seed distributions*.—The following quantities of seed materials were distributed from the Rice Research Station, Ambasamudram, during the year under report :—

	LB.
(1) Paddy seeds—	
ASD. 1	16,543½
ASD. 2	1,097
ASD. 3	578
ASD. 4	1,349½
ASD. 5	9,761
ASD. 6	1,538
ASD. 7	1,457
ASD. 8	207½
ASD. 9	207½
Co. 13	2,030
Co. 23	190
G.E.B. 24	1,601
Co. 25	3,570
Basumathi	650
Miscellaneous	19½
Total ..	40,699½

	Seeds. LB.	Seedlings or cuttings.
(2) Green manure seeds and plants—		
<i>Sesbania speciosa</i>	302½	120,000
<i>Crotalaria striata</i>	35	..
<i>Leucaena glauca</i>	4½	300
Vagai	24	..
<i>Gliricidia maculata</i>	1	1,250
<i>Bodantum</i>	1	..
<i>Ipomea cornea</i>	..	175
Total ..	368½	121,760

	LB.	oz.
(3) Vegetable seeds—		
Cow pea (new era)	21	0
Bendai (local)	4	2
Sword beans	2	8
Brinjals	1	4
Ribbed gourd	0	8
Bottle gourd	0	3
Total ..	29	9

	LB.	
(4) Hedge plant, fodder grass, etc—		
<i>Prosopis juliflora</i> seeds	25	..
Guinea grass slips	..	25,400
Water grass slips	..	4,000
Kapok seedlings	..	400
Total ..	25	29,800

(b) *Green manure crop*—(1) *Daincha*.—Daincha was sown in 6.56 acres immediately after the harvest of the *Pishanam* or second crop paddy and from this, an average acre yield of 10,928 lb. was obtained, the maximum and minimum record being 20,147 lb. and 7,438 lb. respectively.

(2) *Sesbania speciosa*.—*Sesbania speciosa* plants were grown all along the margins of the paddy fields during the second crop season for seed production. From a total area of 13.92 acres, 388 lb. of seeds were collected. This works out to 28 lb. per acre, which is more than the quantity of seeds required for sowing one acre of pure green manure of *Sesbania speciosa*.

(c) *Trial of cotton (P. 216 F.) in the rice fallow*.—Cotton, P. 216 F, was tried in a small area in the fallow period, immediately after the second crop paddy. The seeds were dibbled in between the paddy stubbles of the second crop of paddy on 7th February 1952. The germination was good, but subsequent growth was not satisfactory. The crop was given two hoeings and four irrigations before the end of March, when the irrigation canal was closed. The plants never grew more than nine inches and the crop was ploughed at the time of preparation of the lands for the succeeding paddy crop in June 1952.

(d) *Trial of groundnut in the rice fallow*.—In order to see the possibility of raising a crop of groundnut in the rice fallow, after the second crop of paddy, groundnut TMV. 2 was grown in an area of 48 cents. The kernels were dibbled in the seedling stubbles of the previous crop of paddy, on 25th January 1952 and was harvested on 21st May 1952. An acre yield of 744 lb. (wet weight) of pods and 1,042 lb. of haulms was recorded. This year's experience has clearly indicated the possibilities of raising a groundnut crop in the rice fallows and it is felt that a little adjustment in the time of sowing and planting of the second crop of paddy will go a long way to enhance the yield of groundnut that was recorded in this year.

(e) *Vegetables*.—As a measure to step up the production of vegetable seeds, an attempt was made to grow cow pea (new era) on paddy field bunds. This attempt was crowned with good success and a total quantity of about 20 lb. of seeds was collected.

(f) *Insect pests and diseases*—(1) *Rats*.—As usual, rat damage was there in the second-crop season and this was effectively kept under check by poison baits, bow traps and pot traps.

(2) *Paddy stem borer*—(*Schoenobius incertellus*) also appeared to some extent and was kept under check by setting up light traps and by spraying BHC. 0.2 per cent solution in badly affected areas.

(3) *Soorai or mealy bugs (Ripersia oryzae)*.—also made their appearance in small patches here and there and the affected plants were promptly removed to prevent further spread.

AMBASAMUDRAM,
30th August 1952.

R. H. KRISHNAN,
Assistant-in-charge.

MA DURAI,
13th September 1952.

A. MUHAMMAD ALI,
Deputy Director of Agriculture, VII Division.

APPENDIX I.

STATEMENT OF RECEIPTS AND CHARGES FOR THE YEAR 1951-52 (FASLI 1361).

Receipts.

	RS.	A.	P.
XXIX. Agriculture—Agricultural Receipts—			
Agricultural stations	1,216	2	2
Miscellaneous	321	3	0
Total, Receipts ..	1,537	5	2

Charges.

40. Agriculture—c. Agriculture—Experimental Farms—A. Agricultural Research Stations—Voted—	RS.	A.	P.
1 Pay of establishment—Permanent	858	0	0
Pay of establishment—Temporary	4,556	7	0
Travelling allowance	191	1	0
Dearness allowance	1,681	13	0
House rent allowance	211	1	0
Total of Pay and Allowances ..	7,498	6	0
2 Office contingencies—Voted	385	4	0
3 Other Charges—Voted—	RS.	A.	P.
Petty construction and repairs	49	9	6
Capital outlay—Purchase of live and dead stock and cost of lands ..	1,998	8	6
Working expenses	13,560	15	10
Dearness allowance to menials	860	8	0
Total, Other Charges ..	16,469	9	10
Grand total of charges ..	24,353	3	10

APPENDIX II.

CULTIVATION EXPENSES OF NON-EXPERIMENTAL AREA.

(Kar or first-crop.)

1 Preparatory cultivation.	5 After cultivation.						
2 Manures and manuring.	6 Irrigation.						
3 Seeds and sowing.	7 Harvest, threshing, etc.						
4 Transplanting.							
	Field No. 7. (0.48)	Field No. 8. (0.47)	Field No. 11. (0.24)	Field No. 12. (1.15)	Field No. 14. (0.51)	Field No. 15 W. (0.43)	Field No. 21. (0.82)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
1	16 4 9	15 11 3	5 6 6	17 0 0	10 6 6	15 9 6	19 6 6
2	21 8 5	21 2 7	13 6 4	46 8 9	31 9 5	80 1 3	37 12 0
3	9 7 4	10 13 3	7 2 9	33 7 6	25 4 9	14 5 6	23 14 6
4	3 13 6	4 8 6	1 14 0	5 15 0	5 12 0	4 12 6	6 8 0
5	3 0 0	4 6 0	7 12 0	11 10 0	8 2 6	7 0 0	14 3 6
6	1 2 0	1 2 0	0 9 0	2 6 3	1 2 0	1 2 0	1 11 0
7	11 15 0	19 6 0	11 10 0	29 0 0	18 7 0	13 2 0	27 0 0
Total ..	67 3 0	77 1 7	47 12 7	145 15 6	101 12 2	91 0 9	130 4 6
	LB.	LB.	LB.	LB.	LB.	LB.	LB.
Grain per plot ..	1,428	1,414	812	3,105	1,852	1,239	3,068
Straw per plot ..	930	832	890	2,574	1,720	1,185	3,068
Grain per acre ..	2,975	3,009	3,384	2,700	3,632	2,881	3,742
Straw per acre ..	1,938	1,770	3,708	2,238	3,373	2,756	1,921
Variety	ASD. 9	ASD. 8	ASD. 3	ASD. 1, 8 Co. 13	ASD. 1	Basumathi ASD. 1	ASD. 1

RICE RESEARCH STATION, AMBASAMUDRAM

	Field No. 22 (0.89).	Field No. 23 (0.93).	Field No. 24 (0.57).	Field No. 25 (6.68).	Field No. 26 (0.54).
(1)	(2)	(3)	(4)	(5)	(6)
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
1	35 11 6	21 12 0	6 0 6	14 10 0	9 11 6
2	51 9 2	39 7 11	22 15 6	28 3 1	23 11 9
3	26 4 9	28 11 0	14 5 6	19 2 0	14 5 6
4	8 3 6	8 0 0	5 1 0	5 2 0	5 9 0
5	17 13 0	12 8 6	2 1 6	19 6 0	19 11 6
6	1 13 3	2 4 0	1 4 3	1 6 6	1 2 0
7	35 0 0	25 2 0	17 12 0	18 10 0	15 15 0
Total ..	176 7 2	137 13 5	69 8 3	106 7 7	90 2 3
	LB.	LB.	LB.	LB.	LB.
Grain per plot ..	3,638	3,002	1,836	2,379	1,388
Straw per plot ..	1,484	1,752	1,350	1,155	960
Grain per acre ..	4,038	3,228	3,309	4,234	2,570
Straw per acre ..	1,667	1,884	2,368	1,699	1,778
Variety	ASD. 1	ASD. 1	ASD. 7 & 2	ASD. 1	ASD. 2

	RS.	A.	P.
Total cultivation expenses for 7.71 acres	1,241	8	9
	LB.		
Total grain production from 7.71 acres	25,711		
Total straw production from 7.71 acres	16,407		
	RS.	A.	P.
Value of grain produced at 10 lb. per rupee	2,571	1	7
Value of straw produced at 70 lb. per rupee	234	6	2
Total money value of the produce	2,805	7	9
Net gain from 7.71 acres	1,563	15	0
or Rs. 202—14—0 per acre.			

Pishanam or second crop.

1 Preparatory cultivation.
2 Manures and manuring.
3 Seeds and sowing.
4 Transplanting.

5 After cultivation.
6 Irrigation.
7 Harvest, threshing, etc.

	Field No. 4 (0.57).	Field No. 7 (0.48).	Field No. 8 (0.41).	Field No. 11 (0.24).	Field No. 12 (1.15).	Field No. 14 (0.51).
(1)	(2)	(3)	(4)	(5)	(6)	(7)
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
1	18 11 0	10 11 0	11 4 0	6 12 0	22 11 0	13 1 0
2	46 3 2	38 12 5	38 5 4	19 14 7	98 1 9	61 11 7
3	13 11 6	11 6 11	9 2 4	5 11 6	7 7 0	11 6 11
4	5 14 0	6 0 0	4 12 0	3 0 0	11 4 0	5 0 0
5	7 8 0	2 7 0	5 1 6	5 1 0	11 10 6	4 8 6
6	2 4 0	2 4 0	1 11 0	1 2 0	5 1 0	2 4 6
7	12 1 6	7 5 0	15 14 0	9 0 6	42 7 0	20 5 6
Total ..	106 5 2	78 14 4	86 2 2	51 2 7	213 10 3	118 5 6
	LB.	LB.	LB.	LB.	LB.	LB.
Grain per plot ..	1,061	88	1,045	704	2,403	1,968
Straw per plot ..	972	365	1,206	800	2,814	2,553
Grain per acre ..	1,861	183	2,549	2,933	2,030	3,859
Straw per acre ..	1,705	760	2,941	1,250	2,447	5,006
Variety	ASD. 4	CO. 13	CO. 12	ASD. 6	ASD. 6	CO. 25

	Field No. 21 (0'82).	Field No. 22 (0'89).	Field No. 23 (0'93).	Field No. 24 (0'57).	Field No. 25 (0'68).	Field No. 26 (0'54).
(1)	(2)	(3)	(4)	(5)	(6)	(7)
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
1	23 13 6	23 8 0	23 8 0	12 2 0	23 15 0	17 0 0
2	67 4 1	72 13 5	75 11 10	46 11 8	55 7 6	44 2 4
3	18 4 8	20 9 3	22 13 10	13 11 6	16 0 1	13 11 6
4	8 10 0	9 1 6	8 15 0	7 13 0	8 6 6	7 6 0
5	7 14 0	8 14 6	8 5 0	8 0 6	18 4 6	17 0 6
6	3 0 0	3 15 0	4 8 0	2 4 0	3 6 0	2 4 0
7	27 10 0	30 12 0	26 15 0	18 4 0	23 2 0	15 3 0
Total ..	156 14 3	169 9 8	170 12 8	108 14 8	148 9 7	116 11 4
	LB.	LB.	LB.	LB.	LB.	LB.
Grain per plot ..	2,214	2,316	2,061	1,177	1,433	1,073
Straw per plot ..	2,201	2,379	2,088	1,452	1,701	1,125
Grain per acre ..	2,700	2,602	2,216	2,065	2,107	1,987
Straw per acre ..	2,684	2,673	2,245	2,547	2,501	2,083
Variety ..	ASD. 5	ASD. 5	ASD. 5	G.E.B. 24	GEB. 24 A. S.D. 5	GEB. 24
	RS. A. P.					
Total cultivation expenses for 7.79 acres	.. ..	.. ..	.. ..	.. ..	1,526 0 2	
	LB.					
Total grain production from 7.79 acres	.. ..	.. ..	.. ..	.. ..	17,543	
Total straw production from 7.79 acres	.. ..	.. ..	.. ..	.. ..	19,156	
	RS. A. P.					
Value of grain produced at 9½ lb. per rupee	.. ..	.. ..	.. ..	.. ..	1,846 10 1	
Value of straw produced at 70 lb. per rupee	.. ..	.. ..	.. ..	.. ..	273 10 7	
Total money value of the produce from 7.79 acres	.. ..	.. ..	.. ..	.. ..	2,120 4 8	
Net gain from 7.79 acres	.. ..	.. ..	.. ..	.. ..	594 4 6	
					Net gain per acre	76 5 0

APPENDIX III.

A SHORT NOTE ON THE ORIGIN AND OBJECT OF THE RICE RESEARCH STATION, AMBASAMUDRAM.

Inception.—The temporary Rice Research Station, Ambasamudram, was opened in 1937, in pursuance of the policy to provide facilities for the improvement of the paddy crop in each of the most important paddy tracts, as it is the case, as a rule, that the good performance of a strain evolved under certain climatic conditions is not equally so over a wide range of lands, with different agronomical and seasonal conditions, and as such, selection for a particular tract should be done in that tract only.

Situation.—The Rice Research Station is situated in the village of Kila Ambasamudram, Ambasamudram taluk, Tirunelveli district, closely adjoining Urkad village and about 1½ miles to the east of Ambasamudram Railway Station. The total area of the wet land piece of the station is 13.92 acres taken on lease. The fields are irrigated by the *Nathiunni* channel of the perennial river *Thambravarni*. The soil is fairly representative of the *Thambravarni* valley and the strains evolved at the station are found to be suitable for this tract, and also to the minor paddy growing tracts of this district commanded by rainfed tanks and mountain streams from the Western Ghats. Adjacent to the wet land block, a dry land piece with a small building on has also been taken on lease for the use of the station as farmstead.

Objects.—The fundamental object of the Station is the improvement of the local varieties of paddy by the evolution of pure strains on the basis of yield, duration, etc., by means of pure line selection and hybridization and also to tackle the manurial and cultural problem pertaining to the tract.

A SHORT ACCOUNT OF THE AGRICULTURAL PRACTICES IN THE NEIGHBOURHOOD OF RICE RESEARCH STATION, AMBASAMUDRAM.

General.—The *Thambravarni* valley may be divided into three main portions, which differ slightly from one another: (1) the upper or head portion, (2) the middle portion and (3) the tail-end portion of the valley. There is a belt of wet lands on either side of the perennial river *Thambravarni*, which is blocked in its course by eight masonry anicuts, wherefrom channels are taken off to irrigate the fields.

Soil.—The conformation of the land in this valley is undulating and the fields are all well-drained. The soil is red sandy loam with a substratum of gravel at a depth of 1 to 1½ feet especially in the higher reaches of the valley. The middle portion is mostly clayey loam with a very good capacity to retain moisture. The lands at the tail end are clayey and are a bit alkaline in patches.

Season.—The average annual rainfall of this district is about 42 inches. The agricultural year commences with the onset of the south-west monsoon. At the break of the south-west monsoon, in the month of June, freshes are received in the river setting busy the ryots to raise their first-crop nurseries in right earnest. At the upper portion of the valley, due to early receipt of unfailing supply of water, the wet lands are double cropped, whereas in the lower half, the water-supply is not assured and as such all the wet lands are classified as single or compounded double crop lands.

Cropping.—There are two main cropping seasons for paddy in this tract, *Kar* season (June to September) and *Pishanam* season (September to February).

Kar season.—In the *Kar* season, a short duration variety, *Karasamba* red or white (about 110 days from sowing to harvest) is grown. The *Kar* nurseries are generally dry—ploughed with the help of summer showers and kept in a fine tilth—and the seeds are sown in *Puzhuthi* (dry seed bed) in June as soon as water is received or even earlier, with the aid of water from small ponds nearby or with the help of soaking rains received in the later half of May.

Seed-rate.—The seed-rate varies from 60 lb. to 80 lb. sown in 8 cents of nursery to transplant an acre. If broadcasting is done, a seed-rate as high as 125 lb. to 175 lb. is adopted.

Preliminary cultivation.—After the harvest of the *Pishanam* crop, the fields are ploughed dry when the lands come to condition. If this opportunity is lost due to some reason or other, the lands are wetted in the month of March, before the channels are closed, and then ploughed when the lands are fit for dry ploughing. Subsequent ploughings are given to the fields as many times as possible at the receipt of summer showers in April and May. Generally, in normal years, 9 to 12 ploughings are given to these fields and the soil is brought to a fine tilth for the *Kar* crop.

Planting.—Should the tilth of the fields to be transplanted be in a very good condition, by repeated dry ploughings with the aid of summer showers, water is let into the fields and planting is done straightaway without any further wet ploughing to the fields. But, if the condition of the fields be not quite good, 2 to 4 more ploughings are given with the country plough, levelled up and planted. The former method is largely practised as it saves a lot of time and labour during the busy transplanting season. Usually, for pulling out seedlings from the nursery and planting an acre, 20 to 24 women are required. The practice is bulk planting, about 6 seedlings per hole, 6 to 8 inches apart either way.

In the *Pishanam* season, a long duration fine variety, like *Anaikomban* (165 days from sowing to harvest) is usually grown. Some of the other varieties grown in the second crop season are *Sendhinayagam*, *Thattavellai*, *Sembuli* and *Karthigaishamba*.

Soon after the harvest of the *Kar* crop, in the last week of September, the fields are ploughed and prepared for the second crop. Generally the fields are given 6 to 8 ploughings with the country plough so as to make the *Kar* crop stubbles rot well. The ploughed fields are allowed to remain in the puddled condition for about 3 to 4 weeks, as the consensus of the ryots is that a good rotten puddle for the second crop is very conducive to its vigorous growth. The transplant fields are given one or two ploughings just before planting, perfectly levelled and transplanted at once. Bunch planting, 6 to 9 inches apart is the common practice for the second crop also.

Seed-rate.—The seed-rate ranges from 40 lb. to 80 lb. sown in 8 cents of nursery to transplant an acre.

Manures and manuring.—For the *Kar* or first crop, the transplant fields receive 20 to 25 cart-loads of village cattle manure to an acre. For the *Pishanam* or second crop, the fields receive two cart-loads of green leaf to an acre (*Kolinji*) obtained from the dry tracts nearby. Only a few adopt this practice. Generally, the cultivators, who are lessees, do not apply any manure at all to the second crop. But the second crop nurseries, invariably receive two cart-loads of green leaf.

Rotation.—Generally, very little rotation is practised on the paddy fields of this valley. But in certain places, where there are facilities for irrigation during the month of April, sunn hemp is grown for fibre. Especially in the single-crop wet lands, *Kolinji* is grown for green manure, or *Atri* wild indigo for dye.

APPENDIX IV.

DESCRIPTION OF STRAINS OF PADDY RELEASED SO FAR FROM THE RICE RESEARCH STATION, AMBASAMUDRAM.

ASD. 1 (*Kar samba* red).—This has been isolated from *Kar samba* red, giving 21 per cent increase over the unselected bulk and 12 per cent over CO. 9 a strain from the same variety selected at Coimbatore. This grows tall, tillers well with good quality straw. It has a better proportion of rice to paddy than the unselected bulk, the increase

being 2.09 per cent by weight and 0.89 per cent by volume. Though coarse, it is held in high esteem and it fetches as good a price as fine white rice. The acre yield ranges from 3,600 lb. to 4,500 lb. under well-manured conditions. Sowing time is May-June and the duration is 115 days. Glume colour is dull straw and rice is red. Purple tip. Grain size: L = 8.0 mm., B = 3.1 mm., T = 2.1 mm.

ASD. 2 (*Kar samba white*).—This is a strain isolated from *Kar samba white*, and is grown in the first crop (*Kar*) season. This has given 10.0 per cent increase over the unselected bulk. It has attractive and showy panicle with a finer size of grain than the unselected bulk. It is of a non-shedding nature. Its flour is very much reputed for the preparation of high quality 'Idlies'. The acre yield ranges from 3,500 lb. to 4,000 lb. Sowing time is May-June. Duration is 110 days. Glume colour is straw, rice is white and tip is green. Grain size: L = 7.6 mm., B = 3.0 mm., T = 2.1 mm.

ASD. 3 (*Veedhividangan*).—This has been isolated from a variety called '*Veedhividangan*' and gives 15 per cent increase over the unselected bulk. It is a coarse long duration variety grown very largely in Tenkasi taluk of this district where heavy winds prevail during the south-west monsoon period. It is drought resistant to some extent and non-lodging. The acre yield ranges from 3,000 lb. to 3,500 lb. Sowing time is May-June and the duration is 130 days. Glume colour is dirty in furrows and rice is red. Grain size: L = 8.3 mm., B = 3.1 mm., T = 2.1 mm.

ASD. 4 (*Kuruvakalayan*).—This is a strain isolated from a variety by name '*Kuruvakalayan*' and gives 35 per cent over the unselected bulk. It is a coarse drought resistant strain suitable to be sown broadcast with the advent of the pre-monsoonic north-east showers in September. It is grown as a dry crop for about two months and there after treated as a swamp paddy. It is largely grown under rainfed tanks, where the rainfall is moderate to precarious and the supply of water is not adequate to take in a long duration paddy. The acre yield ranges from 2,000 lb. to 2,500 lb. Sowing time is first week of September and the duration is 135 days. Glume colour is dirty in furrows with red rice. Grain size: L = 8.5 mm., B = 3.3 mm., T = 2.3 mm.

ASD. 5 (*Karthigai samba*).—This is a strain isolated from the variety called '*Karthigaisamba*' and gives 15 per cent more than the unselected bulk. It is taller than CO. 2, has a finer grain and gives a better hulling percentage. It adapts better than other varieties for late planting. It may be noted that this strain is highly cosmopolitan in nature and has done well under different conditions prevailing in a number of other districts. Sowing time is middle of October and the duration is 135 days. Glume colour is straw with green tip and white rice. Grain size: L = 7.6 mm., B = 2.5 mm., T = 1.9 mm.

ASD. 6 (*Anaikomban*).—This is a strain isolated from a variety called '*Anaikomban*' and gives 12 per cent more than the unselected bulk. It has a little non-shedding habit. Under well-manured conditions its yield ranges from 3,500 lb. to 4,000 lb. per acre. Sowing time is first week of September and the duration is 170 days. Glume colour is straw with green tip and fine white rice. Grain size: L = 8.6 mm., B = 2.5 mm., T = 1.9 mm.

ASD. 7 (*Kar samba early*).—This is also a strain from the first crop variety *Kar samba red* but this is earlier than ASD. 1 by about a week. It gives 12 per cent more than the unselected bulk. This is confined to and very much appreciated in Srivaikuntam taluk of this district. Sowing time is the first week of June and its duration is 108 days. Glume colour is dull straw with red rice and purple tip. Grain size: L = 8.0 mm., B = 3.3 mm., T = 2.1 mm.

ASD. 8 (*Thuyamalli*).—This is a short duration variety of paddy grown in fields where the second crop or *Pishanam* unseries are to be raised, on account of its short duration. It is usually grown in the month of June when it is at its best. The practice of sowing this variety in the month of October-November also is not uncommon. But its yield is considerably reduced. The average increase over the unselected bulk recorded by this strain is 8.1 per cent and the increase has gone up to 26 per cent. The average acre yield is about 2,700 lb. and this has gone up to 3,557 lb. Duration is 86 days. Glume colour is dirty in furrows, ripening rich brown with red rice and purple tip. Grain size: L = 7.9 mm., B = 2.9 mm., T = 2.0 mm.

ASD. 9 (*Avasarasamba*).—This is also a short duration first crop variety, usually sown in places where water is received a bit late. It is at its best when sown in the month of May-June. It is not uncommon to sow this in the late second-crop season also, when its yield is to some extent reduced. It has given on an average 12.6 per cent more than the unselected bulk and this increase has gone up to 25 per cent. The average acre yield is about 3,250 lb. with a maximum of 4,526 lb. Duration is 92 days. Glume colour is green ripening straw with purple tip with red rice. Grain size: L = 8.2 mm., B = 3.1 mm., T = 2.1 mm.

APPENDIX V,

STEPS TAKEN TO INCREASE THE REVENUES OF THE STATION.

Of the two tables presented below, one gives the production figures in respect of the various articles produced on the station, during the year under report and the year previous to that, while the other table gives the money value of these produce. These tables indicate that the year 1951-52 has not only recorded an increase in production in the case of practically all the old items, excepting paddy and paddy straw, but a number of new items as well

have made their appearance. The fall in the production of paddy and paddy straw is due to the fact that 1951-52 second or *Pishanam* crop recorded an yield which was estimated to be only 75 per cent of the normal yield, due to the vagaries of the monsoon. The increase in the production of all the other items and the appearance of a few new items were made possible by bestowing greater attention upon the production of green leaf, green manure seeds, composting all available waste matter and utilizing as much of the waste area as possible for growing something or other. Thus the loss sustained by the fall in the production of paddy and paddy straw was amply made good by other items.

Production figures.

	1950-51.	1951-52.
Paddy (in pounds)	79,569	69,731
Paddy straw (in pounds)	72,773	62,060
Vegetable seeds (in pounds)	15 $\frac{1}{2}$	41
Green manure seeds (in pounds)	198 $\frac{1}{2}$	538 $\frac{1}{2}$
Green leaf (in pounds)	23,132	78,179
Compost manure (in pounds)	10,800	18,250
<i>Prosopis juliflora</i> pods (in pounds)	64	116
<i>Prosopis juliflora</i> seeds (in pounds)	..	25
Groundnut pods (in pounds)	137	157
Gingelly (in pounds)	76	..
Green grass (in pounds)	4,640	1,308
Guinea grass slips (number)	..	17,400
Water grass slips (number)	..	4,100
<i>Gliricidia maculata</i> cuttings (number)	..	100
<i>Ipomea cornea</i> cuttings (number)	..	175
<i>Leucaena glauca</i> seedlings	..	300
Kapok seedlings (number)	..	400
<i>Gliricidia</i> seedlings (number)	..	1,250
Mango seedlings (number)	..	1,200

Money value of the above produce.

	1950-51.	1951-52.
	RS. A. P.	RS. A. P.
Paddy	9,946 2 0	8,716 6 0
Paddy straw (value of surplus only)	392 12 6	344 7 4
Vegetable seeds	63 0 0	164 0 0
Green manure seeds	39 10 0	109 1 0
Green leaves	115 11 0	390 14 0
Compost manure	21 10 0	36 8 0
Groundnut pods	17 2 0	19 6 0
Gingelly	25 5 0	..
Green grass	22 13 0	6 8 0
<i>Prosopis juliflora</i> pods	16 0 0	29 0 0
<i>Prosopis juliflora</i> seeds	..	50 0 0
Guinea grass slips	..	21 12 0
Water grass slips	..	5 2 0
<i>Gliricidia maculata</i> cuttings	..	0 8 0
<i>Ipomea cornea</i> cuttings	..	0 15 0
<i>Leucaena glauca</i> seedlings	..	18 12 0
Kapok seedlings	..	25 0 0
<i>Gliricidia maculata</i> cuttings	..	78 2 0
Mango seedlings	..	300 0 0
Miscellaneous receipts	137 15 0	321 3 0
Total	10,798 0 6	10,637 8 4

Besides the above, a number of seedlings and cuttings of *Gliricidia maculata* were planted all along the boundary and other odd places, the beneficial effects of which will be felt only in course of time.

In addition to all these, in an exploratory trial, the possibility of raising a crop of groundnut in the rice fallow during the off-season months of March, April and May was indicated.

Considering the temporary nature of the station, which is being run on leased out lands and which lease expires on 24th April 1953 (steps are being taken for the extension of the life of the station by one more year), no permanent improvements like the sinking of wells, improving the nature of soil in the dry land area, etc., could be undertaken.

**ANNUAL REPORT OF THE AGRICULTURAL RESEARCH STATION,
TALIPARAMBA, FOR THE YEAR 1951-52 (FASLI 1361).**

I. SEASON AND RAINFALL.

South-west monsoon.—The south-west monsoon commenced early in June and continued to be fairly heavy till the third week of August 1951 and later its intensity was much less till the third week of September. The total rainfall received during the monsoon was 81.41 inches distributed over 76 days as against a fall of 123.78 inches distributed over 94 days during the previous year and the average for the last ten years for this monsoon was 120.57 inches spread over 89.42 days. Compared to that of last year the rainfall received during the period this year was very low and this caused the poor performance of many crops. Even the paddy crop in the wet lands had to be irrigated by bailing out water from the nearby channel where an improvised dam had to be constructed.

North-east monsoon.—During the north-east monsoon a fall of 19.83 inches distributed over 27 days was received as against 8.69 inches spread over 18 days during the corresponding period of the last year and an average of 16.46 inches for 20.61 days for the past ten years for the period. The rainfall was scanty after the second week of November and its uneven distribution caused failure of many crops especially those grown in the dry lands and *punam* area.

Hot weather.—The hot weather rains amounting to 7.11 inches distributed over 14 days as against 20.26 inches spread over 16 days during the corresponding period of last year, were received. The average rainfall for the last ten years for this period was 18.64 inches distributed over 16.50 days.

In spite of the fact that an aggregate of 108.35 inches received during the year, the season experienced drought also. One of the wells in the dry land dried up and but for the timely receipt of rains in May considerable difficulty for drinking water would have been felt. Pot watering of grafts and plants had to be resorted to from December onwards and had to be continued till May. On the whole the season was unfavourable for perennials like pepper, etc., as well as to the annual crops.

A detailed statement of the rainfall received during the period is given in Table I.

TABLE I.—Statement of rainfall.

		1951-52.		1950-51.		Average for the past ten years.		Average for the past 40 years.	
Month.	Week.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.
South-west monsoon.									
June 1951	..	1-6	0.39	1	..	0.88	0.82	1.29	0.88
	..	7-13	2.81	6	16.07	9.76	6.20	8.88	6.42
	..	14-20	11.48	7	7.45	11.28	6.00	9.71	6.13
	..	21-27	11.08	7	4.52	9.30	6.40	7.92	6.35
	..	28-30	7.25	3	0.92	..	..	4.44	2.49
July	..	1-4	1.21	3	0.75	12.24	6.20	6.13	3.20
	..	5-11	8.16	4	14.08	10.62	6.50	14.60	6.30
	..	12-18	9.04	7	16.88	11.48	6.50	12.37	6.41
	..	19-25	12.91	7	14.22	10.82	6.70	11.00	6.30
July-August	..	26-1	6.38	7	13.92	8.49	6.30	8.44	6.61
	..	2-8	8.19	6	11.96	8.12	5.50	6.89	6.32
	..	9-15	2.38	4	5.15	5.61	5.00	5.45	5.61
	..	16-22	5.10	6	1.61	6.71	6.00	3.91	5.71
	..	23-29	0.32	1	0.92	5.29	5.10	2.51	5.39

Month.	Week.	1951-52.		1950-51.		Average for the past ten years.		Average for the past 40 years.	
		Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.
South-west monsoon—cont.									
August-September ..	30—5	0.08	..	7.13	5	2.80	4.70	2.47	5.05
	6—12	1.70	3	6.47	5	3.55	4.50	2.50	3.80
	13—19	0.44	2	1.61	3	1.79	3.00	2.22	3.90
	20—26	1.61	2	0.72	5	1.73	3.10	2.33	3.38
Total ..		81.41	76	123.78	94	120.57	89.42	112.51	90.16
North-east monsoon.									
September-October..	27—3	0.17	7	0.65	4	1.16	2.60	2.74	3.06
	4—10	1.59	4	1.62	5	0.97	2.00	2.35	3.45
	11—17	2.35	3	1.59	2	2.35	2.70	2.50	3.28
	18—24	0.14	1	..	..	3.59	2.80	2.12	2.25
	25—31	0.58	2	..	..	0.95	1.70	1.92	2.90
November ..	1—7	1.76	2	0.99	2	1.52	1.70	2.65	2.30
	8—14	2.57	5	1.11	3	1.01	2.10	1.02	1.68
	15—21	0.53	2	2.71	2	1.74	1.80	1.18	1.59
	22—28	0.72	2	..	..	0.99	0.90	0.59	1.76
November-December.	29—5	0.42	1	..	..	0.48	1.00	0.64	0.61
	6—12	..	..	..	..	0.52	0.60	0.22	0.71
	13—19	..	..	0.02	..	0.50	0.40	0.12	0.18
	20—26	..	..	..	..	0.18	0.20	0.11	0.23
December-January..	27—3	..	..	..	..	0.23	0.01	0.04	0.09
	4—10	..	..	..	..	0.27	0.10	0.41	0.19
	11—17	..	..	..	..	..	..	0.03	0.05
	18—24	..	..	..	..	..	..	0.03	0.03
	25—31	..	..	..	..	..	..	0.02	0.14
Total ..		19.83	27	8.69	18	16.46	20.61	18.69	24.80
Hot weather.									
February ..	1—7	..	..	..	..	..	..	0.13	0.14
	8—14	..	..	..	..	0.32	1.10	0.23	0.14
	15—21	..	..	..	..	0.09	..	0.01	0.06
	22—28	1.08	3	..	..	0.01	..	..	..
February-March ..	29—7	..	..	..	..	0.25	0.30	0.01	0.06
	8—14	..	..	..	..	..	..	0.01	0.02
	15—21	..	..	..	..	2.10	0.20	0.72	0.15
	22—28	..	..	..	..	0.12	..	0.05	0.36
March-April ..	29—4	..	..	..	..	0.46	0.70	0.29	0.57
	5—11	..	..	0.44	1	0.54	0.80	0.21	0.43
	12—18	0.06	..	4.64	5	0.85	0.90	3.52	4.34
	19—25	0.37	2	1.20	1	0.65	1.00	0.18	0.86
April-May ..	26—2	..	..	..	..	0.45	0.90	0.28	1.16
	3—9	0.81	1	..	..	0.33	0.90	0.49	1.13
	10—16	1.02	1	0.01	..	0.93	1.40	1.48	1.60
	17—23	..	..	1.78	2	3.29	1.80	2.25	2.13
	24—30	0.74	2	0.33	1	1.94	2.80	4.30	3.30
May-June ..	31—5	2.13	5	11.86	6	6.31	3.70	3.23	6.28
Total ..		7.11	14	20.26	16	13.64	16.50	17.40	22.73
Grand Total ..		108.35	117	152.73	128	155.67	126.53	143.60	137.69

II. CROPS.

A. Wet lands.

(a) *Paddy*.—As in the previous year five varieties of paddy, namely, PTB. 8, PTB. 9, PTB. 13, along with Rajakayama and Kurumkayama were grown from May to September 1951 in an area of 6.14 acres for seed multiplication. Green manure was applied to the crop in the form of sunnhemp ploughed in situ at the rate of 4,000 lb. per acre. Besides groundnut cake and superphosphate at the rate of 250 lb. and 112 lb. respectively per acre were applied at the time of transplanting. Sixty pounds of ammonium sulphate per acre was applied in two equal doses, the first dose one month after planting and the second dose one month before flowering as top-dressing.

Paddy crop planted late showed attack of paddy Case worm (*Nymphula depunctalis*) but it was successfully brought under control by timely dusting of insecticides.

Due to drought condition late at September an improvised dam was constructed in the nearby channel and water was diverted to the wet lands.

The comparative yields per acre for the last five years are given below :—

TABLE II.

Variety.	1947-48.	1948-49.	1949-50.	1950-51.	1951-52.
	LB.	LB.	LB.	LB.	LB.
PTB. 8 ..	2,360	1,659	1,614	1,408	2,889
PTB. 9 ..	1,755	1,521	1,759	1,939	2,433
PTB. 13 ..	..	..	1,917	2,506	2,272
Rajakayama ..	1,460	1,947	1,414	1,133	1,633
Kurumkayama ..	2,527	2,062	2,223	1,588	2,875

Paddy varietal trial.—Object to compare the yields of PTB., strains, viz., PTB. 8, PTB. 9 and PTB. 13 with the local Kurumkayama.

Layout.—Randomized plot replicated six times.

Treatments.—

A Kurumkayama.

B PTB. 8.

C PTB. 9.

D PTB. 13.

Gross area of the plot—6.738 cents.

Net area of the plot—0.4775 cents.

Date of planting—20th August 1951.

Date of harvest—

PTB. 8—22nd September 1951.

PTB. 9—8th October 1951.

PTB. 13—9th October 1951.

Kurumkayama—9th October 1951.

The above trial was inconclusive.

(b) *Sunn hemp*.—Sunn hemp for green manure was raised in an area of 3.02 acres in the wet lands from the end of April to June 1952 with a view to get sufficient green manure to be ploughed in for the paddy crop. The germination was good and the growth was vigorous especially in the farm wet land where a maximum yield of 11,014 lb. per acre was recorded. The green manure was ploughed in for the paddy crop which followed.

(c) *Blackgram*.—An area of 2.75 acres in the farm and school wet lands was raised with blackgram to avoid land lying fallow during the summer months. Seventy-nine pounds of blackgram was obtained and this poor yield is attributed to severe summer conditions.

B. Dry lands.

(a) *Modan paddy*.—Modan paddy varieties, namely, Assam dry paddy, Black modan, Chennellu, Dirty modan, Kattamodan and Thonnuran were grown in

2.725 acres in the farm and school dry lands. The yields are tabulated below:—

TABLE III.

Variety.					Area.	Yield.	Acre yield.
					ACS.	LB.	LB.
Assam dry paddy					0.075	17	226
Black modan					0.20	60	300
Chennellu					0.20	45	225
Dirty modan					1.50	880	587
Kattamodan					0.55	247	449
Thonnuran					0.20	100	500

(b) *Chillies*.—A total area of 1.55 acres was grown with South Malabar, South Kanara, Pusa and Guntur varieties under dry condition. One thousand two hundred and fifty-eight pounds of dry chillies were obtained which works out to 811 pounds per acre. Comparatively the yield was much better than that of last year. This increase in yield may be attributed to the favourable seasonal conditions.

Chillies varietal trial.—Object: to compare the three varieties of chillies, namely, South Kanara, Pusa and Guntur with the locally cultivated variety, South Malabar.

Lay out—Randomized plot replicated five times.

Treatments—
A—South Malabar.
B—South Kanara.
C—Pusa.
D—Guntur.

Gross area of the plot—0.69 cents (300 sq. feet).

Net area of the plot—0.31 cents (135 sq. feet).

Planted on—21st June 1951.

Date of harvest—23rd September to 12th December 1951.

Summary of trials.

Particulars.	Treatments.				General mean.	'Z' test satisfied or not.	Standard error.	Critical difference (P=0.05).
	A.	B.	C.	D.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Percentage on general mean.	118.37	77.83	104.56	99.24	100	Yes.	11.56	25.2
Acre yield in lb.	4,839	3,181	4,274	4,056	4,037.5	..	472.52	1,030.05
Conclusions—A C D B T.								

From the results of the experiment it was indicated that South Malabar variety is better than the other three varieties followed by South Kanara and Guntur. The experiment is being repeated in 1952-53.

(c) *Ginger*.—An area of 0.16 acre was planted with Chernad variety of ginger. A poor yield of 170 pounds of green ginger was obtained which works out to an acre yield of 1,062½ pounds. The poor performance was due to lack of rains after planting.

(d) *Redgram*.—Five pounds of 'Attapadi' redgram seeds dibbled in line in an area of 1.0 acre in the Punam area, though germinated and progressed satisfactorily in the initial stage, failed due to the failure of the monsoon and consequent drought condition.

(e) *Tapioca*.—The Valenca variety was grown in bulk in an area of 0.09 acre in the Punam area and an acre yield of 4 tons and 173 pounds was obtained.

In the orchard outskirts butterstick variety was raised in an area of 12½ cents. The yield was very poor due to the attack of wild boars.

Among the varieties grown for observing the performance on 31st May 1951 (not regular trial), Rotikappa produced an acre yield of 5 tons and 1,787 pounds

followed by Valenca which gave 4 tons 1,204 pounds per acre. Butterstick produced an acre yield of 4 tons and 478 pounds. The general performance of the three varieties during the year was satisfactory.

Out of the six Travancore varieties namely Aryankappa, Pongankappa, Karpurakappa, Nedumangadan, Onthegadan and Elamurian planted in single rows in the Punam area for trial and multiplication of sets, the performance of Nedumangadan was found to be good.

The acre yields of the different varieties are given below.—

TABLE IV.

Number and variety.	Acre yield	
	TONS.	LB.
1 Aryankappa	6	1,080
2 Pongankappa	6	1,080
3 Karpurakappa	..	..
4 Nedumangadan	12	2,160
5 Onthegadan	6	996
6 Elamurian	1	987

The variety Elamurian gave a poor yield. Regarding Karpurakappa even the planted sets did not sprout. Development and size of tubers were good in the case of Nedumangadan and Onthegadan. The trial is continued this year also.

(f) *Horsegram*.—An area of 2.72 acres in the dry land was grown with horsegram in rotation with modan paddy after the harvest of paddy. Ash at the rate of 500 pounds per acre was applied at time of sowing. A total yield of 450 pounds of horsegram was obtained which works out to 165 pounds per acre after drying. The low yield is attributed to the vagaries of the monsoon.

(g) *Coconut*.—Five thousand and eighty nuts were harvested during the year from 331 trees. The trees received a manurial dose of 10 pounds of groundnut cake, 4 pounds of ammonium sulphate and 3 pounds of bonemeal followed by 20 pounds of ash per tree. The low yield was mainly due to the button shedding during the hot months.

(h) *Cotton*.—The two varieties of cotton namely, Moco and Quebradinho each grown in an area of 0.15 acre in block 7 of school dry land failed due to extraordinary drought condition.

(i) *Sunn hemp*.—An area of 1.50 acres in the Punam area was sown with sunn hemp seeds but the crop was a failure due to adverse weather conditions.

(j) *Castor*.—Ten cents in the Punam area was dibbled with castor seeds in line in July 1951. In spite of satisfactory germination in the initial stages, most of the plants died later due to extreme heat.

(k) *Fodder grass*.—Thin Napier grass planted during 1949 in the farm dry land bunds is progressing satisfactorily. Gaps were filled during the year.

(l) *Malayan oil palm*.—Out of the four Malayan oil palm seedlings remaining and planted during 1949 in the school dry land block 7, outskirts, all of them died during the summer months.

C. Garden lands.

(a) *Fodder grass*.—In plots 14 and 17 four varieties of fodder grasses were planted in August 1951 in an area of 42½ cents as follows:—

	CENTS.
Thin Napier grass	17½
Guinea grass	17½
Buffalo grass	7
Cenchrus ciliaris	½

Manuring was done at the rate of 5 tons per acre [with cattle manure. Thin Napier grass and Guinea grass showed luxuriant growth. Cutting for the first time was done in December 1951 and the yields are as follows :—

Variety.	Yield.	Yield per acre.
	LB.	LB.
Thin Napier grass	2,200	12,571
Guinea grass	990	5,657

The other two grasses namely, Buffalo grass and *Cenchrus ciliaris* were not harvested as they have not attained sufficient foliage by now. Thirty-five pounds of Thin Napier grass seeds were collected during the year.

(b) *Cotton*.—In the plot 25 of the garden lands an area of 0.20 acre was planted with the perennial Moco cotton in June 1951. The germination of the seeds was not satisfactory. Hence filling gaps had to be attended several times. Manuring was done with compost at the rate of 5 tons per acre. The crop gave a yield of 9 pounds and 12 ounce of kapas. The whole yield was sent to the cotton specialist as instructed by him.

(c) *Sweet potato*.—An area of 5 cents in the orchard outskirts was planted with sweet potato, a local variety. Manuring was done with cattle manure at the rate of 5 tons per acre. The yield was only 48 lb. which works out to 960 pounds of tubers per acre. The crop was purely rainfed and since the rains were scanty at the later stages the yield had decreased.

(d) *Arecanut*.—The produce from the arecanut trees was harvested and the total yield came to 103,288 arecanuts from 800 trees which works to an average of 129 nuts per tree. Out of this 8,024 seednuts were sown for raising seedlings and 83,902 nuts were sold in public auction.

(e) *Pepper*.—The seasonal conditions that prevailed during the year were unfavourable to pepper. The rainfall received during the south-west monsoon was unevenly distributed and this condition affected severely the pepper crop of this station as it did throughout Malabar. The usufructuary rights of the pepper crop at this station were auctioned for Rs. 4,925 and from the data collected during the harvest it was seen that from a total area of 22.25 acres under pepper 2,645½ pounds of green pepper was obtained.

Studies on the incidence of 'Pollu' and 'wilt' were continued. It has been found that incidence of 'Pollu' is considerably more in site which is very shady and that the Travancore varieties are more susceptible to 'Pollu' than the local varieties, Kalluvally and Balankotta. Severe incidence of 'wilt' has been found to be associated with soils of granite origin with disintegrating rock in the site, water-logging, lack of sufficient shade and care of the vines. Uthirankotta, one of the cultivated varieties has been found to be comparatively resistant to 'wilt.'

Blossom biological studies on pepper were in progress to study the difference between different varieties of vines of the same variety and to evolve a suitable technique for controlled pollination of pepper flowers for evolving new high yielding types.

An experiment in respect of seed propagation of pepper to determine the optimum depth at which the seed is to be sown, whether removing the seed coat is necessary for proper germination and to determine a suitable media for the seed beds for proper germination were carried out during the year. Only in respect of sowing the seeds with the seed coat and without the seed coat there is marked difference between treatments in favour of sowing the seed with the seed coat.

III. ORCHARD AND NURSERY.

1. *Mango varietal collection*.—Due to the unfavourable climatic conditions the performance of the mango trees was very poor this year. Out of a total population of 413 trees in 54 varieties 230 trees flowered out of which only 45 trees in 18 varieties have set fruit.

2. *Mango top-working trials*.—*Object*.—To find out the optimum period for top-working unthrifty mango trees to convert them into economical ones.

The mango top-working trials both by frame-working and insertion methods which were in progress for the past five years were concluded this year and the following details give conclusions arrived at :—

(a) *Insertion method*.—The trial was in progress for the past five years and every month two trees were top-worked by this method. The results of the past five years are given below :—

TABLE V.

Month.	Percentage of success in each year.									
	1947.		1948.		1949.		1950.		1951.	
	Tree 1	Tree 2	Tree 1	Tree 2	Tree 1	Tree 2	Tree 1	Tree 2	Tree 1	Tree 2
	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.
January	..	..	..	..	..	..	..	..	..	..
February	..	..	..	..	..	..	..	..	..	..
March	..	..	..	..	..	..	..	..	..	..
April	..	..	..	..	..	..	..	..	..	..
May	..	..	25	..	..	..	50	50	50	50
June	..	..	..	..	..	..	..	..	..	..
July	..	50	100	50	100	75	100	100	100	100
August	..	100	75	50	100	100	100	100	75	100
September	..	75	75	100	50	100	25	75	50	100
October	..	50	100	50	..	..	25	25	50	75
November	..	..	..	..	..	..	..	..	..	..
December	..	..	..	..	..	..	..	..	..	..

As shown in the table two trees were top-worked every month for the past five years by insertion method.

It is seen that from October 1947 to June 1948 the results are practically negligible and from July to October 1948 the success varied with a take ranging from two to four shoots out of four inserted on each tree. From a review of the above results it would appear that only the period from July to October is the one optimum for top-working mango trees by the insertion method and this has been confirmed by the trial conducted over a period of five years.

(b) *Frame-working method*.—The one other method of top-working which has now been pursued over two complete years (from July 1949 to June 1951) is frame-working seedling trees by inarching. Two trees were frame-worked every month for the past two years by inarching each with four Bennet Alphonso grafts and the following table gives the detail of the operation.

TABLE VI.

Month.	Percentage of success for the past two years.					
	1949.		1950.		1951.	
	Tree 1	Tree 2	Tree 1	Tree 2	Tree 1	Tree 2
	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.
January	..	..	25	50	50	25
February	..	..	50	50	25	25
March	..	..	50	25	25	25
April	..	..	75	25	25	25
May	..	..	75	50	50	75
June	..	..	100	75	100	100
July	..	..	100	75	..	..
August	..	..	100	100	..	..
September	..	..	100	100	..	..
October	..	..	100	75	..	..
November	..	..	75	50	..	..
December	..	..	75	75	50	25

In contra-distinction to the top-working, by the insertion method there has been a success throughout the year ranging from 25-100 per cent though the success have been relatively large in the months of June, July and October (70 to 100 per cent).

3. (a) *Jack inarching trial (Observational)*.—This trial to find out the best period of the year suitable for inarching on three root stocks, viz., jack, *Artocarpus hirsuta* and Rudrakshi conducted at monthly intervals for the past five years (from 1947 to 1951) was concluded this year and the following table gives the details of the operation. The inarching was done throughout the five years at the rate of six inarches on each stock per month.

TABLE VII.

Month.	Jack seedlings.					A. hirsuta.					Rudraksl.				
	Years.					Years.					Years.				
	1947	1948	1949	1950	1951	1947	1948	1949	1950	1951	1947	1948	1949	1950	1951
May	..	..	*50	33	0	16	10	0	0	0	33	50	0	0	0
June	..	..	50	33	83	50	20	0	0	66	33	10	16	0	66
July	..	..	66	50	83	60	70	0	16	83	40	30	16	16	83
August	..	..	33	33	83	60	10	33	33	83	40	60	50	66	50
September	..	..	0	50	33	40	50	0	33	16	40	50	0	33	16
October	..	..	16	33	0	10	40	0	16	0	20	30	0	16	0
November	..	..	0	16	0	0	0	0	0	0	10	0	0	16	0
December	..	..	0	33	0	0	0	0	0	0	0	0	16	0	0
January	..	..	0	0	0	0	0	0	0	0	0	0	0	0	0
February	..	..	0	0	0	0	0	0	0	0	0	0	0	0	0
March	..	..	0	0	0	0	0	0	0	0	0	0	0	0	0
April	..	..	50	0	0	0	0	33	0	0	0	0	33	0	0

* Shows the percentage of success in each month in the corresponding years.

From the data set above the period from November to April in all the three years was found to have proved entirely unfavourable though in a few instances there has been some amount of success. The results are sufficiently indicative of the fact that the optimum period for inarching on all the three stocks is roughly from June to August with possible extension during September if the weather continues to be propitious. The above findings are of much value in that it enables to restrict the graftings to the optimum period of June to August. As these months are rainy the grafting can be done economically as watering need not be attended to during this period.

(b) *Jack seed propagation*.—During the year 8,000 seeds from selected trees were collected and sown.

(c) *Singapore jack*.—Out of the 79 Singapore jack seedlings planted in the year 1948 only 14 seedlings are surviving at present. The progress of the seedlings is satisfactory though none have flowered till now. They have grown up to a maximum height of 14 feet 11 inches [13 feet 23 inches], the girth being 6.4 inches.

4. *Sapota rootstock trial—Object*.—To study, the merits and demerits of each of the stock, viz. *Bassia longifolia*, *Mimusops hexandra* and sapota with regard to growth, bearing, etc.

Area of each plot—1,875 square feet.

Total area—1.04 acre.

Date of inarching—15th August 1952.

Date of separation—15th November 1950.

Date of planting—19th June 1951.

Date of the collection of initial data—19th June 1951.

System of layout.—Randomized blocks replicated eight times with three trees for each treatment in one block.

Treatments.—A. Sapota seedling stock.

B. *Bassia longifolia*.

C. *Mimusops hexandra*.

The collection of necessary data is in progress. Though from the observations it is seen that the maximum growth is made by the plant on *Bassia longifolia* root stock, closely followed by plants on sapota and *Mimusops hexandra* stock respectively, the statistical analysis will be made next year when the growth measurements are expected to be sufficiently large to lend to analysis.

5. *Pineapple hormone trial*.—To induce early flowering in pineapple by the applications of alpha-naphthalene acetic acid in different concentrations in the form of 'Planofix', four months prior to the normal differentiation of inflorescence presuming that the suckers differentiate flower buds normally at the end of 12 months of planting.

Area of each plot—234 square feet.

Date of planting—17th September 1951.

System of layout.—Randomized block replicated five times with twelve suckers for each treatment.

Treatments.—A. Control.

B. Application of alpha-naphthalene acetic acid of .001 per cent strength in the form of 'Planofix', a proprietary chemical of May and Baker.

C. Application of alpha-naphthalene acetic acid of .003 per cent strength in the form of 'Planofix', a proprietary chemical of May and Baker.

D. Application of alpha-naphthalene acetic acid of .006 per cent strength in the form of 'Planofix', a proprietary chemical of May and Baker.

Manuring.—(1) Basal dressing of farm-yard manure at 20 tons per acre on 17th September 1951.

(2) Second dose of 10 tons of farm-yard manure per acre during June-July, i.e., 10 months after planting.

(3) Mulching during summer.

(4) Weeding as and when necessary.

For the above trial four applications of alpha-naphthalene acetic acid in the form of 'Planofix' have been already given as per programme. It is too early to judge the result of application.

Second experiment.—Pineapple hormone trial to delay the flowering beyond the normal period of pineapple crop by the application of alpha-naphthalene acetic acid in the form of 'Planofix' in different concentrations repeated 12 times at bi-weekly intervals for six weeks. The first application is to be made one month prior to the normal differentiation of inflorescence presuming that the suckers differentiate flower buds normally at the end of 12 months of planting.

Area of each plot—234 square feet.

Date of planting—17th September 1951.

System of layout.—Randomized plots replicated five times with 12 suckers for each treatment.

Treatments.—A. Control.

B. Application of alpha-naphthalene acetic acid of .01 per cent strength.

C. Application of alpha-naphthalene acetic acid of .05 per cent strength.

D. Application of alpha-naphthalene acetic acid of 0.1 per cent strength.

Manuring.—(1) Basal dressing of farm-yard manure at 20 tons per acre.

(2) Second dose of manure at 10 tons per acre during June-July 1952, i.e., 10 months after planting.

(3) Mulching during summer.

(4) Weeding as and when necessary.

The treatments have not been yet started as the hormone are to be applied only one month before the normal differentiation of flower buds.

6. *Root crops*.—The root crop planted during the year 1951 was miserable failure due to the late planting as a result of non-availability of seed materials. The unfavourable weather condition is also responsible for the poor yield.

During the year 1952 a second planting of the root crops was started early and new varieties of colocasia were introduced from Wynaad in a small scale. Dioscorea varieties were also added in the above trial.

The planting details are given below :—

TABLE VIII.

Serial number and name of root crop.	Date of planting.	Number of pits.
1 Elephant yam	29th Apr. 1952.	102
2 <i>Colocasia</i> varieties—		
Malaraman	Do.	18
Pilathatti	Do.	30
Karimchembu	Do.	12
Palchembu	Do.	120
3 <i>Dioscorea alata</i>	Do.	36
4 <i>Dioscorea aculeata</i>	Do.	36

The above root crops were planted in individual pits of 2' × 2' × 2' after manuring each pit with two baskets of farm-yard manure, one basket of dry leaves and two pounds of ash. The above heavy application is made as per the local custom as the root crops require heavy manure and the laterite soils in these parts are deficient in organic matter due to the heavy rainfall characteristic of West Coast.

7. *Jack hybridization*.—A small scale jack hybridization work was attempted during the period with an idea to study its possibility on jack breeding work. The following initial observations were recorded and the work is under progress.

Local jack—Female flower.—This takes 10 to 15 days from the visible differentiation of flower buds to complete opening of flowers. Flowering starts from the base and it takes seven days for all the flowers in the inflorescence to open.

Male flower.—The male flower takes three days from the opening from the leathery sheath to start flowering. In male catkins the complete emergence of anthers take place in three or four days. The anther dehiscence commences at 7 p.m. and reaches the peak in one and a half hours. After 8-30 p.m. about 75 per cent of the anthers would have shed their pollen though a few may continue up to 10 p.m. The anthers after shedding their pollen gradually fade away and in three or four days turn black and finally fall.

Receptivity of stigma.—Flowers pollinated after third or fourth day after the opening of flowers resulted in fruit set. Under visual observation the stigma of jack do not show any secretion as an indication of receptivity. The stigma fade away on the third or fourth day after pollination and gradually dry up. But the stigma of flowers without pollination did remain fresh for about 20-30 days without any change.

The female flowers covered to prevent pollination also set fruit but the size was very small and drop off after one or two months. On examination of such fallen fruits no seed set or carpel development was noticed.

The bread fruit and *Artocarpus hirsuta* follow the same pattern as jack regarding the time of receptivity, anther dehiscence, etc.

But in bread fruit anthers were not found to develop and dehisce and seems to be peculiar in that in other places they are said to produce pollen. Any way these preliminary observations are yet to be confirmed before coming to any definite conclusion.

The following crosses were done during the period to study their possibility in jack breeding work :—

Artocarpus hirsuta (male) × jack (female).—Six batches of crossings in each of the four following treatments were done :—

Jack female flowers were subject to the following :—

- (1) Open pollination.
- (2) No pollination.
- (3) Jack (female) × jack (male) of the same tree.
- (4) Jack × *Artocarpus hirsuta* (male).

The seeds of these (except 2) were collected and sown in pots. In not 'pollinated fruit' (flower was covered by bag to prevent pollination) no seeds were available.

Reciprocal crossing.—Jack (male) × *Artocarpus hirsuta* (female).—Two fruits only resulted out of the above crosses and the seeds of these have been sown. Along with this seeds from open pollinated fruit and selfed fruit (dusted with the pollen of the same tree) were also sown in pots.

In 'not pollinated' (covered fruit) no seeds were found. But these require further confirmation.

Bread fruit (female) × jack (male).—Six batches of the following treatments were given :—

- (1) Leaving spike for open pollination.
- (2) No pollination.
- (3) Pollinating with jack pollen.

Pollinating the female flowers of the fruit with its own pollen and the reciprocal crossing with jack as female was not done as pollen was not available in the male spikes. The above fruits are yet to be harvested.

Further observations on these are under progress and in general the following preliminary conclusions may be recorded :—

- (1) In jack open pollinated fruit was bigger than the fruit which is a result of cross between *Artocarpus hirsuta* × jack.
- (2) There was no increase in size in bread fruit or *Artocarpus hirsuta* as a result of dusting with the pollen of jack.
- (3) 'Not pollinated' (covered fruit) was very small without seed or carpels though the fruit developed up to 4 lb. in weight and of length 26 centimetre and circumference 42 centimetre.

8. *New introduction of fruits and other horticultural crops and their progress*.—
(a) *Miscellaneous plants*.—Of the different fruit plants introduced at this station the progress of mulberry, lemon varieties, cacao, surinam cherry and sathgudi continued to be satisfactory.

The gaps in this area caused by the death of nutmeg, avocado and rambutan were replanted with plants received from Kodur, Kallar and Burliar gardens.

(b) *Selection and introduction of early bearing mango varieties*.—The progress of Nangilary mango grafts, early bearing Mundappa grafts, Burma grafts and mango hybrids introduced at this station progressed satisfactorily during the period. The removal of stock and side sprouts and provision of cages and stakes were made whenever necessary.

(c) *Roselle* (*Hibiscus subdariffa*).—This crop introduced at this station during 1952 progressed satisfactorily.

(d) *Singapore jack*.—Out of the 79 Singapore jack seedlings planted in the year 1948, only 14 seedlings are surviving at present. The progress of the seedlings is satisfactory though none have flowered till now. They have grown up to a maximum height of 13 feet 23 inches, the girth being 6.4 inches.

(e) *Date palm*.—Out of 110 date palm seeds sown during 1949 only 40 plants survived after a period of two years. The progress of the surviving plants is satisfactory.

(f) *Balsa wood*.—Out of 124 seedlings planted in the station during 1950, 99 are surviving and are making good progress. They have grown up to a maximum height of 14 feet and girth 8 inches, within a period of 10 months.

(g) *Indigofera teysmanii*.—Out of 200 seeds sown on (second batch received from the Systematic Botanist, Coimbatore) 8th May 1952 only 10 seedlings have come up till now. The progress of the germination is being watched.

The 12 seedlings got from the 95 seeds sown on 30th November 1951 were transplanted in plot 9 on 14th June 1952. At present the seedlings have grown to a maximum height of 3 feet and girth half an inch.

Fruits of appeal to poor classes—(a) *Indian gooseberry*.—During the period 7½ ounce of seeds were sown, out of which 300 seedlings were got and potted for distribution.

(b) *Eugenia jambolana*.—To popularize this cheap fruit 50 lb. of seeds was collected and sown and the seeds have only just started germination.

(c) *Bastard sago*.—To extend the area of this useful palm in the district 2,500 seeds were distributed. About 500 seeds have been sown for raising seedlings for distribution.

9. *Number of private orchards visited by the staff for advisory calls including the number of orchards to which skilled labour was deputed for assisting in propagation, etc.*—Six private orchards were visited during the period and arrangements are in progress to raise grafts of jack and mango from individual trees of merit for planting in this station. No grafts were raised during the period from private orchards.

Skilled labour was deputed to six gardens for grafting and other horticultural operations.

10. *Number of enquiry received both in person and by post and attended to.*—During the period 720 references were attended to regarding plant distribution and plant advisory work.

Other items of note and interest which are considered fit for incorporation in the annual report—*Vegetable seed production*.—During the period the production of vegetable seeds was intensified for meeting the ever increasing demand from the district staff. As a result 312 lb. of amaranthus seed (summer) and 112 lb. of bitter gourd (summer) were produced. About 900 ash gourds were also harvested and reserved for seed extraction.

This is the maximum production of vegetable seeds so far produced at this station.

IV. LIVESTOCK.

Eight work bullocks were maintained during the year. The bullocks herd consisted of 13 animals including the breeding bull and one work animal at the beginning of the year. There was four births during the year and one work animal and one she-buffalo were auctioned and one she-buffalo and five calves died during the year. At the end of the year the total number of 17 animals in the stock consisted of eight work bullocks, one breeding bull, four she-buffaloes two heifer calves and two bull calf.

Milk yield.—During the year a total yield of 4,606½ lb. of milk was obtained from four she-buffaloes.

Silage.—During the year a total quantity of 77,800 pounds of green grass was ensilaged at a cost of Rs. 701-13-0 and a quantity of 68,030 pounds of excellent silage was prepared. The ratio of silage to green grass was 87 per cent. The cost of preparing silage works out to the rate of 97 pounds per rupee.

V. PESTS AND DISEASES.

But for the caseworm (*Nymphula depunctalis*) on paddy and *Epilachna* beetles on brinjal there were no cases of insect attack of any serious extent. Proper control measures were taken by repeated dusting with 'Hexidol' and the pests brought under control.

VI. SALES AND TRANSFERS.

Particulars.	Quantity disposed of by sales and transfers.
Mango grafts	2,063
Malta lemon plants	2,296
Jack seedlings	1,631
Arecanut seedlings	903
Sapota grafts	342
Jack grafts	6
Banana suckers	6
Pineapple suckers	171
Mangosteen seedlings	32
Arecanuts	91,727 (bulk and seed).
Tapioca cuttings	3,500
Chilli seedlings	2,9300
Mango seedlings	200
Pepper cuttings	166
Coffee seedlings	125
Brinjal seedlings	62
Roseapple seedlings	12
	LB.
Paddy seeds	14,295
Cashew (seed)	360
Napier grass seed	95
	OZ.
Vegetable seeds	20-11
	LB.
Horsegram	168
Crotalaria seeds	120
Banana fruits	2,816
Pineapple fruits	6,32½
Jack fruits	1,948
Tapioca, yam, etc.	3,097½
Sapota fruits	2,436½
Vegetables	1,207½
Mango fruits	1,376
Papaya fruits	180½
Cashew (bulk)	1,460
Fuel	39 cart-loads.
Dry chillies	1,443½
Sago palm seeds	1,500 numbers.

AGRICULTURAL RESEARCH STATION, TALIPARAMBA,
28th September 1952.

COIMBATORE,
13th September 1952.

P. V. RAJAPPAN,
Fruit Assistant.

S. S. KATCHAPESWARAN,
Deputy Director of Agriculture.

APPENDIX I.

FINANCIAL STATEMENT FOR JULY 1951 TO JUNE 1952.

Receipts.

XXIX. Agriculture—Agricultural Receipts—

	RS.	A.	P.
1 Agricultural stations	11,383	15	9
2 Miscellaneous receipts	1,156	9	3
3 Rent on buildings	135	10	0
4 Recoveries of overpayments			
Total ..	12,676	3	0
Add revenue on account of stocks transferred ..	8,741	12	1
Grand total ..	21,417	15	1

XXXIX. Civil Works—

Rent on residential buildings	302	0	0
P.W.D. 111. Other remittances	59	0	0
Total ..	361	0	0

Charges.

1 Pay of Establishment—Permanent	8,639	0	0
2 Allowances—			
Travelling allowance	1,099	0	0
Dearness allowance	2,656	2	0
Total (1 and 2) ..	12,394	2	0
3 Contingencies—			
Petty construction and repairs	1,000	0	0
Purchase of live and dead stock	482	3	3
Working expenses	39,560	6	11
Other contingencies	1,394	2	6
Dearness allowance to manials	4,539	0	0
Total ..	46,975	12	8
Grand total of items 1 to 3 ..	59,369	14	8
50. d. Civil Works—Repairs—1 Ordinary area—			
(a) Ordinary repairs to residential buildings	80	0	0
(b) Special repairs to buildings			
Total ..	80	0	0

APPENDIX II.

ATTEMPTS MADE TO INCREASE THE REVENUE AND REDUCE THE EXPENDITURE OF THE FARM.

1. *Improving irrigation facilities.*—Irrigation at this station can be done only for the paddy crop which covers annually an area of 6.97 acres. Only a single crop is raised on this area as done in the neighbourhood. After the paddy is harvested vegetables for seed production are raised in about 3 acres. The rest of the area used to lie fallow.

A second crop of paddy can be raised if irrigation facilities are provided. There is a small river flowing by the side of the farm. If a 15 horse power oil engine is installed on the river bank within the wet land area a second crop can be raised by lifting water from the river. Provision of Rs. 7,500 has been made in the Budget for 1952-53 for installing such an engine for this purpose.

There is a perennial fountain of very limited capacity near the western end of the paddy area which if converted into a reservoir and replenished with much larger supply of water by boring into the rock which supplies the fountain, sufficient water could be made available in the summer for irrigating the fruit and arecanut nurseries, arecanut garden and a second crop of paddy in an area covering a total of 2.67 acres. This has to be investigated and given effect to if found possible.

Irrigation of vegetables.—Nearly 2 acres of wet lands were planted with summer vegetables for seed production work. This was started at the end of November 1951. This area had to be irrigated and usually lift irrigation by picottah was resorted to. This year as a novel measure, the stream running along the border of the paddy area with its water level 4 feet below the level of the wet lands was dammed by constructing an improvised dam made of stakes, plaited coconut leaves and mud at an approximate cost of Rs. 10. With the aid of this dam, irrigation could be carried over an area of one acre for nearly one month saving a daily expense of approximately Rs. 10 per day. This is a definite measure of reducing the cost of cultivation.

Increasing the yield of paddy.—The average yield of paddy at this station during the past three years (1948-49, 1949-50 and 1950-51) were 1,797 lb., 1,778 lb. and 1,714 lb. per acre respectively. In 1951-52 however an average yield of 2,500 lb. per acre was obtained as a result of growing sunnhemp and puddling it before paddy was transplanted. Growing of sunnhemp as a green manure crop for paddy was done this year also.

2. *Reducing fallow period.*—As already mentioned nearly 3 acres of wet lands which used to be fallow from November to May have been sown with blackgram in November-December 1951 with a view to reduce the fallow period of wet lands and has increased the income. This will be done in future also.

3. *Raising live-fence.*—In an attempt to raise fence to protect an area of 20 acres in the farm *Prosopis* seeds were sown during the last season. The gaps are being filled during this season in an attempt to raise a live-fence to protect this area.

Glyricidia cuttings have already been planted all along the borders of the paddy area where *Sesbania* cannot be planted.

Adathoda cuttings have already been planted all along the farm bunds bordering the main roads passing through the station.

Glyricidia and Adathoda will increase the production of green manure as well as cuttings, and seeds for further multiplication and distribution.

4. *Rehabilitation of the pepper plots of the station.*—This is the only crop in this farm the income from which can be substantially increased by proper improvement methods. Considering the prevailing prices of commodities raised at this farm this is the only crop which can increase the income of the station substantially. Much money was not spent during the past decade to maintain the pepper crop extending over 13 acres as the prices obtained at that time was not commensurate with the expenses involved and was really unprofitable. This lack of attention to the pepper crop has caused such a deterioration to the crop that all the 13 acres put together is only actually equal in productive capacity to 2 acres of normal pepper crop. That is the reason why the 13 acres of pepper produced only a low yield. The whole area was overgrown with thick shade making it impossible to the vines to produce anything. An attempt was made during the last two seasons to rehabilitate these pepper plots by first reducing the shade to the required amount by ruthlessly lopping the standard trees which have grown from 50 to 60 feet high and replanting pepper cuttings to the standards made vacant by the death of large number of vines. This work which was in progress during 1950 and 1951 has made the existing vines yield to their normal capacities. The record of yield and price received for pepper during 1950 was mainly due to this rehabilitation work. The 1951 season was an extremely poor year of pepper. It was reported that North Malabar has a whole obtained not more than 10 per cent of the yields recorded during last year. Prominent pepper growers who visited the Research Station were of opinion that the yield of pepper in this station would be nearly 40 per cent of previous year's yield, i.e., four times the average yield of pepper in this taluk. They were also unanimously of the opinion that the comparatively good yield obtained at this station was entirely due to the rehabilitation work (thinning shade, digging regularly, etc.) done during that year. That meant at least Rs. 3,000 out of the Rs. 4,975 obtained from pepper during that season was due to the improvement work done.

During the current season also about 1,000 vacancies in this pepper crop of this station were filled up with rooted cuttings raised at this station. The process if continued for the next 2 to 3 years also is bound to increase the income from this crop vastly during the coming years.

Some of the vacant trees standing in plot 26 of the station were also planted with pepper cuttings.

5. *Rehabilitation of the old coconut block.*—In the old coconut garden at this station there were nearly 50 vacancies caused by the death of old trees. These gaps were also filled up during the season with high quality coconut seedlings obtained from the Agricultural Research Station, Nileshwar.

As was done in the case of coconut crop 71 arecanut seedlings were planted in plot 11. This is bound to increase the revenue from this crop in the long run.

6. *Cacao plantation*.—With a view to establish production of cacao as an industry on the West Coast, 7 acres of the abandoned pepper area at this station, are being planted during this season with *Criolla cacao*. This area is intended to be cacao *cum* pepper area and is bound to increase the income of the station in the long run. This is a scheme approved by the Director of Agriculture at my suggestion.

6. *Vegetable seed production*.—Five hundred and twelve pounds of amaranthus seeds have been produced at this station for distribution. One hundred and twelve pounds of bittergourd seeds and 900 ashgourds for seeds, have been produced at this station for distribution.

7. *Production of plants*—(a) *Malta lemon*.—The target fixed for the production of Malta lemon plants has been exceeded during the year.

Efforts are being also made to increase production of mango and sapota grafts and seedlings for which there is an ever-increasing demand which we are unable to meet at present.

(b) *Cashew*.—With a view to increase the area under cashew in rocky shallow soiled areas unfit for other crops planting in block 9 of about 5 acres with cashew seedlings is in progress.

(c) *Pineapple*.—The area under pineapple is being increased from 1 acre to 2 acres.

It may be mentioned that this being a station devoted to perennial trees the process of increasing the revenue is bound to be a slow one.

APPENDIX III.

COSTS OF PRODUCTION OF PLANTS.

Mango grafts—

	RS.	A.	P.
Cost of mango seedlings purchased	97	8	0
Cost of collection of mango stones and seedlings	250	0	0
Preparing beds and planting mango seedlings	159	0	0
Weeding mango nursery	135	9	0
Watering mango grafts	241	7	0
Grafting, giving cuts and separating grafts	167	12	0
Potting mango seedlings	102	8	0
Beating coconut husk	89	14	0
Transporting and soaking coconuts	12	0	0
Manuring mango nursery	26	13	0
Cost of manures	50	10	0
Cost of potting materials used—			
Cost of mudpots (3,200) at Rs. 80 per 1,000	256	0	0
Cost of coconut husk	35	0	0
Cost of gunny twine 32½ lb. at Rs. 2-4-0 per lb.	73	2	0
Cost of coir twist for packing	49	5	0
Paraffin wax 38 lb. at Rs. 1-10-0 per lb.	61	12	0
Grating cloth used 86 yards at Re. 1 per yard	80	0	0
Coir twist for grafting	30	4	0
Transport charges on red earth, sand and cattle manure and cost of preparation of potting mixture	85	0	0
Cost of 12 cart-loads of cattle manure at Rs. 5 per cart-load	60	0	0
Total cost of production	2,063	8	0

Cost of 2,045 grafts produced at Re. 1 per graft	3,045	0	0
Profit	981	8	0

Malta lemon—

Cost of Malta lemon cuttings 6,410 at 1 anna each	400	10	0
Preparing beds and potting Malta lemon cuttings	20	5	0
Hoeing, weeding and other operations	5	7	0
Cost of bamboo tubes for potting	300	0	0
Cutting charges for bamboo	13	3	0
Proportionate transport charges on potting mixture containing red earth, sand and manure	10	0	0
Potting charges	25	6	0
Total	774	12	0
Number of rooted cuttings produced, 5,647 at 4 annas per cutting	1,411	12	0
Profit	637	0	0

RS. A. P.

Jack seedlings—

Cost of jack seeds used for sowing 10,000 seeds at Rs. 5 per 1,000	50	0	0
Preparing beds and sowing jack seeds	19	15	0
Potting jack seedlings (6,000)	45	8	0
Weeding and hoeing nursery beds	3	8	0
Cost of potting materials used (2,000)	62	8	0
Cost of coir twist 200 hanks at 4 annas per hank	50	0	0
Cost of three cart-loads of cattle manure at Rs. 15	15	0	0
Transporting charges on red earth and sand	7	12	0
Total cost of production	254	3	0

Cost of 6,000 seedlings available for sale at 4 annas each	1,500	0	0
Profit	1,245	13	0

Sapota graft—

Preparing beds and sowing Mimosa hexandra seeds	7	4	0
Weeding and hoeing nursery beds	6	6	0
Cost of grafting, giving cuts and separating	12	0	0
Watering charges	22	0	0
Beating husk for potting	16	0	0
Cost of gunny thread 4 lb. at Rs. 2-4-0 per lb.	9	0	0
Cost of coir rope for potting (150 hanks at 6 annas per hank)	4	11	0
Cost of mud pots 500 at Rs. 80 per 1,000	40	0	0
Grafting wax 2 lb. at Rs. 1-10-0 per lb.	3	4	0
Cost of 4 yards of kora cloth at Re. 1 per yard	4	0	0
Cost of 12 hanks of coir twist at 4 annas per hank	3	0	0
Total cost of production	127	9	0

Number of grafts produced 500 at Re. 1 each	500	0	0
Profit	372	7	0

Arecanut seedlings—

Cost of 8,024 areca seed nuts used for sowing at Rs. 20 per 1,000	160	8	0
Forming beds and sowing seeds	3	6	0
Watering charges	30	12	0
Cleaning and weeding nursery beds	6	4	0
Total	200	14	0
Cost of 6,050 arecanut seedlings produced at 3 annas each	1,134	6	0
Profit	933	8	0

APPENDIX IV.

LOCAL NAMES OF CROPS.

Name of crops.	Local name of crop.
Paddy	Nellu.
Sunn hemp	Chanam.
Blackgram	Uzunu.
Modan paddy	Puthada.
Chillies	Parangi.
Ginger	Enji.
Redgram	Thovara.
Tapioca	Marakizhangu.
Horsegram	Muthira.
Coconut	Nalikeram.
Cotton	Paruthi.
Castor	Avanakku.
Sweet potato	Chakkara kizhangu.
Arecanut	Adakka.
Pepper	Kurumilaku.
Colocasia	Chembu.

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Name of crops.	Local name of crop.
<i>Dioscorea alata</i>	Kacil.
<i>Dioscorea aculeata</i>	Mullamkizhangu.
Jack	Chakka.
<i>Artocarpus hirsuta</i>	Ayini pilavu.
Bread fruit	Bilathi chakka.
Rosello	Pulicheera.
<i>Eugenia jambolana</i>	Naval.
Indian gooseberry	Nelli.
Date palm	Etha pazham.

APPENDIX V.

LOCAL WEIGHTS OF IMPORTANT CROPS.

Particulars.	Local weight, or measure.
Paddy	Seer.
Balekgram	Do.
Chilli	Pound.
Ginger	Do.
Redgram	Seer.
Tapioca	Pound.
Horsegram	Do.
Sweet potato	Do.
Areca nut	Number.
Pepper	Pound.
Colocasia	Do.
<i>Dioscorea</i> varieties	Do.

APPENDIX VI.

COST OF PRODUCTION AND RECEIPTS OF THE IMPORTANT CROPS AT THE
AGRICULTURAL RESEARCH STATION, TALIPARAMBA.

Serial number and name of crop.	Area grown.	Cost of production per plot.	Total value realized per plot.	Cost of production per acre.	Value realized per acre.	Profit or loss per acre.
	ACS.	RS.	RS.	RS.	RS.	RS.
1 Wet land paddy	6.14 (bulk)	1,604	2,651	248	448	200
2 Dry land paddy	2.72	223	399	86	186	100
3 Pepper *	27.00	1,994	4,631	75	177	102
4 Coconuts	11.20	1,030	1,642	92	147	551
5 Chillies †	1.35 (bulk)	568	337	426	272	154

* Pepper crops is in a very deteriorated condition due to the neglect for many years. So much so there is only 1 acre of normal pepper crop.

† Steep fall in the price of produce resulted in a loss in this crop.

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PILICODE (NILESHWAR I), FOR THE YEAR 1951-52 (FASLI 1361).

MAIN CROP—COCONUT.

Soil—Laterite gravel.

Season and rainfall.—A total rainfall of 107.74 inches distributed over 111 rainy days was recorded during the year as against 134.88 inches received on 115 rainy days during 1950-51. The average for the past 10 years is 139.58 inches of rain on 117.3 rainy days.

The south-west monsoon commenced in the first week of June 1951 and continuous rains were received till the middle of September. A total rainfall of 83.00 inches was received on 73 rainy days as against 111.52 inches of rain received on 89.0 rainy days during the corresponding period of last year.

The north-east monsoon rains commenced in the last week of September and continued to the end of November 1951. A total rainfall of 17.94 inches was received on 22 rainy days as against 9.77 inches of rain received on 14 rainy days during the corresponding period of the previous year.

The few summer showers received during the middle of April and May 1952 were highly beneficial to the coconut palms and facilitated the sowing of green manure crops and paddy. A total rainfall of 6.80 inches was received on 18 rainy days as against 13.60 inches received on 12 rainy days during the corresponding period last year.

The rainfall statement is furnished in Table I.

TABLE I.—Rainfall statement—Agricultural Research Station, Pilicode.

Month.	Week.	1951-52.		1950-51.		Average for ten years (1942 to 1951).	
		Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.
1951.		South-west monsoon.					
June	7-13	19.39	7	0.03	5	12.69	6.2
	14-20	10.07	7	13.17	7	11.53	6.3
	21-27	4.23	6	6.52	4	7.53	6.0
June-July	28-4	1.63	5	2.11	6	9.23	6.4
	5-11	3.83	4	12.98	7	9.08	6.1
	12-18	10.63	7	13.09	7	11.53	6.5
	19-25	13.21	7	14.06	7	10.95	6.5
July-August	26-1	3.38	6	12.97	7	6.79	6.0
	2-8	3.47	7	9.99	7	6.01	5.7
	9-15	3.79	5	4.78	6	4.02	4.9
	16-22	4.82	6	1.21	2	5.69	5.1
	23-29	0.06	..	0.54	2	3.66	4.1
August-September	30-5	0.22	1	7.23	6	3.15	4.4
	6-12	4.50	4	8.03	7	3.47	4.4
	13-19	0.03	..	1.63	4	1.91	3.2
	20-26	0.19	1	2.25	5	2.13	3.3
	Total ..	83.00	73	111.52	89	109.47	85.1
		North-east monsoon.					
September-October	27-3	5.69	7	3.44	2	1.92	2.8
	4-10	3.37	4	1.26	4	0.95	1.6
	11-17	4.07	3	2.12	3	1.73	2.2
	18-24	..	..	..	..	1.63	1.8
	25-31	0.59	2	..	..	0.77	1.4
November	1-7	1.17	3	1.75	2	0.95	1.2
	8-14	1.09	1	1.16	3	0.71	1.2
	15-21	0.46	1	0.04	..	2.88	1.0
	22-28	1.50	1	..	..	0.37	0.5
November-December.	29-5	..	..	..	..	0.11	0.3
	6-12	..	..	..	..	0.53	0.7
	13-19	..	..	..	..	0.07	0.1
	20-26	..	..	..	..	0.35	0.4

		1951-52.		1950-51.		Average for ten years (1942 to 1951).	
Month.	Week.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.
North-east monsoon—cont.							
December 1951-January 1952	27-3	..	..	..	..	..	..
	4-10	..	..	..	..	0.16	0.1
	11-17	..	..	..	..	..	..
	18-24	..	..	..	..	0.22	0.3
	25-31	..	..	..	..	..	..
Total ..		17.94	22	9.77	14	12.80	16.5
Hot weather rains.							
1952.							
February ..	1-7	..	..	..	..	0.06	0.1
	8-14	..	..	..	..	0.05	0.1
	15-21	..	..	..	..	0.02	0.1
	22-29	0.19	1	..	..	0.26	0.2
March ..	1-7	..	..	..	..	0.06	0.1
	8-14	..	..	..	..	0.05	0.1
	15-21	..	..	..	..	0.23	0.6
	22-28	..	..	..	..	0.37	0.8
March-April ..	29-4	..	..	..	..	0.90	0.8
	5-11	..	..	..	..	0.34	0.4
	12-18	0.54	1	3.96	4	0.15	0.5
	19-25	0.18	1	..	..	0.71	1.1
April-May ..	26-2	0.37	1	..	..	0.47	1.2
	3-9	0.64	2	0.18	1	3.87	2.0
	10-16	0.46	2	..	..	2.33	2.8
	17-23	0.39	1	1.69	1	7.39	5.0
	24-30	0.60	3	..	..	..	..
May-June ..	31-6	3.45	4	7.76	6	..	..
Total ..		6.80	16	13.59	12	17.31	15.7
Grand total ..		107.74	111	134.88	115	158.39	117.3

The maximum temperature during the year ranged between 98.0°F (May 1952) and 79.0°F (July 1951) and minimum temperature ranged between 80.0°F (May 1952) and 60.0°F (December 1951).

Soil analysis.—Representative samples of soil at the station taken from the different blocks were analysed during the year by the Government Agricultural Chemist, Coimbatore. Results of analysis are furnished in Table II.

TABLE II.—Soil analysis at the Agricultural Research Station, Pilicode—1951.

Head of analysis.	Northern extension.		Block I.		K. extension.	
	0-12"	12"-24"	0-12"	12"-24"	0-12"	12"-24"
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Moisture ..	1.50	1.87	1.48	1.87	1.55	1.54
Loss on ignition ..	4.43	8.02	5.23	5.48	5.25	5.21
Lime ..	0.057	0.081	0.037	0.043	0.107	0.080
Potash ..	0.22	0.23	0.28	0.23	0.30	0.24
Phosphoric acid ..	0.089	0.090	0.075	0.072	0.062	0.073
Nitrogen ..	0.092	0.084	0.089	0.083	0.075	0.095
Available P2O5 ..	0.0030	0.0029	0.0066	0.0031	0.0031	0.0062
Available K2O ..	0.0036	0.0039	0.0016	0.0025	0.0023	0.0018
Clay ..	24.93	35.85	25.18	29.69	32.09	28.94
Silt ..	6.60	6.90	6.24	6.56	7.21	7.16
Fine sand ..	20.84	17.83	21.40	19.24	15.67	15.46
Coarse sand ..	48.71	42.03	48.71	45.34	46.68	49.83
Block I.						
	0-12"	12"-24"	0-12"	12"-24"	0-12"	12"-24"
(8)	(9)	(10)	(11)	(12)	(13)	(14)
Moisture ..	2.42	2.58	1.73	1.99	2.08	2.32
Loss on ignition ..	6.67	6.13	5.39	5.76	6.29	5.89
Lime ..	0.029	0.054	0.040	0.048	0.061	0.050
Potash ..	0.29	0.27	0.17	0.20	0.26	0.23
Phosphoric acid ..	0.095	0.085	0.081	0.064	0.061	0.047
Nitrogen ..	0.099	0.085	0.085	0.071	0.110	0.086
Available P2O5 ..	0.017	0.0022	0.017	0.0069	0.015	0.0014
Available K2O ..	0.0072	0.0034	0.0025	0.0018	0.0048	0.0086
Clay ..	38.32	44.14	27.73	32.4	34.05	37.78
Silt ..	10.71	10.47	6.90	7.60	9.50	8.91
Fine sand ..	13.76	12.60	22.43	19.26	16.99	16.12
Coarse sand ..	38.60	34.27	44.35	42.70	40.99	38.61

Remarks.—The soils are loams to clay loams. They are poor in lime status and available potash and P2O5. Total P2O5 and nitrogen are present in good quantities.

2. **Cultural and manurial operations.**—(i) **Cultural operations.**—All the non-experimental blocks received two ploughings with monsoon or Cooper plough. The first ploughing was given in September-October and the second ploughing during November-December 1951. The showel cultivator was worked in January-February 1952 and *H.M.Guntaka* in March-April 1952 to create soil mulch and arrest weed growth. The cultivator was again worked in April-May 1952 at the time of sowing the green manure crops.

The experimental blocks received the cultural operations as per schedule.

(ii) **Manurial operations.**—The coconut palms in the non-experimental blocks were given the general dose of manures, viz.,

	LB.
Groundnut cake ..	7½
Ammonium sulphate ..	3
Super phosphate ..	2
Ash ..	30
Green leaves ..	100

per tree per year.

Groundnut cake and ammonium sulphate were applied in shallow trenches along with the green manure while super phosphate and ash were applied broadcast over the entire area and ploughed in. Coconut seedlings received half the general dose of manures. Trees under manurial experiments in blocks C and D received the scheduled dose of manures.

Fruit trees.—Graft mangoes and sapotas in block L were not manured, with a view to chocking the vegetative growth.

The oil palms.—On the border of blocks KA and L were manured with three pounds of ammonium sulphate and 20 lb. of ash per tree, per year.

The cashew trees.—In block N.V. received manuring at the rate of ten pounds of ash per tree per year.

(iii) **Burying of coconut husks and leaves.**—Block J.A.—Burying of coconut husks and leaves in trenches 6 feet wide and 15 inches deep was taken up in the north-south direction in block JA during 1951. A total of 60,000 husks and 15,800 leaves were buried in an area of 1.88 acres.

Effect of husk burial in the Block G—Area 4.37 acres.—Burial of husks in block G was started in the year 1947 and was completed during the year 1950. The pre-treatment and post-treatment yields are given in the Table III.

TABLE III.—Block G—Yield of nuts.

Pre-treatment yield.						Post-treatment yield.					
1942.	1943.	1944.	1945.	1946.	Mean.	1947.	1948.	1949.	1950.	1951.	Mean.
5,703	6,313	5,497	8,093	5,773	6,275.8	7,819	11,022	6,186	9,412	7,070	8,301.8

The post-treatment yields show an average increase of 2026 nuts per year over the yield of the pre-treatment period. The yield of coconut all over the tract is in general very poor due to the adverse seasonal conditions during the last two or three years. But it may be observed that the trees in the plot buried with husk withstand the drought remarkably and maintain the yields.

(iv) **Green manures.**—(a) *Crotalaria striata* was sown in April-May 1951 for green manure purposes in the blocks C, D, F, H, I (part) and K (part). The germination of seeds and yield of green stuff was satisfactory. The crop was lopped and

buried in shallow trenches in between rows of trees. The calculated acre yields of green stuff obtained in the different blocks are furnished in the following table:—

Block.	Area sown in acres.	Calculated yield per acre of green stuff in lb.	Remarks.
C ..	2.97	4,200	Manurial experiments.
D ..	2.95	5,000	Do.
F ..	3.52	5,118	Non-experimental area.
H ..	4.32	3,460	Do.
I (part.) ..	1.50	2,600	Do.
K (part.) ..	0.50	2,800	Do.

Crotalaria striata was sown for green manure in blocks C, D, F and I (part) during May 1952. The germination was observed to be rather poor.

(b) *Other green manure crops.*—*Crotalaria striata* variety *acutifolia* was grown during the south-west monsoon period in block G in observation plots. A calculated acre yield of 6,500 lb. of green leaves was obtained in the case of variety *acutifolia* whereas *crotalaria striata* gave the calculated acre yield of 7,200 lb. of green stuff in similar observation plots.

(c) *Hyptis suaveolens* a local herbaceous wood, which came up well in the main blocks gave the following acre yield of green stuff:—

Block.	Area in acres.	Acre yield of green stuff in lb.
F ..	3.52	13,760
H ..	4.32	9,600
I ..	1.93	12,250
FA ..	1.85	12,150
Average ..	...	11,940

3. *Harvests.*—Ripe coconuts were harvested every month and detailed harvest notes were recorded for all the bearing trees. A total number of 26,615 ripe nuts were harvested from 1,328 bearing trees during the year 1951, which works out to an average yield of 20 nuts per bearing tree, per year. The number of nuts harvested from 1937 onwards are furnished in Table IV.

TABLE IV.—Coconuts—Annual yield of nuts—Pilicode.

Year.	Total number of nuts harvested.	Number of bearing trees from which nuts were harvested.	Mean yield of nuts per bearing tree.
1937 ..	15,057	752	20.0
1938 ..	27,388	980	27.9
1939 ..	38,840	1,229	31.6
1940 ..	32,112	1,250	25.7
1941 ..	40,044	1,327	30.2
1942 ..	45,977	1,413	32.5
1943 ..	53,508	1,411	37.9
1944 ..	41,265	1,408	29.3
1945 ..	70,548	1,422	49.6
1946 ..	41,046	1,432	28.7
1947 ..	71,796	1,451	49.5
1948 ..	94,038	1,469	64.0
1949 ..	47,488	1,473	32.2
1950 ..	62,916	1,491	42.2
1951 ..	26,615	1,328	20.0

The yield of coconuts for each block with the number of bearing trees and average yield per tree for the year 1951 are furnished in Table V.

TABLE V.—Block-wise yield of nuts in 1951.

Block number and special features.	Number of nuts harvested.	Number of bearing trees.	Mean yield of nuts per bearing tree.
A ..	266	5	53.2
B Office block ..	377	7	53.9
C Manurial experiments ..	3,033	143	21.2
D Do. ..	2,116	143	14.8
E Cultural experiments ..	2,940	180	16.3
F ..	1,153	118	9.8
G Husk buried area (started in 1947 and completed in 1950).	7,070	175	40.4
H Exotic varieties ..	3,042	135	22.5
I ..	1,507	102	14.8
J Cultural experiment and exotic varieties.	2,996	167	17.9
K ..	1,356	68	19.9
FA ..	281	26	10.8
JA ..	478	59	8.1
Total ..	26,615	1,328	20.0

During the years 1948–49 and 1949–50 the north-east monsoon completely failed and the coconut trees suffered much due to the severe drought during summer. The vagaries of the season had to a large extent affected the setting of female flowers. There was considerable shedding of buttons due to inadequate summer rains. The low yield of nuts during 1951 may be attributed to these factors.

4. *Experiments and research*—(i) *Manurial experiment on adult coconut trees*—(a) *Method of application*—Object.—To find out the best method of applying the usual manures to coconut trees in laterite gravelly soils—

Field—Block C.

Area—2.97 acres.

Treatments.—Applying 4½ lb. of ammonium sulphate, 30 lb. of ash, 2 lb. of bone-meal and 100 lb. of green leaf per tree, per year in—

(a) Circular basins to a radius of eight feet round each tree and depth of one foot.

(b) Broadcast over the entire area and ploughing in.

(c) In linear trenches two feet wide and one foot deep in between rows of trees.

Layout.—Randomised blocks replicated five times with two experimental trees per plot.

The experiment was started in 1948. Observations on the production of leaves and female flowers and on the yield of nuts are being recorded. The yield and leaf production data for 1951 when statistically analysed did not show any significant differences due to the treatments. The summary of results is furnished in Table VI.

TABLE VI.—Manurial experiments—Yield and leaf characters, 1951.

Treatment number and details of treatment.	Mean yield of nuts per tree in 1951.	Mean number of leaves produced in 1951.
1 Applying manures in circular basins round each tree	16.5	13.0
2 Applying broadcast and ploughing in ..	14.3	12.3
3 Applying in linear trenches in between rows of trees	26.5	12.3
Whether 'Z' test satisfied or not P=0.05	No.	No.
Standard error ..	4.25	0.22

The experiment is being continued to get conclusive results.

(b) *Comparison of potassic fertilizers—Object.*—To find out the best potassic fertilizer that could effectively replace ash, sufficient quantity of which are not, available locally for manuring the coconut trees.

Field—Block D.

Area—2.95.

Treatments—

- | | |
|------------------------------------|---|
| (a) Potassium sulphate | } on equivalent K ₂ O basis. |
| (b) Muriate of potash | |
| (c) Ash (30 lb. per tree per year) | |

The trees in addition to the treatments receive 13½ lb. of groundnut cake and 2 lb. of bone-meal per tree per year. The green manure crop of *Crotalaria striata* will also be raised and the green stuff cut and applied at a uniform rate of 100 lb. per tree per year.

The experiment was started in 1951. Observations on the yield and leaf characters of the trees under the experiment are being made.

(ii) *Cultural experiments—(a) Ploughing versus digging—Object.*—To find out and compare the effects of ploughing with monsoon plough and digging the soil with mamutty on the yield of nuts and the minimum number of ploughings required to get proper yields.

Field—Block E.

Area—3.55 acres.

Treatments—

- (1) Ploughing with monsoon plough once in August-September.
- (2) Ploughing with monsoon plough twice in June and September.
- (3) Ploughing with monsoon plough thrice in June, September and November.

(4) Digging the soil 9 inches deep with mamutty once in August-September.

All the trees in the block receive in addition to the cultural treatments, the general dose of manures, viz., 7½ lb. of groundnut cake, 3 lb. of ammonium sulphate, 2 lb. of super-phosphate and 20 lb. of ash per tree per year.

Layout.—Randomized blocks replicated five times with two experimental trees per plot.

The experiment was started in the year 1942 and no significant results were obtained till 1950. The yield data for 1951 were analysed statistically. It was found that the differences in yield due to treatments were not significant.

The summary of results is furnished in Table VII.

TABLE VII.—Cultural experiments—Yield of nuts during 1951.

Treatment number and details of treatments.	Mean yield of nuts per tree in 1951.	Whether "Z" test Significant or not (P=0.05.)	Standard error.
1 Ploughing once in August-September.	10.0	No.	2.70
2 Ploughing twice in June and September	14.4		
3 Ploughing thrice in June, September and November	10.6		
4 Digging 9" deep once in August-September	18.4		

The experiment is being continued to get conclusive results.

(b) *Depth of cultivation—Object.*—To find out the correct depth to which the soil in a coconut garden has to be cultivated.

Field—Block J (part).

Area—3.22 acres.

Treatments—

- (1) Ploughing thrice, 4" deep with monsoon plough.
- (2) Ploughing thrice, 6" deep with Victory plough.
- (3) Digging 5" deep with mamutty and forming mounds in September

and breaking up the mounds and levelling in December-January.

The ploughings will be given roughly at two months intervals in June, August and October. The trees in the block receive, in addition to the treatments, the general dose of manures, viz., 7½ lb. of groundnut cake, 3 lb. of ammonium sulphate, 2 lb. of super-phosphate and 30 lb. of ash per tree per year. Further the trees receive green leaf at the rate of 100 lb. per tree.

Layout.—Randomized blocks replicated six times with two experimental trees in each plot.

The experiment was started in 1948 and observations on the yield of nuts and production of leaves were made. The data collected during 1951 did not show any significant differences due to the treatments. The summary of the analysis is given in Table VIII.

TABLE VIII.—Coconut—Depth of cultivation experiment—Yield and leaf characters, 1951.

Treatment number and details of treatment.	Mean yield of nuts per tree in 1951.	Mean number of leaves produced in 1951.
1. Ploughing 4" deep	24.25	9.7
2. Ploughing 6" deep	19.66	11.6
3. Digging 5" deep and mounding	18.16	11.10
Whether 'Z' test satisfied or not (P=0.05)	No.	No.
Standard error	5.40	0.62

The experiment will be continued to get conclusive results.

(iii) *Subsidiary crop trials—Object.*—To find out the most remunerative crop that can be cultivated in the shade of coconut trees to provide an additional source of income to the coconut grower.

Field—Block I (part).

Area—0.28 acre.

The following seven crops were under trial during the year 1951-52:—

Crops.	Variety.
(a) Dry paddy	Parambanavara.
(b) Tapioca	Valenca.
(c) Elephant yam	Local.
(d) Cotton	Sea Island (Monteserrat).
(e) Turmeric	Local.
(f) Ginger	Local.
(g) Pineapple	Kew.

Layout.—Randomized blocks replicated four times, each plot being one cent in area. The coconut trees in the blocks received the general dose of manures and the subsidiary crops received cattle manure at the rate of 2,000 lb. per acre and ash at 1,000 lb. per acre.

The yield data for 1951 are presented in Table IX.

TABLE IX.—Subsidiary crops for coconut gardens—Yield data, 1951.

Serial number and name of crop.	Calculated acre yield in lb.	Cost of cultivation per acre in rupees.	Mean value of produce per acre in rupees.	Remarks.
(1)	(2)	(3)	(4)	(5)
1 Paddy { Grain	337½	192	61	Loss
2 Tapioca	1,500	364	94	"
3 Elephant yam	1,150	239	216	"
4 Cotton	2.7	239	8	"
5 Turmeric	500	372	125	"
6 Ginger	62½	364	24	"
7 Pineapple	750	271	47	"

It is found that elephant yam gave the maximum calculated gross return per acre during the year under trial. During the previous years of trial pineapple and tapioca were also found to give good gross returns. The yield of these two crops are poor during the year under report as they were attacked by wild bears and jackals.

The trial will be repeated in 1952.

(iv) *Coconut varieties suited for cultivation in low-lying areas—Object.*—To spot out the variety or varieties that will come up best in low-lying areas subject to water stagnation during the south-west monsoon period.

Field—Block F.A.

Area—1.80 acres.

The following nine varieties are under trial :—

- (1) Laccadive ordinary.
- (2) Andaman ordinary.
- (3) Laccadive small.
- (4) Cochin-China.
- (5) Java.
- (6) Philippines.
- (7) Fiji.
- (8) Tall × Dwarf.
- (9) West Coast (Tall).

Layout.—Latin square with nine replications and nine seedlings per plot. The seedlings were planted on the surface in August 1947.

Observations on the following vegetative characters are being made and recorded :—

- (a) Rate of leaf production.
- (b) Longevity of leaves.
- (c) Measurable characters of shed leaves, such as length of petiole, length of leaflet bearing region, length of longest leaflet and number of leaflets per leaf.

(d) Girth at collar.

(e) Number of leaves on the crown.

The summary of the data gathered in 1951 are furnished in Table X.

TABLE X.—Coconut seedlings planted in low-lying area—Leaf characters and girth measurements, 1951.

Serial number and name of variety.	Mean number of leaves produced during 1951.	Mean number of functioning leaves in the crown on 31st December 1951.	Mean girth at collar in inches on 31st December 1951.
1 Tall × Dwarf	6.5	9.3	27.8
2 Philippines	7.6	9.9	29.9
3 Laccadive ordinary	6.6	9.2	25.7
4 Fiji	7.4	9.6	27.7
5 Andaman ordinary	6.8	8.6	25.6
6 Laccadive-small	5.8	7.8	22.4
7 Cochin-China	6.8	8.0	26.3
8 West Coast	6.3	7.3	18.3
9 Java	7.1	9.7	29.5

It may be observed from the data collected in 1951 on the vegetative characters of the seedlings that varieties, Java, Philippines, Fiji, Tall × Dwarf and Laccadive ordinary are promising. The varieties best suited are to be finally judged from their yields when they come to normal bearing. The observation made this year is in conformity with that made in 1950. The observations are being continued.

(v) *Exotic and State varieties—Study of—Object.*—To find out the varieties which are promising with regard to the yield of nuts, quality and quantity of copra and the percentage of oil in copra. Promising varieties will be utilized for propagation and breeding economic types.

The following observations were recorded on all the exotic and State varieties at the station :—

- (a) Rate of production of leaf,
- (b) Longevity of leaf,
- (c) Female flower production,
- (d) Yield of nuts, and
- (e) Setting percentage.

The data collected in 1951 are summarized in Table XI.

TABLE XI.—Coconut—Exotic and State varieties—Palm characters, 1951.

Serial number and variety.	Mean number of leaves produced in 1951.	Mean number of days for emergence of leaves from sheath.	Mean longevity of leaves in days.	Mean number of female flowers produced.	Mean yield of nuts.	Setting percentage.	Number of palms under study.
1 Fiji	12.0	30.4	750.5	67.4	13.0	19.3	18
2 Straits Settlements	13.5	20.6	776.7	84.0	18.7	29.2	8
3 Laccadive ordinary	12.5	25.5	780.9	317.4	33.5	12.4	7
4 Laccadive small	11.5	30.0	840.3	307.0	51.6	13.0	9
5 Laccadive dwarf	11.0	24.3	650.4	91.0	25.0	27.5	1
6 Andaman ordinary	12.5	25.5	805.6	102.4	22.0	21.5	5
7 Andaman giant	12.0	25.7	865.2	130.6	19.0	14.6	1
8 Andaman dwarf	12.5	24.5	650.4	67.0	9.5	14.2	4
9 Philippines	13.0	28.0	780.8	119.0	20.8	17.5	11
10 New Guinea	12.5	23.3	700.4	125.6	20.6	16.4	4
11 Cochin china	12.5	24.2	940.2	89.0	10.7	12.0	6
12 Siam	14.0	28.0	720.0	171.0	24.0	14.0	1
13 Java	12.5	24.5	780.6	91.1	18.9	20.8	10
14 Bombay	13.5	29.0	930.4	202.0	23.0	14.8	9
15 Bengal	12.0	26.2	675.4	50.2	11.0	21.9	2
16 Ceylon	12.0	23.5	845.0	157.8	25.3	16.0	4
17 Godavari	12.5	26.5	780.0	103.2	14.4	13.3	5
18 Tanjore	12.0	30.4	775.2	138.0	96.0	20.6	1

From the data collected during the year it is observed that the following are the promising varieties :—

- (1) Laccadive ordinary.
- (2) Laccadive small.
- (3) Andaman ordinary.
- (4) Philippines.
- (5) Siam.

Among the State varieties Tanjore is found to be the most promising. This is in conformity with the observations made previously. The observations will be continued.

(vi) *Coconut breeding.*—The progenies of the inter-varietal crops between the West Coast tall and dwarf variety were under study at the Coconut station. The performance of these progenies for over 15 years was very encouraging. The progeny palms have the economic characters of early bearing, high yield, good quantity and quality of copra and oil. These progenies have also become very popular with the ryots and they are in high demand. With a view to meeting the

demand for these hybrid seedlings, large scale production of pollinated seed coconuts of this cross was taken up at this station, during the year under report.

One hundred tall variety mother palms were selected in December 1951 and artificial cross pollination was done with pollen from the dwarf variety during the summer months of 1952 from January to May.

A total of 386 inflorescences were pollinated during the 1952 season. Also 898 tall and dwarf pollinated coconuts, pollinated during 1951 season, were harvested for raising seedlings for distribution.

Twenty inflorescences of the Andaman ordinary (economic variety) were crossed with the pollen from the Straits Settlements variety (medium dwarf in character) for the production of pollinated nuts for raising seedlings.

(vii) *Miscellaneous trials*—(a) *Incidence of rhinoceros beetle*—*Object*.—Certain palms and varieties are found to be more susceptible to beetle attack than others. The object of this study is to estimate the extent of beetle attack in relation to season, variety, etc.

The study was started in 1948. The data collected in 1951 with regard to the number of beetles removed from crowns of trees and killed are furnished in Table XII.

TABLE XII.—Details of beetles extracted from crowns of trees, 1951.

Serial number and variety.	Total number of trees in each variety.	Number of beetles caught and killed in												Total.	Average number of beetles per tree.
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.		
1 West Coast	1,325	168	188	165	212	224	76	19	63	37	49	109	49	1,359	1.0
2 Omalur	6	5	..	..	..	..	..	..	..	..	5	..	..	15	2.5
3 Kulitalai	6	1	..	..	..	..	..	..	..	..	..	..	..	1	0.2
4 Koduripadu	6	1	..	..	..	..	..	..	..	..	..	..	..	1	0.2
5 Indupalli	26	4	..	12	..	..	..	..	..	..	..	..	..	23	0.9
6 Laccadive ordinary.	35	8	..	9	..	..	..	..	..	..	5	..	..	23	0.7
7 Fiji	6	..	..	..	..	..	13	..	..	..	..	..	..	13	2.2
8 Andaman ordinary.	22	4	..	..	..	..	13	..	..	..	..	..	..	13	0.6
9 Straits Settlements.	5	..	..	..	..	..	..	..	..	..	..	..	..	3	0.6
10 Laccadive dwarf	20	1	..	..	..	19	16	..	..	..	..	..	..	33	1.7
11 Philippines	5	..	..	..	..	..	..	..	..	..	..	..	..	2	0.4
12 Mysore	5	..	..	..	..	..	..	..	..	..	..	21	..	23	4.6
13 Laccadive small	15	3	..	..	..	19	..	..	..	..	..	..	..	22	1.5
14 Andaman giant	5	..	..	..	..	..	..	..	..	..	..	..	..	4	0.8
15 Ceylon	7	3	..	..	..	..	..	..	..	..	..	..	..	15	2.1
16 Bengal	2	..	..	..	..	..	7	..	..	..	..	..	..	14	7.0
17 Godavari	8	..	..	5	..	..	..	..	..	..	..	..	..	13	1.6
18 New Guinea	7	..	..	1	..	..	..	..	..	..	..	..	..	8	1.1
19 Cochin China	8	..	..	..	..	11	..	..	..	..	..	..	..	15	1.9
20 Kappadam.	6	..	..	2	..	7	..	..	..	..	..	..	..	9	1.5
21 Bombay	23	..	..	..	..	10	..	..	..	..	..	..	..	10	0.4
22 Andaman dwarf	4	..	..	..	..	..	..	..	..	..	1	..	..	9	2.3
23 Java	15	..	..	2	..	9	..	9	..	..	4	..	..	24	1.6
Total for each month	..	209	188	212	212	317	126	41	63	37	87	109	70	1,671	..
Percentage of attack to the total for different months.	..	12.5	11.3	12.7	12.7	19.0	7.5	2.5	3.8	2.2	5.2	6.5	4.2	..	..

It may be observed that the incidence of beetle attack is maximum during summer months and the exotic varieties of palms appear to be more susceptible to beetle attack than the West Coast tall or other State varieties. Observations will be continued.

These observations are in conformity with those of the previous year.

(b) *Assessing the loss due to beetle attack*—*Object*.—Since the exact extent of damage caused by the rhinoceros beetle is not known, an experiment was started in 1948 to assess the loss in yield of coconuts due to beetle attack.

Field—Block F.

Treatments.—(1) Sixteen trees vigorously kept free from beetle attack by regular search both in the morning and evening.

(2) Sixteen trees left without search for beetles form the control.

The data collected during the last three years on the yield of nuts have not given useful indications to assess the true value of loss due to beetle attack as the yield of nuts in general, was very poor due to adverse seasonal conditions.

(c) *Inheritance of characters in the coconut*.—*Object*.—To study how far the characters of parent trees are inherited by the progeny and the nature of inheritance in the coconut.

The following are the characters scheduled for the study:—

- 1 Colour of potiole.
- 2 Colour of nut.
- 3 Shape of nut.
- 4 Size of nut.
- 5 Thickness of kernel.
- 6 Spiral nature.

Materials.—The materials for the study consist of these lfed, natural and cross progenies of Kasaragod parents that were planted some years ago at the Agricultural Research Stations, Pilicode and Nileshwar III.

Preliminary observations on the spiral nature of the progenies and parents were made during the year under report. The results of the observations are furnished below:—

(1) The spiral nature of the parent trees does not appear to be truly inherited by the progenies because parent trees with left spiral do have progenies with right spiral and *vice versa*.

(2) In the selfed progenies except in a few cases the major number of progenies of each parent have left spiral irrespective of the spiral of the parent tree. The data are furnished in Table XIII.

TABLE XIII.—Data relating to the study of inheritance of spiral nature in coconut.

Selfed progenies—Inheritance of spiral nature.				
Serial number and parent.	Spiral of parent tree.	Number of progenies that are true to the parent.	Number that are not true to the parent.	Total.
(1)	(2)	(3)	(4)	(5)
1 I/58	Left	8	6	14
2 I/84	"	4	1	5
3 I/109	"	17	9	25
4 I/129	"	10	5	15
5 I/139	"	2	2	4
6 IV/94	"	1	3	4
7 VI/4	"	15	12	27
8 VI/116	"	4	3	7
9 VIII/127	"	17	18	35
10 I/174	"	10	14	24
11 I/25	Right	1	2	3
12 I/148	"	3	2	5
13 I/158	"	5	11	16
14 I/138	"	3	2	5
15 IV/97	"	1	4	5
16 IV/103	"	3	3	6
17 VI/97	"	5	11	16
18 VIII/146	"	4	7	11
Total	..	113	115	228

Natural progenies—Inheritance of spiral character.

Serial number and parent. (1)	Spiral. (2)	True. (3)	Not true. (4)	Total. (5)
1 I/53	Left	1	2	3
2 I/84	"	2	2	4
3 I/109	"	4	5	8
4 I/129	"	6	7	13
5 I/139	"	2	1	8
6 I/174	"	1	3	4
7 IV/94	"	2	4	6
8 VI/4	"	0	4	4
9 VI/116	"	1	4	5
10 I/127	"	3	2	6
11 X/55	"	2	6	8
12 X/76	"	3	3	6
Total ...		27	43	70
13 I/148	Right	0	2	2
14 I/158	"	2	0	2
15 I/138	"	1	0	1
16 IV/97	"	2	4	6
17 IV/103	"	0	1	1
18 VIII/146	"	0	2	2
19 I/10	"	4	4	8
20 I/88	"	8	0	8
21 I/182	"	4	4	8
22 VI/136	"	1	2	3
Total ..		22	19	41

Cross progenies—Inheritance of spiral characters.

Female parent.	Male parent.	Spiral of female.	Spiral of male.	Number of progenies true to female.	Not true to female.	Total.
I/53 ..	VIII/146 ..	Left	Right	11	7	18
VIII/146 ..	I/53 ..	Right	Left	3	4	7
I/109 ..	I/158 ..	Left	Right	3	1	4
I/158 ..	I/109 ..	Right	Left	2	5	7
I/129 ..	I/138 ..	Left	Right	25	28	53
I/138 ..	I/129 ..	Right	Left	1	4	5
				45	49	94

On an examination of the data collected it is observed that the progenies do not follow any regular sequence in the inheritance of spiral nature. Since the number of progenies are too small and the progenies of different parent trees are not equal in number, it is difficult to arrive at any general conclusions.

Shape of nut and thickness of kernel are the other characters taken up for study. The data are being gathered.

(d) *Tall × dwarf coconut*—The study of F₂ generation.—In order to study the performance of the F₂ progenies of tall × dwarf hybrid coconut, 140 seedlings from 10 selected parent trees at Nileshwar II were planted in Block NI during September 1950. The seedlings are coming up satisfactorily. Twenty-seven gaps were filled up during the year.

(e) *World variety × Gangabondam crosses*.—During the year 1949, forty-eight seedlings of world variety (♀) × Gangabondam (♂) crosses were planted in Block KA and the progenies were under study for the various seedling characters.

The measurable characters of the seedlings were continued to be observed during the year 1951. The data gathered are furnished in Table XIV.

TABLE XIV.—Progenies of Exotic varieties × Gangabondam seedling characters, 1951.

Details of crosses.				Mean number of leaves produced in 1951.	Mean number of functioning leaves in the crown on 31st December 1951.	Mean girth at collar in inches on 31st December 1951.
Laccadive ordinary	×	Gangabondam	..	6.6	7.6	14.0
Laccadive small	×	do.	..	5.6	7.3	16.0
Andaman ordinary	×	do.	..	6.0	6.0	15.0
Cochin china	×	do.	..	6.6	7.0	15.0
West Coast tall	×	do.	..	6.3	7.4	17.0
Java	×	do.	..	6.3	8.6	17.0

All the progenies are quite vigorous particularly the cross between Java × Gangabondam. The observations on the progenies will be continued and their performance finally judged from their yields when they come to normal bearing.

5. *Pests and diseases*—(a) *Rhinoceros beetle*.—This is one of the major pests on coconut. As the damage done is immense, regular search for the pests is being carried out on the crowns of trees and the beetles removed with an iron hook and killed. Manure pits and compost pits where the beetles regularly breed are searched for periodically and the beetle grubs picked out and destroyed. In all 1,671 beetles were removed from the crowns of trees and 218 beetle grubs picked out from the manure pits and killed during the year.

(b) *Nephentis Serinopa*.—There was a serious attack of this pest during the year under report. The affected leaflets of trees in blocks D and C (part) were cut and burnt. Spraying with 0.2 per cent strength of wettable D.D.T. 550 on all the trees in the remaining blocks infested with *Nephentis serinopa* and the release of parasites, namely, Bethyrid and Eulophid brought the pest under control. Spraying with 0.2 per cent wettable D.D.T. was found very effective in controlling the spread of the pest.

(c) *Shoot rot*.—This disease was noticed on three trees in Block H, viz., 72, 78, and 97 (Fiji variety) during the year. The attack was very mild. A preventive spraying was given with one per cent Bordeaux mixture prior to the onset of the south-west monsoon to all the trees and seedlings.

6. *Other crops*—(a) *Subsidiary food crops (bulk)*.—The following food crops were grown on a bulk scale, during the year. The calculated acre yields obtained from the various crops raised are furnished in Table XV.

TABLE XV.—Yield of various subsidiary crops.

Block and crop.	Date of sowing.	Area sown in acres.	Seed rate per acre. Lb.	Manures applied in lb. per acre.			Acre yield in lb.		Net income. RS. A. P.
				Cattle manure.	Ash.	Compost.	Grain.	Straw.	
G Dry paddy Parambanavara.	28th May 1951 ..	2.00	80	5,000	2,500	..	412	320	118 0 0
G Dry paddy Kattamoodam.	31st May 1951 ..	1.00	80	5,000	2,500	..	288	320	48 0 0
J Sweet potato ..	20th June 1951 ..	0.50	6 head loads	*5,000	1,000	2,500	1,467 of tubers.	..	23 0 0
FA, Varagu ..	20th June 1951 ..	1.00	15	5,000	..	..	crop failed.	..	..

* Green leaves.

(b) *Vegetables*.—During the south-west monsoon period of 1951, *Bondai* crop was raised in an area of 10 cents. A total quantity of sixteen and a half pounds of seeds were collected for distribution.

(c) *Redgram*.—The short duration Tenkasi variety of redgram and the local were raised in plots of 0.25 acre each during the year in Block K. Manuring was done at the rate of 5,000 pounds of cattle manure and 1,000 pounds of ash per acre. Sowing was done in the month of June 1951 in lines six feet apart. An acre yield of 50 lb. of seed was obtained from the local variety while the Tenkasi variety gave an acre yield of only sixteen pounds.

(d) *Fodder crops*—(i) *Thin Napier grass*.—During the year 10 lb. of seed and 15,100 slips were collected on the Farm and distributed. The crop was not grown in a compact area and hence no yield records could be maintained. This year, the slips are being planted in an acre and yield records will be maintained in future.

(ii) *Cumbu × Napier hybrid*.—The hybrid fodder grass slips planted in block A came up well. The slips are being cut and planted for multiplication.

(e) *Green manure*—(i) *Gliricidia maculata*.—Ten thousand cuttings of *Gliricidia* obtained from the existing plants at the station were planted in the nursery during the summer months of 1952 and pot watered. Eighty-five per cent of the cuttings sprouted and the sprouted cuttings are being utilized for planting on the Farm along the sides of the roads, footpaths, drains and boundaries.

Two pounds of seeds were collected from the existing plants and half a pound of seeds were sown in the nursery for raising seedlings.

(ii) *Sesbania speciosa*.—Five pounds of seeds of *Sesbania speciosa* received from Nileshtar were sown in the nursery in 1952. The seedlings raised are being planted all along the sides of the foot paths and drainage channels on the station.

(iii) *Bodantum (Bauhinia variegata)*.—The five *Bodantum* trees at the station made satisfactory growth during the year and 1,000 lb. of green leaves obtained from these trees were used for manuring the sweet potato crop in Block H.

(f) *Oil-bearing trees*.—(i) *African oil palm*.—The twenty-two oil palms planted along the borders of Blocks KA and L during the year 1934 are progressing satisfactorily. The palms were manured with 20 lb. of ash and 3 lb. of ammonium sulphate per tree per year.

(ii) *Other oil-bearing trees*.—The oil-bearing trees of teak (*Teetona grandis*), neem (*Azadiracta indica*), punnai (*Calophyllum inophyllum*), Payyil (*Vateria indica*) and pungam (*Pongamia glabra*) are all growing satisfactorily.

(g) *Fruit plants*.—(i) *Graft mangoes*.—Out of the 92 trees planted during 1933-34 only 10 trees have flowered and borne fruits during the year. A total of 283 lb. of mango fruits were harvested and sold during the year from the *Bennet alphonso*, *Mundappa* and the *Neelam* trees.

(ii) *Cashew*.—The cashew trees in Block NV planted during 1940 have not flowered during the year. The plants are slow in growth. The trees were manured with ash at the rate of 10 lb. per tree and the area ploughed twice during the rainy months.

One hundred selected cashew seeds were sown in Block NVIII 25 feet apart during the year under report.

(iii) *Malta lemon plants*.—The six malta lemon plants in Block B were utilized for propagation. One thousand two hundred and thirty cuttings were taken from these plants and potted for rooting in coconut spathe baskets. A total of 807 rooted cuts were sold during the year under report.

(iv) *Singapore jack*.—The four surviving jack seedlings planted in 1947 have not flowered so far.

(v) *Local jack*.—The one grown-up tree near the manure-pit flowered very late.

(vi) *Sapota*.—Out of 28 sapota plants only the 3 grafts are bearing. The plants raised from seeds have not flowered so far. During the year 35 lb. of fruits were harvested and sold.

(vii) *Citrus*.—The following varieties of citrus were planted at the station during the year 1950:—

- (1) Sathugudi budded.
- (2) Acid lime seedlings.
- (3) Citron seedlings.
- (4) Rajahmundry lemon layers.
- (5) Lemon Nepali budded (round).

The plants are making satisfactory growth, they have not yet flowered.

(viii) *Cacao*.—Out of the 24 cacao plants planted in October 1951, only four seedlings are surviving and they are also very stunted in growth. The seedlings were planted in Block A.

Pits have been dug in Block L in-between rows of mango trees for planting 100 cacao seedlings in August 1952.

(ix) *Cotton*.—Sea Island cotton was sown in 1951 in an area of 0.22 acre in Block KA. A total of 51.8 oz. of kapas was obtained.

(x) *Kapok*.—The twenty-two kapok plants along the boundary are progressing satisfactorily.

7. *New plantings*.—Fifty coconut seedlings were planted during the year under report in the gaps caused by the death of seedlings. The details are furnished in Table XVI.

TABLE XVI.—New Plantings, 1951.

Variety.	Number of seedlings.	Block and pit numbers.
F ₂ of tall × dwarf	27	N-I 2, 3, 11, 16, 21, 22, 25, 28, 29, 43, 53, 58, 64, 74, 98, 103, 105, 111, 115, 119, 121, 122, 124, 132, 133, 81 and 90.
Bansa hybrid	1	KA. 51
West Coast tall	13	G-14; H. 7, K-23 and 93, E-6; C-70; JA-24, 25, 40, 41 and 104; FA-14 and F-146.
Straits Settlements	3	H-112, 123 and 132.
Laccadive dwarf	1	H-185
Dwarf green	1	H-214
Siam	1	J-30
New Guinea	1	J-1
Tall × dwarf	1	FA-43
Bengal	1	H-98

Total number of seedlings—50 (fifty) seedlings.

8. *Silage and hay-making*.—During the year 3,500 lb. of hay was prepared from the green grass cut on the station. The thin Napier and ordinary grasses were cut and ensilaged. The silage obtained was fed to cattle during the summer months. Out of 15,800 lb. of green grass put in the silo 8,530 lb. of good silage was obtained. Thus the outturn of good silage worked out to 54 per cent of green grass ensilaged.

9. *Tree-planting week*.—During the *vanamahotsava* week (1951), the following seedlings were planted at the station:—

	NOS.
Glyricidia seedlings	1,375
Kapok seedlings	400

10. *Seed supply.*—During the year under report, the following seed and seed materials were distributed from the station:—

(a) Seed coconuts	1,160 Nos.
(b) Pollinated nuts	943 Nos.
(c) Coconut seedlings	4 Nos.
(d) Cashew seeds	4 lb.
(e) New Era cowpea seeds	1½ lb.
(f) Bendai seeds	9 oz.
(g) Malta lemon rooted cuttings	807 Nos.
(h) Redgram seeds	2 lb.
(i) Thin Napier grass seed	10 lb.
(j) Thin Napier grass slips	15,100 Nos.

11. *Digging a trial pit for a well.*—A trial pit for a well was dug in the northern extension with a view to finding out the possibility of increasing the irrigation facility at the station. The place for the trial pit was fixed by the Director of Agriculture, Madras, during his inspection of the station in December 1951.

The first few feet of soil were fairly loose laterite with plenty of gravel, and then hard laterite rock was met with for a depth of twelve feet. Thereafter the strata was fairly loose and at a total depth of 35 feet strong water springs were tapped.

Further deepening was done in shape of a baby well leaving 2 feet of soil all round as a protective layer, and a regular sandy strata was reached at total depth of 47 feet below ground level.

At this depth a number of strong springs appeared and there was very good flow of water. In May 1952, there was 11 feet of water in the well. To have water column of 11 feet during the summer months was very unique on this station and the well ensures a perennial source of water.

12. *Works.*—The reconstruction of the roof of maistry's quarters was taken up and completed during the year under report at a total cost of Rs. 500.

13. *Visitors.*—(1) The Director of Agriculture, Madras, inspected the station on the 7th December 1951.

(2) The Headquarters Deputy Director (Research) inspected the station on 31st October 1951.

AGRICULTURAL RESEARCH STATION,
NILESHWAR,
12th July 1952.

P. M. SAYEED,
Superintendent.

AGRICULTURAL COLLEGE AND RESEARCH
INSTITUTE, LAWLEY ROAD P.O.,
COIMBATORE,
11th August 1952.

G. V. NARAYANA,
Oil-Seeds Specialist and Vice-Principal.

APPENDIX I.

COST OF CULTIVATION OF COCONUT PER ACRE OF 56 TREES (AGRICULTURAL RESEARCH STATION, PILICODE).

	RS.	A.	P.
Manures and manuring	84	5	1
After cultivation (cultural)	20	5	9
Cost of treating for pests and diseases	5	7	6
Cost of harvest	5	13	2
Total Cost of cultivation	115	15	6
Yield of coconuts at 20.0 nuts per tree 1,120 nuts—			
Value of 1,120 nuts at Rs. 150 per 1,000 nuts	168	0	0
Value of 1,120 husks at Rs. 30 per 1,000 nuts	33	9	7
Total	201	9	7
Net gain per acre	85	10	1

APPENDIX II.

STATEMENT OF RECEIPTS AND CHARGES FOR THE FASLI YEAR 1361 (1951-52) OF THE AGRICULTURAL RESEARCH STATION, PILICODE.

	RS.	A.	P.
<i>Receipts—</i>			
XXIX Agriculture—Agricultural Stations—			
Agricultural Receipts	6,309	15	9
Miscellaneous	409	6	4
Rent on buildings	1	2	0
Total	6,720	8	1
Free transfer and book adjustment	1,260	14	2
Grand total	7,981	6	3

Expenditure—

40-c. Agricultural—Experimental Farms—A. Agricultural Research Stations—
Office Contingencies—

Dearness allowances to menials	888	4	0
Other contingencies	86	1	0
Freight charges	19	8	0
Total, Office contingencies	943	13	0

Other Charges—

Purchase of live and deadstock	694	1	0
Petty construction and repairs	118	0	0

Working expenses—

Repairs and upkeep	515	11	3
Maintenance of cattle	672	6	6
Mazdoor labour	2,362	9	5
Miscellaneous cultivation expenses	1,865	3	8
Seeds and plants	557	13	5
Manures and chemicals	4,436	14	5
Sunderies	109	12	6
Total Working expenses	11,120	7	2
Total, Other charges	11,932	8	2
Total, Contingencies	12,878	5	2

APPENDIX III.

STEPS TAKEN TO INCREASE THE REVENUE.

(a) All the non-experimental area available at the station is utilized for raising economic crops. They were raised both in the open and in-between rows of coconut trees. The area put to different crops were as follows —

	ACS.
Dry paddy	3.00
Ragi	1.50
Tapioca	1.00
Sweet potato	2.00
Groundnut	1.00
Castor	1.00
Chillies	1.00
Cowpea	0.50
Vegetables	0.50
Redgram	0.50
Fooder cholam	1.00
Total ..	13.00
	Nos.
Nendran suckers	100

(b) The work animals of the station are hired out to private parties for ploughing when they are not engaged at the station.

(c) Production of mango grafts and other fruit plants has been intensified during the year with a view to increase the revenue.

(d) All the available farm wastes are composted to economise the expenses on manures.

ANNUAL REPORT OF THE AGRICULTURAL (COCONUT)
RESEARCH STATION, NILESHWAR II, FOR 1951-52
FASLI 1361—JULY 1951 TO JUNE 1952.

MAIN CROP—COCONUT.

Soil—Red loam.

Season and rainfall.—During the year under report a total rainfall of 111.63 inches was recorded on 114 rainy days as against 164.19 inches on 119 rainy days for the corresponding period last year. The rainfall was less than the ten-year average of 146.63 inches. The south-west monsoon commenced early in the first week of June and continued till the end of September, though it weakened from the beginning of August. During the period, a total rainfall of 82.29 inches on 78 rainy days was recorded as against 138.71 inches on 90 rainy days during the corresponding period last year. The north-east monsoon was fairly active during the year and benefited the standing crops like the coconut and the second crop of paddy. A total of 20.18 inches of rain was received on 25 rainy days during this period as against 9.74 inches on 15 rainy days during the same period last year. During the hot weather period, 9.16 inches of rain were received on 11 rainy days as against 15.74 inches on 14 rainy days during the corresponding period last year. The few showers received towards the end of April and during May facilitated the sowing of green manure crops and subsidiary crops in dry lands in the shade of coconut.

The rainfall statement is given in Table I.

TABLE I.—Rainfall statement—Agricultural Research Station, Nileshwar II, 1951-52.

Month.	Week.	1951-52.		1950-51.		Average for ten years.	
		Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.
South-west monsoon.							
June	7-13	15.37	7	2.32	5	11.50	6.7
	14-20	11.35	7	15.77	7	11.63	6.5
	21-27	4.22	6	6.43	4	8.19	6.2
June-July	28-4	1.59	6	2.44	5	10.15	6.3
	5-11	3.29	6	13.21	7	8.86	6.4
	12-18	12.28	7	14.70	7	10.21	6.4
	19-25	14.13	7	19.39	7	10.33	6.0
July-August	26-1	3.24	6	12.89	7	7.68	6.0
	2-8	3.06	7	11.20	7	6.19	5.7
	9-15	1.98	4	6.87	6	5.00	5.1
	16-22	5.19	6	2.68	3	6.03	5.6
	23-29	0.10	..	0.74	2	4.17	4.6
August-Septem- ber.	30-5	0.87	2	8.81	5	3.81	4.7
	6-12	4.45	5	9.37	7	3.35	4.5
	13-19	0.42	1	7.55	6	2.95	4.1
	20-26	0.75	1	4.84	5	2.53	3.5
Total ..		82.29	78	138.71	90	112.58	88.3
North-east monsoon.							
September-Octo- ber.	27-3	4.58	7	5.08	4	2.02	2.1
	4-10	5.05	4	1.53	2	1.20	1.8
	11-17	2.95	3	0.98	3	1.37	2.3
	18-24	0.63	1	0.50	1	1.34	2.2
	25-31	0.88	3	..	..	0.70	0.9
November	1-7	0.22	1	0.46	2	1.04	1.3
	8-14	1.03	2	1.16	3	0.57	1.1
	15-21	2.32	2	0.93	..	3.03	1.8
	22-28	1.15	1	..	..	0.96	0.8

Month.	Week.	1951-52.		1950-51.		Average for ten years.	
		Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.
North-east monsoon—cont.							
November-December.	29— 5	1.86	1	..	..	0.92	0.5
	6—12	..	..	..	..	0.44	0.5
	13—19	..	..	..	..	0.38	0.3
	20—26	..	..	..	..	0.14	0.3
	27— 3	..	..	..	..	0.01	0.1
December-January.	4—10	0.03	..	..	..	0.16	0.3
	11—17	..	..	..	..	..	..
	18—24	..	..	..	..	0.17	0.2
	25—31	..	..	..	..	..	..
Total ..		20.18	25	9.74	15	14.44	16.5
Hot weather.							
February ..	1— 7	..	..	..	..	..	..
	8—14	..	..	..	..	0.06	0.2
	15—21	..	..	..	..	0.07	0.1
	22—28	0.20	..	..	..	..	..
March ..	1— 7	..	..	..	..	0.12	0.1
	8—14	..	..	..	..	0.04	0.1
	15—21	..	..	..	..	0.03	0.1
	22—28	..	..	..	..	0.06	0.1
March-April ..	29— 4	..	..	..	..	0.21	0.7
	5—11	..	..	..	..	0.45	0.6
	12—18	0.11	..	4.27	4	0.72	1.0
	19—25	0.14	..	0.15	1	0.76	0.8
April-May ..	26— 2	0.36	1	0.05	..	1.08	1.0
	3— 9	1.76	2	..	..	0.45	0.9
	10—16	1.74	1	1.04	1	0.93	0.8
	17—23	0.08	..	..	..	4.19	2.0
	24—30	1.08	3	1.85	1	3.07	2.9
May-June ..	31— 6	3.69	4	8.38	7	7.37	4.4
	Total ..	9.16	11	15.74	14	19.61	15.8
Grand Total ..		111.63	114	164.19	119	146.63	120.6

2. *Cultural and manurial operations*—(a) *Cultural operations*.—All the blocks received two ploughings during the year. The first ploughing was given during September-October and the second during November-December. One more ploughing was given at the time of sowing of green manure seeds or subsidiary crops during April-May. The junior hoe was worked during the summer months to create soil mulch and arrest weed growth. In addition, all the unploughed corners and bases of coconut trees were dug out with mammutty and the dry weeds collected and burnt.

The young coconut seedlings were shaded with dry coconut leaves and pot watered during the summer months. The seedling pits were also weeded and hoed.

(b) *Manurial operations*.—The coconut trees received the general dose of manures, viz.,

	LB.
Groundnut cake	10
Ammonium sulphate	4
Super phosphate	4
Ash	40
} per tree, per year.	

The green manure crop of *Crotalaria striata* was also cut and applied at a uniform rate of 100 lb. for all the trees. Groundnut cake and ammonium sulphate were buried in trenches two feet wide and one foot deep along with the green leaf of *Crotalaria striata* in the month of October and November 1951, while ash and super phosphate were broadcast over the entire area and ploughed in. Half the dose of ash was applied at the time of sowing green manure seeds and the other half dose of ash and super phosphate during November-December.

The young palms received half the general dose of manures.

(c) *Green manure crops*.—*Crotalaria striata* was raised for green manure in all the blocks, where subsidiary crops were not grown using a seed rate of 10-15 lb. per acre. Half the dose of ash for coconut was applied at the time of sowing the seeds of *Crotalaria*. The germination and stand of the crop were satisfactory and a maximum calculated acre yield of 22,000 lb. of green stuff was recorded in block VIII. All the available seeds were collected and a total quantity of 400 lb. of good seeds was obtained during the year.

(d) *Burying dry husks and leaves of coconut*.—During the year, burying dry husks and shed leaves of coconut was continued in Block IV and a total of 3,582 husks and 3,993 leaves were buried in an area of 0.35 acre. Burying was done in linear trenches 6 feet wide and 18 inches deep in between rows of coconut.

(e) *Soil analysis*.—Representative samples of surface and sub-soils of blocks I to VIII were drawn during April 1950 and the samples were analysed by the Government Agricultural Chemist, Coimbatore. The results of analysis are given in Table II.

TABLE II.—*Soil analysis—Results of analysis of 9 samples of soil of the Agricultural Research Station, Nileshwar II.—Chemical analysis—Results on dry basis.*

Head of analysis.	Blocks I to IV.		Block V.	
	0-12"	12"-24"	0-12"	12"-24"
	(1)	(2)	(3)	(4)
Moisture	0.85	1.04	0.60	0.80
Loss on ignition	2.48	2.72	1.74	1.96
Insolubles	90.05	88.14	92.73	90.72
Solubles (by difference)	7.47	9.14	5.53	7.32
Total	100.00	100.00	100.00	100.00
Lime (Cao)	0.031	0.020	0.023	0.034
Potash (K ₂ O)	0.51	0.75	0.64	0.41
Total phosphoric acid (P ₂ O ₅)	0.068	0.068	0.080	0.092
Nitrogen	0.042	0.030	0.030	0.029
Available phosphoric acid	0.0013	0.0019	0.014	0.018
Available potash	0.0055	0.0024	0.0031	0.0029
P.H.	..	..	..	..

Head of analysis.	Blocks VI and VII.		Block		Block I.	
	0-12"	12"-24"	0-12"	12"-24"	0-12"	12"-24"
	(6)	(7)	(8)	(9)	(10)	(11)
Moisture	0.80	0.91	1.00	1.11	1.00	0.86
Loss on ignition	2.26	2.94	2.88	2.86	3.00	2.57
Insolubles	89.76	87.90	88.33	86.42	89.10	89.10
Solubles (by difference)	7.98	9.16	8.79	10.72	7.90	8.38
Total	100.00	100.00	100.00	100.00	100.00	100.00
Lime (Cao)	0.030	0.032	0.051	0.025	0.037	0.065
Potash (K ₂ O)	0.46	0.16	0.20	0.12	0.18	0.21
Total phosphoric acid (P ₂ O ₅)	0.047	0.043	0.046	0.048	0.059	0.063
Nitrogen	0.045	0.031	0.049	0.034	0.048	0.046
Available phosphoric acid	0.0014	0.0006	0.0047	0.0014	0.0029	0.0017
Available potash	0.0049	0.0035	0.0074	0.0056	0.0033	0.0084
P.H.	..	..	..	..	5.50	6.44

Remarks.—All the samples contain only fair amounts of nitrogen and the soil in Block V is poor in nitrogen. The soils are fair to rich in total K₂O but poor in available potash. The total phosphoric acid content is fair in all blocks except in blocks VI, VII and VIII and available P₂O₅ is also poor in all the blocks except in blocks I to IV and V. The soils are poor in lime also.

The pH of the soil from block I is in acid range.

3. *Harvests*.—Ripe coconuts were harvested every month and the detailed harvest and flowering notes recorded for all the bearing trees. A total number of 3,712 ripe coconuts was harvested from 258 bearing trees during the year and it

works out to an average of 14.4 nuts per bearing tree, per year. The details of harvests are furnished in Table III.

TABLE III.—Details of coconut harvests.

Block.	Number of nuts harvested in 1951.	Number of trees from which harvested in 1951.	Mean yield of nuts per bearing tree.	Yield of nuts in 1950.	Mean yield of nuts per bearing tree in 1950.
(1)	(2)	(3)	(4)	(5)	(6)
I	81	11	7.4	102	5.7
II	20	2	10.0	15	7.5
III	370	38	9.7	521	8.4
IV	149	23	6.5	108	3.9
VI	541	31	17.5	557	15.9
VII	1,044	50	20.9	1,255	27.3
VIII	1,265	62	20.4	2,239	37.8
IX	5	4	1.3	23	2.9
X	149	31	4.8	197	5.2
Office compound ..	88	6	14.7	95	15.8
Total ..	3,712	258	14.4	5,112	16.9

4. *Experiments and Research*—(i) *Hybridization in the coconut*—Study of the progenies of intra-varietal cyclic crosses.—With the object of finding out the possibilities of improving the coconut by controlled pollination, four schemes of hybridization were taken up at the coconut stations in 1932-33 and the progenies under the different schemes were planted at the station during 1935-36.

(a) *Scheme I*.—Under this scheme, cyclic crosses were effected between 5 parent trees each having the following characters:—

- (1) High yield.
- (2) High production of female flowers.
- (3) High setting percentage.
- (4) Thick meat (kernel).
- (5) Large sized nuts.

The progenies of these different character combinations are being studied for the various measurable characters from the date of planting. The vigour of young palms is judged by their vegetative characters, viz., production of leaves, growth of stem, etc. The progenies are young and all have not yet come to the normal stage of bearing. A few of the progenies planted are in their initial stages of bearing. The observations on their characters were continued during the year. Data regarding the production of female flowers and the yield of nuts for the year are presented in Table IV.

TABLE IV.—Coconut—Progenies of cyclic crosses—Scheme I planted in 1935-36—Mean number of nuts and female flowers produced in 1951.

Number and particulars of crosses.	Number planted.	Number flowered.	Percentage of flowering.	Mean number produced per tree per year.				Mean number of leaves in the crown.	
				Nuts.		Female flowers.		1951. 1950.	
				1951.	1950.	1951.	1950.	1951.	1950.
I High yield × High female flower production ..	17	7	41.2	1	4	9	14	11.8	11.3
High yield × High setting percentage ..	20	8	40.0	..	..	..	..	12.9	11.0
High yield × Thick meat ..	23	16	69.6	..	3	..	6	14.6	14.0
High yield × Large size ..	24	13	54.2	..	..	..	50	15.2	16.0
II High female flower production × High yield ..	16	8	50.0	16	7	50	23	13.1	14.0
High female flower production × High setting percentage ..	29	14	48.3	..	2	..	5	12.5	11.0
High female flower production × Thick meat ..	28	21	75.0	12	9	53	61	15.8	23.0
High female flower production × Large size ..	25	16	64.0	2	2	7	5	14.6	11.6

Number and particulars of crosses.	Number planted.	Number flowered.	Percentage of flowering.	Mean number produced per tree per year.				Mean number of leaves in the crown.	
				Nuts.		Female flowers.		1951. 1950.	
				1951.	1950.	1951.	1950.	1951.	1950.
III High setting percentage × High yield ..	23	7	25.0	9	4	24	15	12.3	9.7
High setting percentage × High female flower production ..	30	2	66.7	2	4	10	22	14.0	13.6
High setting percentage × Thick meat ..	27	11	40.7	17	7	58	94	12.1	11.3
High setting percentage × Large size ..	27	8	29.6	6	4	23	24	13.3	11.3
IV Thick meat × High yield ..	7	3	42.9	3	2	13	11	12.7	16.0
Thick meat × High female flower production ..	9	8	88.9	13	13	47	51	15.4	11.7
Thick meat × High setting percentage ..	17	9	53.0	..	5	..	23	13.3	11.4
Thick meat × Large size ..	25	3	12.0	..	1	..	2	11.5	9.8
V Large size × High yield ..	27	8	29.6	4	6	9	27	13.3	10.7
Large size × High female flower production ..	22	16	72.7	14	8	52	64	15.1	12.6
Large size × High setting percentage ..	22	3	13.6	..	3	..	..	11.1	7.5
Large size × Thick meat ..	21	11	52.4	9	12	36	13	14.2	11.7

As the progenies are still young and in their initial stages of bearing, the data regarding production of female flowers and yield of nuts may not be a true index to judge the superiority of progenies of the various character combinations. Yet, based on the indications obtained so far, the progenies with the following character combinations are promising.

- (i) High female flower production × high yield.
- (ii) Large sized nuts × high female flower production.

The observations will be continued.

(b) *Scheme II*.—Under this scheme seedlings were obtained by crossing the inflorescences of trees having maximum setting percentage with those producing large number of female flowers and *vice versa*. The progenies were planted at the station in 1935-36 and are being observed for the various measurable characters. A few of the palms under this scheme are in their initial stages of bearing. The yield data for 1950 and 1951 with the number of female flowers produced are given in Table V.

TABLE V.—Coconut—Progenies of intra-varietal crosses—1951-52.

Scheme II.							
Particulars.	Number plan- ted.	Number flower- ed.	Mean number of nuts.		Mean female flowers produced per tree.		Mean number of leaves in the crown.
			1951.	1950.	1951.	1950.	
High setting × High female flower production ..	47	35	8.5	8.1	39.2	44.7	14.2
High female flower produc- tion × High setting ..	43	18	2.0	1.5	6.0	18.0	12.3

A study of the data for 1951 shows that the progenies of High setting percentage × High female flower production are better than their reciprocal crosses. This observation is in conformity with that of the previous year.

The observations are being continued.

(c) *Scheme III*.—Irregular bearers in the coconut are usually heavy yielders. With a view to find out whether the regular bearing nature could be induced in the progenies, crosses were effected between regular and irregular bearers. The progenies of such crosses were planted at the station in 1935-36 and are under observation. The number of palms flowered so far, mean number of leaves produced in 1951 and the yield of nuts during 1951 are furnished in Table VI.

TABLE VI.—Coconut—Progenies of intra-varietal crosses.

Particulars.	Number planted.	Number flowered.	Mean number of leaves—1951.		Mean yield of nuts.
			1951.	1950.	
Irregular (natural)	5	Nil.	8.6	..	Nil.
Regular (natural)	8	1	11.5	..	Do.
Regular × Irregular	10	2	9.3	..	Do.
Irregular × regular	17	1	9.8	..	Do.

The progenies of this cross are found to be very poor with regard to all the characters.

(d) *Scheme IV—Inter-varietal crosses—(Tall × Dwarf).*—The ordinary tall (var. *typica* Nar) and the Dwarf (var. *Nana-Nar*) are two distinct varieties in the coconut. With a view to evolve a superior form of coconut, crosses were effected between these two varieties, keeping the tall as the mother. The progenies of these crosses were planted at the station during 1934-35 and were observed for their vegetative characters, etc. The performances of these progenies were outstanding and these could be given the status of a distinct variety (var. *javanica* Nar). They commenced bearing in 4½ years after planting exhibiting a combination of the desirable economic characters of both the parents. The yield data of the progenies along with the data on female flowers produced during 1951 are furnished below:—

TABLE VI-A—Coconut—Progenies of Tall × Dwarf.

Scheme IV.							
Particulars.	Number plan- ted.	Number flowered.	Mean yield of nuts.		Mean number of female flowers produced.		Mean number of leaves in the crown.
			1950. 1951.		1950. 1951.		
Progenies of Tall x Dwarf	183	160	35	20	146	81	23.2

The low yield during the year is due to severe summer conditions that prevailed during the preceding years.

(e) *Method of pollination and vigour of progenies.*—In order to study whether method of pollination in coconut has any influence on the performance of the progenies, self, natural and cross progenies of the parent trees under Scheme I were also raised and planted at the station in 1935-36. Observations on their characters were being made. Data regarding the production of nuts and female flowers for the year 1951 are furnished in Table VII.

TABLE VII.—Coconut—Progenies of cross, self and natural pollination—Mean yield of nuts and production of female flowers—1951.

Parent characters.	Cross (controlled).			Natural.			Selfed.		
	Setting percentage.			Setting percentage.			Setting percentage.		
	Nuts.	Female flowers.		Nuts.	Female flowers.		Nuts.	Female flowers.	
1 High yield ..	1.0	8.5	11.8	1.0	3.0	33.3	..	..	..
2 High female flower production.	10.0	36.7	27.3	4.5	26.5	17.0	3.0	23.0	13.0
3 High setting percentage.	8.3	28.6	29.0	21.0	96.0	21.9	..	..	..
4 Thick meat ..	7.8	29.8	26.2	..	..	..	..	..	..
5 Large sized nuts	9.1	32.5	28.0	9.0	31.0	29.0	4.0	13.0	22.2

It is observed that the progenies of artificial crosses are better performers than these of natural crosses and selfed progenies, the latter being the least vigorous.

(f) *Cross, self and natural progenies of parents of different yield groups.*—The progenies obtained by self, cross and natural pollination from parent trees belonging to six yield groups were planted at the station in 1942. Planting was done in randomized block layout replicated five times. These young palms are under observation for the various vegetative characters relating to growth, such as rate of production of leaves, number of leaves in the crown, length of leaves, etc. The data gathered in 1951 on these measurable characters were analysed in

relation to the yield groups and methods of pollination. The summary of results is given in Tables VIII and IX.

TABLE VIII.—Leaf characters in relation to yield groups.

Leaf character.	Yield Groups.						Whether 'Z' test significant or not (P=0.05).	Critical difference P=0.05.	Standard error.
	Above 120 nuts.	101-120 nuts.	81-100 nuts.	61-80 nuts.	41-60 nuts.	40 and below.			
	A.	B.	C.	D.	E.	F.			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1 Mean number of functioning leaves.	13.4	12.7	11.5	12.0	12.5	9.9	No.	..	1.00
2 Mean length of leaf in cms.	388.5	384.1	368.0	373.0	385.1	349.2	Yes.	33.0	12.08
3 Mean number of leaflets on one side of the leaf.	96.1	94.0	98.1	96.6	94.9	87.7	No.	..	3.45
4 Rate of production of successive leaves (in days*).	49.0	46.5	47.3	49.1	47.5	55.0	No.	..	2.14
5 Number of leaves produced.	72.9	73.8	73.0	71.0	68.3	63.6	Yes.	6.1	2.21

* Shorter the days, greater is the vigour.

Conclusions—

Mean length of leaf—A, E, B, D, C, F.

Number of leaves produced—B, C, A, D, E, F.

As is seen from the above table, the value obtained for the various leaf characters is the least for the progenies obtained from the lowest yielding parents. Two of the characters, viz., length of leaf and number of leaves produced have shown significant difference while in the other characters, the difference in value has missed the level of statistical significance.

TABLE IX.—Leaf characters in relation to method of pollination.

Leaf characters.	Natural.	Cross.	Self.	Whether 'Z' test significant or not (P=0.05).	Critical difference.	Standard error.
1 Mean number of functioning leaves ..	12.4	12.6	10.9	No.	..	0.22
2 Mean length of leaves in cms. ..	375.6	388.4	357.6	Yes.	23.3	8.54
3 Mean number of leaflets on one side of the leaf.	94.5	97.9	91.2	No.	..	2.44
4 Rate of production of leaves (in days*).	48.0	48.1	51.0	No.	..	1.51
5 Mean number of leaves produced so far.	70.7	70.9	69.7	No.	..	1.56

* Shorter the days, greater is the vigour.

Conclusions—

Mean length of leaf—Cross, Natural, Self.

As regards methods of pollination the mean value of various characters was the least for progenies obtained by self pollination although difference in value had missed the level of statistical significance. Significant difference was served in 'Mean length of leaf' and the superiority of 'Cross' progenies over self is indicated. This is in conformity with previous years' findings.

The vegetative characters of the young palms are usually fair indications of their vigour of growth and yield of nuts. The results of analysis of the data for 1951 show that the seedlings obtained from the low yielding parents especially these yielding 40 nuts and below per tree, per year are less vigorous than these from higher yielding parents. It is also noticed that the seedlings obtained by self pollination are less vigours than those obtained from either crosses or naturals.

(g) *Progenies of exotic variety crosses.*—The inter-varietal crosses are found to produce vigorous seedlings. A few crosses were effected among promising exotic varieties and their progenies planted at the station during 1943 to 1949. These are under observation for their vegetative characters.

Details of the seedlings planted, number flowered so far and mean values of two of their vegetative characters are furnished in Table X.

TABLE X.—Progeny of world variety crosses—1951.

Year of Planting.	Particulars of seedlings planted.	Number of existing seedlings.	Number of seedlings flowered.	Seedling characters.	
				Mean number of leaves.	Mean length of leaves in cm.
1943	Tall × Andaman dwarf	1	..	3.5	260.2
	Tall × Chowghat dwarf	1	..	8.8	342.5
	Tall × Laccadive dwarf	1	..	2.0	183.6
	Tall × Andaman giant	11	..	6.1	295.3
	Laccadive small × Andaman dwarf ..	7	..	7.5	273.3
1944	Laccadive × Chowghat dwarf ..	3	1	9.2	282.2
	Straits Settlements × Andaman dwarf.	1	1	23.5	468.5
	World variety × Andaman dwarf ..	11	1	7.6	288.5
	Tall × World variety	17	1	7.8	321.3
	Gangabondam	3	..	6.1	215.6
1945	Jaffna	3	..	6.2	285.0
	Adirampatnam	3	..	3.1	201.3
	World variety × Andaman dwarf ..	12	..	5.8	251.3
	Kappadam	4	..	6.0	325.8
	Tall × Andaman dwarf	4	..	7.5	325.0
	Tall × World variety	8	..	5.5	268.3
	Tall × Tall	2	..	5.9	221.4
	Howrah	16	..	4.4	185.5
	Progenies of lightning attacked parents.	6	..	4.3	283.3
	Andaman giant × Laccadive pink ..	2	..	7.5	302.7
	New Guinea × Laccadive pink ..	2	..	4.4	300.6
	Straits Settlements × Andaman dwarf ..	2	..	5.0	128.3
	Laccadive ordinary × Gangabondam ..	3	..	5.1	152.5
	Laccadive small × Gangabondam ..	3	..	4.2	138.5
	Andaman ordinary × Gangabondam ..	3	..	4.8	186.3
1949	Cochin China × Gangabondam ..	3	..	5.4	135.6
	Java × Gangabondam	3	..	4.8	156.3
	West Coast × Gangabondam	4	..	3.8	132.8

It is observed that the cross between Straits Settlements × Andaman dwarf is more vigorous and promising than other crosses.

(ii) *Production of improved seed materials.*—Seedlings of Tall × Dwarf crosses are in good demand. With a view to produce such hybrid seed-nuts to the maximum extent possible all the available good (Tall) trees were selected and their inflorescences pollinated with dwarf pollen during the summer months. During the year under report 38 inflorescences were cross-pollinated with pollen from the dwarf trees. Also 68 selected seed-nuts (Tall × Dwarf) produced from last year's pollination were harvested and sent to nursery at Nileshwar III.

(iii) *Watering experiment on adult coconut trees—Object.*—The object of this experiment is to find out the effect of pot watering coconut trees during the rainless months on the yield of nuts and the economics of pot watering.

Field.—Block VII.

Treatments.—(i) Watering 16 trees (Tall × Dwarf) with ten gallons of water per tree once every week during the rainless months in shallow basins. The basins are mulched with dry leaves or grass.

(ii) Another set of 16 trees are left as control without watering.

Layout.—The area is divided into four sub-blocks each separated by a border row. Two sub-blocks are watered and the other two left as control.

The experiment was started in the year 1950 and observations on the production of leaves, female flowers and yield of nuts are being made and recorded. The data collected during 1951 are summarised below :—

Watering experiment—Yield of nuts, female flower production and leaf production—1951.

Treatment.	Mean yield of nuts per tree in 1951.	Mean number of female flowers produced in 1951.	Mean number of leaves produced in 1951.
(1)	(2)	(3)	(4)
Watered (16 trees)	19.1	77.2	12.6
Control (16 trees)	15.9	75.5	12.2

It is observed that the watered trees yielded more number of nuts and produced more leaves than the control trees during the year 1951. The experiment is being continued.

(iv) *Germinating seed coconut—Study of.*—The object of this experiment is to study the progress of consumption of kernel and the changes taking place as the nut germinates and grows into a seedling. The study was started in 1948. Germinating nuts from the nursery were removed every month and studied for the following :—

- (1) Progress of consumption or disappearance of kernel;
- (2) variations in the size of apple;
- (3) oil content of kernel; and
- (4) shoot and root development of seedling.

TABLE XI.—Coconut—Study of germination.

Age of germinating nut.	Mean weight of unhusked nut.	Mean weight of husked nut.	Mean weight of husk.	Mean volume of water.	Mean weight of kernel.	Mean thickness of kernel.	Mean weight of copra.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	GMS.	GMS.	GMS.	C.C.	GMS.	CMS.	GMS.
Just germinating ..	1319.1	504.3	824.7	80.7	82.6	1.27	155.3
1 month ..	1321.6	561.3	759.7	78.8	243.1	1.21	149.6
2 months ..	1114.4	499.1	612.4	18.2	134.8	0.87	120.9
3 months ..	1119.8	527.3	592.5	5.8	211.2	0.87	109.3
4 months ..	1139.7	462.1	677.6	11.1	163.9	0.83	82.4
5 months ..	1094.3	484.8	609.5	1.8	125.7	0.58	82.1
6 months ..	1173.7	564.2	609.5	..	130.0	0.52	71.7
7 months ..	963.9	569.8	394.1	..	90.9	0.20	57.2
8 months ..	1091.7	637.0	453.0	..	118.6	0.23	57.0
9 months ..	1364.5	705.0	679.5	..	138.3	0.10	35.2
10 months ..	1630.8	724.8	906.0	..	102.5	0.21	56.9
11 months ..	1404.3	770.1	634.2	..	141.3	0.16	40.1
12 months ..	1721.4	815.4	951.3	..	135.0	0.06	21.9
13 months ..	1223.1	770.1	453.0	..	226.2	0.06	65.7
14 months ..	1359.0	906.0	453.0	..	135.0	0.06	20.4
15 months ..	1404.3	1041.9	407.7	..	169.1	0.07	22.2
16 months ..	1540.2	951.3	588.9	..	154.5	0.02	20.9
17 months ..	1630.8	1041.9	588.9	..	127.4	0.02	29.5
18 months ..	1449.6	1087.2	339.8	..	119.3	0.02	3.9
19 months ..	1494.9	1177.8	271.8	..	92.5	0.02	11.4
20 months ..	2083.8	1449.6	588.9	..	162.5	0.02	31.8
21 months ..	2572.7	1857.3	951.3	..	126.6	0.01	4.4

Age of germinating seed nut.	Oil content of copra per cent.	Free fatty acids per cent.	Mean volume of apple.	Mean weight of apple.	Mean number of roots.	Mean number of leaves.	Mean girth at collar.	Mean height of seedling
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
			O.O.	GMS.			CMS.	GMS.
Just germinating ..	71.8	4.6	6.4	26.5	2.9	..	5.2	4.7
1 month ..	78.0	4.7	136.5	60.8	4.4	..	7.5	15.2
2 months ..	77.5	2.1	210.3	100.4	8.4	1.1	8.6	34.2
3 months ..	76.3	1.0	216.9	105.6	5.8	1.0	7.3	38.7
4 months ..	73.5	0.5	146.9	73.3	6.9	1.3	7.8	61.3
5 months ..	76.3	0.6	229.8	96.1	8.0	2.8	8.1	78.2
6 months ..	..	..	264.2	87.4	8.9	3.7	9.4	101.9
7 months ..	..	..	314.6	96.0	10.3	4.1	9.7	120.4
8 months ..	..	..	333.8	101.4	9.5	4.4	9.6	140.7
9 months ..	..	..	354.2	99.3	9.8	5.3	11.1	143.2
10 months ..	..	..	326.5	116.6	11.0	4.9	12.2	135.0
11 months ..	..	..	259.5	69.7	14.2	5.2	11.0	139.0
12 months ..	..	..	337.6	86.6	14.8	5.6	13.3	146.3
13 months ..	..	..	260.6	79.2	13.3	5.6	10.1	127.7
14 months ..	..	..	177.0	69.5	14.0	6.6	13.0	157.6
15 months ..	..	..	315.2	74.5	15.2	5.0	12.2	170.6
16 months ..	..	..	211.3	57.2	13.0	6.4	12.5	148.1
17 months ..	..	..	172.9	48.1	16.2	6.9	13.3	156.7
18 months ..	..	..	228.6	59.4	14.9	7.1	13.3	154.6
19 months ..	..	..	283.7	86.9	14.6	7.0	15.7	164.7
20 months ..	..	..	109.9	29.7	18.5	7.1	18.6	172.1
21 months ..	..	..	142.2	48.4	20.3	7.9	17.2	178.3

The first set of observations up to 24 months old germinating nuts was completed in 1950-51. The second set of observational study on one to 21 months old nuts have been completed and the data are furnished in Table XI.

From an examination of the data given above, it is found that—

- (1) The water (milk) in the seed-nut disappears in the sixth month.
- (2) the first leaf appears in the second month after germination or about five months after sowing and the number of leaves increases with the age of the seedlings.
- (3) Root production commence in the first month after planting and the number increases with age.
- (4) The seedlings increase in height and girth at collar steadily with age.
- (5) The kernel inside the nut starts decreasing in thickness during the fifth month when the apple fills the cavity.
- (6) The apple fills the whole cavity in five months and thereafter looses its sweetness and becomes papery.

(v) (a) *Crotalaria striata* seed-rate trials for green manure.—To find out the optimum seed-rate that has to be adopted for raising *Crotalaria striata* as a green manure crop for the coconut gardens, trials are conducted using seed-rates of 1, 5, 10, 20 and 40 lb. per acre. The experiment was started in 1948. During 1951 April seeds of *Crotalaria striata* were sown in block IV using the above seed-rates in randomized one cent plots, replicated six times. Observations on the germination and stand of the crop in addition to the yield of green stuff were made and recorded. The yield obtained in 1951 are as follows:—

Seed rate per acre.	Calculated yield of green stuff per acre in
LB.	LB.
1	904
5	1,775
10	1,925
20	2,354
40	2,375

The crop failed in some of the plots and hence the data are not statistically analysed. However, it is observed that a seed rate of 20 lb. per acre is economical and advantageous. During 1950, seed-rates of 20 lb. gave the maximum calculated acre yield of green stuff. The trial is being continued in 1952.

(b) *Crotalaria striata*—Viability tests.—Seeds of *Crotalaria striata* were stored in gunny and screw capped bottle and samples of seeds drawn from each tested for their germination capacity every month. The experiment started in November 1950 is being continued. Good quality seeds collected in September–October 1950 were stored in gunny bag and screw capped bottle. The germination capacity of seeds tested every month is furnished below:—

		Percentage of germination of seeds after months.									
Treatments.		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1 Screw capped bottle	.. .. .	71	68	65	63	58	56	52	50	48	46
2 Gunny	.. .. .	71	67	64	63	57	53	51	49	46	44

		Percentage of germination of seeds after months—cont.									
Treatments.		(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
1 Screw capped bottle	.. .. .	44	43	43	42	41	41	40	39	38	36
2 Gunny	.. .. .	41	35	32	27	21	18	11	9	8	2

The germination capacity of seeds is found to decline steadily in both the containers but rapidly in the seeds stored in gunny bag. From the initial germination capacity of 71 per cent in both cases it came down to 36 per cent in screw capped bottle and 2 per cent in gunny bag after 20 months storage.

(vi) *Rhinoceros beetle pest, controlling of*—Spraying trial with guesarol 550—Block VIII.—The trial was started in 1950 to find out whether spraying crowns of coconut with insecticides will effectively control the incidence of the beetle pest. One set of 25 trees are spared with a suspension of guesarol 550 in water (1 lb. in

12 gallons) once every week while another set of 25 trees are left as control without spraying. All the trees are thoroughly searched for beetles once every week and the number of beetles caught recorded for each tree. During the year 1951, 30 beetles were caught and removed from control trees as against 10 beetles from sprayed trees. As in previous years, it was found that spraying guesarol 550 reduced the number of beetle attacks compared with that on control trees but was not effective enough to prevent beetle attack.

5. Other crops—(a) Food crops—(i) Ragi.—Nursery of Ragi was raised in the month of May 1951, adopting a seed-rate of 1 lb. per cent. Germination was satisfactory. The seedlings were transplanted during June 1951 in block V in an area of 50 cents in the shade of coconut trees. The crop received a basal dressing of 10,000 lb. of cattle manure and 2,000 lb. of ash per acre. Harvesting was done in October 1951. An acre yield of 210 lb. of grain was received.

(ii) Tapioca.—The 'Butter stick' variety of tapioca planted in an area of 0.30 acre during 1951 gave an acre yield of 1,464 lb. of tubers. The variety 'Valenca' was raised in an area of 10 cents in Block V and gave an acre yield of 3,180 lb. of tubers. Both the varieties were manured with compost at 5,000 lb. and ash at 1,000 lb. per acre. During May 1952, the variety Valenca was planted in an area of one acre in block II.

(iii) Sweet potato.—The local variety of sweet potato was raised in an area of 50 cents in block V. A basal dressing of 5,000 lb. of green leaf per acre was given at the time of planting in June 1951. The crop was earthed up in July 1951 and manured with compost at 5,000 lb. and ash at 1,000 lb. per acre. Harvesting was done during October 1951 and an acre yield of 1,084 lb. of tubers was received.

Sweet potato varietal trial.—The sets of four varieties of sweet potato received from Paddy Breeding Station, Kankanady, were planted in two cent plots in June 1951. The crop was manured with 5,000 lb. of green leaf, 5,000 lb. of cattle manure and 1,000 lb. of ash per acre. Harvesting was done in November 1951 and the following calculated acre yields of tubers were received:—

LB.	LB.
B. 4,304—1,500	B. 219—2,400
B. 4,004—1,900	I.B. 58—600

The varieties B. 219 and B. 4,004 are found to be promising.

(iv) Vegetables.—Brinjal, Bhendai, Cucumber, Tomatoes, Amaranthus, etc., were raised in an area of 20 cents during the south-west monsoon period. Cattle manure at 5,000 lb., ash at 2,000 lb. and ammonium sulphate at 150 lb. per acre were applied. A total quantity of 18 lb. 15 oz. of seeds were collected in addition to the green vegetables harvested and sold. Brinjal seeds, 1 oz., Cowpea seeds, 8 oz., Cucumber seeds, 1 oz. and Bhendai seeds, 18 lb. 5 oz.

New era cowpea.—An area of 8 cents was put under New era cowpea during the first week of June. Seeds were sown giving a spacing of 2 feet between rows and 9 inches along the furrows. Germination and initial stand of the crop were good but a severe attack of epilachna beetles completely destroyed the crop.

(v) Redgram.—An area of 50 cents was put under this crop. The local variety and the Tenkasi variety were sown in 25 cent plot each. Manuring was done at 5,000 lb. of cattle manure and 1,000 lb. of ash per acre prior to dibbling the seeds in rows. The crop was weeded and hoed during August. It was observed that the local variety put on better vegetative growth than the Tenkasi variety, though the latter commenced flowering earlier. Harvesting mature pods was done during December–January and an acre yield of 132 lb. and 30 lb. of seeds was received from the local and Tenkasi varieties respectively. During last year also, the local variety gave higher yields. Hence, it is observed that the local variety is more suited to the local conditions than the Tenkasi variety.

(b) *Fodder grass*—(i) *Thin (dry) Napier grass*.—The previous year's crop of thin Napier grass in an area of 20 cents in Block VI was continued. It was earthed up and manured with compost at 5,000 lb. per acre in August 1951. All the available fodder was cut and fed to cattle. A total of 28 lb. of seeds and 24,200 slips were collected during the period under report and distributed. An acre yield of 7,500 lb. of green fodder was received in two cuttings.

(ii) *Guinea grass*.—The standing crop of guinea grass was manured with compost at 5,000 lb. and earthed up. All the available fodder, nearly 2,000 lb. per acre was cut and fed to cattle. During the year 1,900 slips of guinea grass were collected and sold.

(iii) *Giant star grass*.—The last year's crop of giant star grass was manured with compost at 5,000 lb. per acre and earthed up during August 1951. A calculated acre yield of 3,800 lb. of green fodder was obtained in one cutting and the fodder was relished by cattle.

(iv) *Hybrid fodder*.—Cumbu $\times$ Napier grass and the amphidiploid of the same were planted in block V during 1950. A total of 100 lb. of green fodder was obtained from both the varieties. It was observed that the amphidiploid is better relished by cattle than the hybrid.

(c) *Green manure crops*—(i) *Gliricidia maculata*.—A total of 3,000 cuttings of Gliricidia was prepared and planted in nurseries at the station during March-April 1952 for rooting. Of these, 2,600 cuttings which had rooted were removed and planted all along the road and foot paths and along the boundary walls. Also 854 cuttings were prepared and planted as stakes for the wire fences in the blocks VI and VII. During the year, 3,000 lb. of green leaf obtained from the existing plants were applied to vegetables and sweet potato.

(ii) *Sesbania speciosa*.—Five pounds of sesbania seeds were sown in the nursery during April 1952. The seedlings made vigorous growth in the nursery. About 7,000 of these seedlings were removed in June 1952 and planted along the drainage channels. They have established satisfactorily.

(iii) *Adhatoda*.—About 5,000 cuttings of Adhatoda were prepared from the existing plants and planted on the boundary mud walls in blocks I, II, IV and IX during June 1952 as a live hedge.

(iv) *Other green manure crops*.—Seeds of *Calopogonium mucunoides*, *Centrosema pubescens*, *Pueraria phaseoloides* and *Hyptis suaveolens* were sown in block VI. Of these *pueraria phaseoloides* came up well. This crop was able to smother the grass growth and also to maintain its vegetative growth during the summer months. *Centrosema pubescens* failed to come up satisfactorily. *Hyptis suaveolens* came up satisfactorily but the yield of green stuff was not promising. Forty-two pounds of *Calopogonium* seeds were collected and distributed during the year. *Pueraria phaseoloides* will be tried as a cover crop in block I.

(v) *Indigofera teysmannii* plant resembling gliricidia but with profuse branching habit promises to be a useful introduction. About a dozen plants planted in March 1952 in the office block at the station are under observation.

(d) *Other miscellaneous crops*—(i) *Cotton*—(a) *Perennial cotton*.—The following varieties of perennial cotton were raised at the station in half cent plots in the office block. The flowering commenced early in November in Moco and Quobradinho. Caramura variety did not flower. There was severe bollworm attack and hence good quality kapas was not available for collection.

(b) *Sea Island cotton* was raised in the blocks V, X and office compound. Seeds were sown early in June and manured with 5,000 lb. of cattle manure per acre. Also seedlings raised during summer were transplanted in an equal area to compare their performance. It was observed that the transplanted crop commenced flowering by the end of July, a month earlier than the seed-sown crop. Also the same number of plants from 11 rows each yielded 1 lb. 13 oz. and 1 lb. 1 oz. of kapas from transplanted and seed-sown crops respectively. It was also observed that the variety St. Vincent gave higher yields of kapas than the variety Monteserrat.

(ii) *Kapok*.—The 33 existing plants of kapok planted along the boundaries in the main blocks flowered satisfactorily. Twelve pounds of lint and 26 lb. of seeds were obtained.

(iii) *Ochroma lagopus*.—The six plants planted during last year in the office block are making steady growth. Plenty of decaying leaf mould was applied to all the plants. One of them is slow in growth. The average height is 68 inches and girth at base 4 inches.

(iv) Bastard sago seeds received from Araku were planted during June 1952. Twenty-four seeds were sown in a raised nursery after soaking the seeds in cow-dung water for a few days. Another 24 seeds were sown *in situ* along the boundary in block X without treatment.

(v) *Terminalia catappa*.—The two plants in block VI made satisfactory growth during the year. They were manured with 10 lb. of compost and 2 lb. of ash per plant.

(vi) *Pepper vine*.—Three hundred and fifty pepper vine cuttings were planted at the station during June 1952 using coconut, mango, kapok and gliricidia as standards. They have not yet established.

(vii) *Thespesia populnea*.—The existing six plants in block VI were manured with compost at 10 lb. per plant and earthed up in October 1951. They are making good growth.

(e) *Fruit plants*—(i) *Singapore cherry*.—The three plants near office were manured with 10 lb. of cattle manure, 5 lb. of ash and 1 lb. of bonemeal each. They have started yielding. One hundred cuttings prepared from the plant are planted in the nursery for rooting.

(ii) *Pappaya*.—The 30 pappaya plants at the station are slow in growth. They were manured with 10 lb. of compost, 5 lb. of ash and 1 lb. of superphosphate each. They are in fruits.

(iii) *Malta lemon*.—The three existing plants are utilized for further propagation. About 1,250 cuttings were prepared and planted in the nursery. Two hundred and two rooted cuttings were sold during the year.

(iv) *Bananas*.—Twelve suckers in each of Mauritius and Chakkarakeli planted in the year 1949 were manured with 10 lb. of cattle manure and 5 lb. of ash per plant. One plant in Mauritius variety yielded a bunch of fruits weighing 14 lb.

(v) *Cashew*.—The 31 cashew trees at the station have flowered satisfactorily. The usufructs were sold in auction for Rs. 32. A total quantity of 1,057 lb. of selected cashew seeds were distributed to the departmental officers during the year.

6. *Pests and diseases*.—The crowns of trees and seedlings were regularly searched for rhinoceros beetles and 1,989 beetles were removed and destroyed during the year. Manure and compost pits were raked every month and 230 beetle grubs therein, picked out and killed. No other serious pests or diseases were noticed during the year.

7. *New planting*.—Gaps caused by the death of coconut seedlings due to water stagnation and other causes were filled up with fresh seedlings as detailed below:—

Block VI—New Guinea	.. .. .	1 seedling.
.. Andaman dwarf	.. .. .	1 "
.. Straights settlements	.. .. .	1 "
Block VII—Tall $\times$ Dwarf	.. .. .	1 "
Block IX—Selfed progenies	.. .. .	8 seedlings.
.. Natural	.. .. .	1 seedling.
Block X—Selfed progenies	.. .. .	1 "
Total		14 seedlings.

8. *Seed supply.*—The following seeds and seed materials were supplied during the period under report:—

Serial number and particulars of seeds and planting materials.	Quantity supplied.
1 Malta lemon rooted cuttings	202 Nos.
2 Thin Napier grass slips	24,200 „
3 Thin Napier grass seeds	28 lb.
4 Gliricidia cuttings	1,550 Nos.
5 Gliricidia seedlings	400 „
6 Crotalaria striata seeds	107 lb.
7 Neem seedlings	4 Nos.
8 Crotalaria var. acutifolia	164 lb. 14 oz.
9 Pappaya seedlings	8 Nos.
10 Bhendai seeds	25 lb. 14 oz.
11 Cashew seeds	1,057 lb.
12 Jack seedlings	56 Nos.
13 Guinea grass slips	1,900 „
14 Calopogonium seeds	42 lb.
15 Cymbopogan slips	200 Nos.
16 Tapioca cuttings	50 „

9. *Steps taken to increase the income of the station.*—All the available vacant area at the station and the area between rows of coconut are utilized for raising subsidiary food crops like dry paddy, *Ragi*, tapioca, sweet potato and vegetables; money crops like groundnut, cotton and castor; fodder crops like napier grass, guinea grass and thin napier grass are raised for feeding cattle. Large-scale production of silage and hay is attempted to reduce the cost of maintenance of cattle. All the rubbish and waste materials are collected and composted. Green manure plants like Gliricidia, Adhatoda and *Sesbania* were planted along the roadsides and boundaries in addition to the green manure crop of *Crotalaria striata* raised in the blocks.

Particulars of subsidiary crops for 1952-53—

	ACS.
Food crops	8.50
Cash crops	4.75
Vegetables	1.60
Fodder	1.94

10. *Distinguished visitors.*—During the period Sri C. M. John, Director, Central Coconut Research, Kasaragod, visited the station.

11. *Inspection.*—Sri K. C. Naik, Headquarters Deputy Director of Agriculture (Research), Madras, inspected the station in November 1951.

M. S. Sivaraman, Esq., I.C.S., Director of Agriculture, Madras, inspected station in December 1951.

AGRICULTURAL RESEARCH STATION,
NILESHWAR,
10th September 1952.

P. M. SAYEED,
Superintendent.

AGRICULTURAL COLLEGE AND RESEARCH
INSTITUTE,
LAWLEY ROAD P.O., COIMBATORE,
15th September 1952.

G. V. NARAYANA,
Oil-seeds Specialist and Vice-Principal.

APPENDIX.

COST OF CULTIVATION OF COCONUT PER ACRE OF 56 TREES.

	RS.	A.	P.
Manures and manuring	117	8	8
After cultivation	22	11	8
Pests and diseases	10	4	4
Cost of harvest	6	7	3
Total	156	15	11
Yield of nuts at 14.4 nuts per tree	806.4		nut
Value of 806.4 nuts at Rs. 187-8-0 per 1,000 nuts	151	3	2
Value of 506.4 husks at Rs. 10 per 1,000 husks	8	1	0
Total	159	4	2
Net gain per acre	2	4	3

As most of the coconut palms at the station have not yet attained the stage of normal bearing, the yield per acre is not marked.

**ANNUAL REPORT OF THE AGRICULTURAL RESEARCH STATION,
NILESHWAR III, FOR THE YEAR 1951-52 (FASLI 1361).**

MAIN CROP—COCONUT.

Soil—Sandy.

Representative samples of soil drawn from the different blocks at the Station were analyzed by the Government Agricultural Chemist, Coimbatore, in 1951. The results of analysis are furnished in Table I.

TABLE I.—Results of analysis of the soil samples of the Agricultural Research Station,
Nileshwar III—1951.

Heads of analysis.	Block I.		Block VI.		Block X.		Soil in the tract outside the station.	
	0—12"	12"—24"	0—12"	12"—24"	0—12"	12"—24"	0—12"	12"—24"
Moisture	0.33	0.27	0.28	0.28	0.31	0.28	0.28	0.28
Loss on ignition ..	0.78	0.68	0.77	0.87	0.89	0.77	0.73	0.64
Insolubles	96.61	96.20	96.16	96.40	95.98	96.49	96.47	96.90
Solubles (difference) ..	2.61	3.12	3.07	2.73	3.13	2.74	2.80	2.46
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Lime (Ca)	0.11	0.16	0.16	0.13	0.13	0.14	0.070	0.077
Potash (K ₂ O)	0.088	0.053	0.051	0.052	0.053	0.063	0.043	0.038
Total, Phosphoric acid ..	0.016	0.013	0.016	0.011	0.016	0.019	0.025	0.041
Nitrogen	0.021	0.017	0.024	0.024	0.024	0.017	0.015	0.016
Available phosphoric acid.	0.0038	0.0061	0.0040	0.0040	0.0068	0.0058	0.0080	0.0094
Available potash ..	0.0039	0.0034	0.0023	0.0039	0.0034	0.0028	0.0020	0.0016
P.H.	5.95	6.25	6.10	5.85	5.76	6.12	6.00	6.04

2. *Season and rainfall.*—The south-west monsoon rains started early in June 1951 and continued till September. The rains were normal and beneficial to the first crop of paddy in the locality. The north-east monsoon rain and its distribution was poor. In 1952 the rain started in the first week of June. The rainfall data are the same as those of Nileshwar II Station, which is only a mile and a half to the south-east of this station.

3. *Cultural and manurial operations.*—(a) *Cultural operations.*—Blocks I to VI were ploughed once in September and for a second time in December 1951 and the junior hoe was worked at the end of December.

(b) *Manurial operations.*—All the coconut trees in blocks I to VII received the general dose of manure, viz., 30 lb. of ash, 7½ lb. of groundnut cake, 3 lb. of ammonium sulphate and 2 lb. of super-phosphate per tree per year. The young coconut seedlings in the blocks received half the general dose of manure. Groundnut cake and ammonium sulphate were applied in trenches two feet deep and one foot wide while ash and super-phosphates were applied broadcast and ploughed in.

(c) *Green-manure crops.*—*Crotalaria striata* was sown in blocks I to V early in May 1951. Even though the seeds germinated properly in all the blocks the crop came up well only in blocks I and II. A total quantity of 339 lb. of seed was collected from all the blocks. Out of this, 50 lb. of seeds were distributed to departmental officers and 150 lb. of seeds were sown in blocks I to VI in May 1952. The seeds have germinated properly and the seedlings are coming up well.

(d) *Husk burial.*—During the year 1951, as a measure of permanent improvement, 8,170 coconut husks, and 17,900 coconut leaves were buried in trenches three feet deep and six feet wide in north to south direction on the eastern side of block VI in between rows of coconut trees.

4. *Flowering and yield.*—In block VII, six trees flowered for the first time during the year. The details of flowering and the number of trees planted and the details of nuts harvested are given in Table II. The yield of the coconuts during the year was very poor when compared with that in the previous year.

The average yield works out to only 1.7 nuts per tree. This is mainly due to the trees being poor and also due to drought and absence of summer rains for the last two years.

TABLE II.—*Flowering and yield of coconuts in the different blocks at the Agricultural Research Station, Nileshwar III.*

Block number.	Special treatments.	Year of planting.	Number of trees planted.	Total number flowered up to the end of 1951.	Yield of coconuts in			
					1941.	1942.	1943.	1944.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
I	Clay and husks in consecutive rows of trees in 1936 to 1938 and general dose of manure up to 1942 and manurial experiment from that year onwards.	1918	275	268	867	1,411	842	933
II	Husk burial between pair of rows of trees in 1938 and general dose of manure in subsequent years and earthing up experiment from 1942 to 1948.	1918	275	272	2,187	5,225	1,458	2,834
III	Husks buried in the lengthwise and crosswise trenches from 1937 to 1939 and general dose of manure in subsequent years. Cultural experiment was started during the year 1948.	1919	275	273	1,515	3,941	2,089	2,349
IV	Husks buried between pairs of rows of trees in 1938 and general dose of manure in subsequent years.	1922	275	272	381	989	493	726
V	General dose of manures only.	1925 to 1933.	121	91	23	86	112	88
VI	Husks in lengthwise rows from 1942 to 1950 and watering experiment.	1928	239	209	84	297	475	845
VII	General dose of manure and depth of planting experiment.	1938	150	6	..	..	..	..
	Office block—General dose of manures.	1919	4	3	2	2	8	4
	Total ..		1,614	1,394	5,059	11,951	5,482	7,779

Block number.	Special treatments.	Yield of coconuts in							Average yield of nuts per tree in 1951.
		1945.	1946.	1947.	1948.	1949.	1950.	1951.	
		(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
I	Clay and husks in consecutive rows of trees in 1936 to 1938 and general dose of manure up to 1942 and manurial experiment from that year onwards.	621	765	1,275	2,968	1,554	522	287	1.1
II	Husk burial between pair of rows of trees in 1938 and general dose of manure in subsequent years and earthing up experiment from 1942 to 1948.	1,640	5,236	2,588	7,892	2,907	1,096	748	2.8
III	Husks buried in the lengthwise and crosswise trenches from 1937 to 1939 and general dose of manure in subsequent years. Cultural experiment was started during the year 1948.	1,242	3,252	1,781	6,328	2,065	1,510	446	1.3
IV	Husks buried between pairs of rows of trees in 1938 and general dose of manure in subsequent years.	504	1,582	1,240	2,956	1,226	892	279	1.0
V	General dose of manure only.	127	203	331	1,042	455	235	114	1.3
VI	Husks in lengthwise rows from 1942 to 1950 and watering experiment.	360	2,017	1,890	6,165	1,305	1,805	446	2.1
VII	General dose of manure and depth of planting experiment.	..	..	..	..	..	..	..	..
	Office block—General dose of manure.	14	12	9	18	13	4	11	3.7
	Total ..	4,508	13,067	9,114	27,369	9,525	6,964	2,331	1.7

5. *Experiments and research*—(i) *Depth of planting experiment*—*Object*.—To find out whether 3 feet or 6 feet depth is better for planting coconut seedlings in sandy soil.

Field—Block VII.

Treatments—(a) Three feet deep planting,
(b) Six feet deep planting.

Layout.—Paired plots AB, BA, replicated six times with 12 seedlings per plot.

The planting was done in 1939. Seedlings have been under observation for measurable characters, viz., the rate of production of leaves and the number of functioning leaves in the crown. The data gathered during 1951 in respect of the two characters were analysed. The results are presented in Table III.

TABLE III.—*Coconuts—Depth of planting experiment—Rate of production and number of functioning leaves—1951.*

Treatment.	Mean number of functioning leaves.	Whether 'Z' test satisfied or not. P = 0.05.	Mean number of days between emergence of successive leaves.	Whether 'Z' test satisfied or not. P = 0.05.
Three feet deep planting ..	13.8	No	53.0	No
Six feet deep planting ..	12.5	No	55.5	No
Standard error	0.469		1.378	

The difference in value of the two characters due to depth of planting has not attained the level of significance, but during the previous year significant differences were observed in favour of 3 feet deep planting.

The palms under study have commenced flowering. The following numbers of palms have flowered so far under the two depths of planting :—

	Number of palms flowered up to the end of 1951.			
Palms planted 3 feet deep	..	..	..	20
Palms planted 6 feet deep	..	..	..	2

Early flowering is a character of economic importance. The effect of treatments will, however, be finally judged from the yield of nuts when the palms come to normal bearing.

(ii) *Watering experiment*—*Object*.—To find out the increase in the yield of nuts due to watering the coconut trees in the sandy soil during hot months when there is no rain.

Field.—Block VI.

Materials.—Two sets of fifty-four trees each were selected at random for the trial.

Treatments—

(a) One set of trees receive 10 gallons of water each on alternate days from February to May.

(b) The second set of trees are not watered and form the control.

The experiment was started in 1945 and the trees were watered as per schedule. Observations of palm characters, viz., interval between the production of successive leaves, number of functioning leaves in the crown, production of female flowers and nuts have been recorded for individual trees.

The data gathered in 1951 on four of the characters were examined and the results are presented in Table IV.

TABLE IV.—Coconuts—Watering experiment—Mean number of functioning leaves, rate of leaf production, yield of nuts and production of female flowers—1951.

Characters.	Watered.	Control.	'Z' test satisfied or not (P = 0.05).	Critical difference.	Standard error.
Mean number of functioning leaves	21.83	10.08	Yes.	2.78	1.433
Interval between the production of two successive leaves (in days)	32.52	36.44	Yes.	3.21	1.655
Mean number of female flowers produced	38.47	37.31	No.	..	8.974
Mean yield of nuts	3.78	3.60	No.	..	0.977

Conclusion—

(1) Number of functioning leaves—watered, control.

(2) Interval between production of successive leaves—Watered, control.

Significant differences were observed in respect of functioning leaves in the crown and mean interval between the production of two successive leaves in favour of watered trees. In the previous year significant differences were observed in all the four characters in favour of watered trees. The experiment will be continued.

(iii) *Depth of cultivation experiment—Object.*—To find out the proper depth to which the soil has to be ploughed or cultivated in the coconut garden in sandy soils—

Field—Block III.

Area—5 acres.

Soil—Sandy.

Treatments—(i) Ploughing in the months of July, September and November with Cooper plough 26 to a depth of 4 inches.

(ii) Ploughing with Cooper plough 34 in the months of July, September and November to a depth of 6 inches.

(iii) Digging 5 inches deep and forming mounds or piling in June and levelling them in November.

Layout—Randomized blocks replicated six times with two experimental trees per plot.

The experiment was started during 1948 and the trees were under observation for the following four characters :—

(1) Number of functioning leaves in the crown.

(2) Interval between the production of two successive leaves.

(3) Production of female flowers.

(4) Yield of nuts.

The data gathered during 1951 were statistically analysed. The results are summarized in Table V to VIII.

TABLE V.—Coconuts—Depth of cultivation experiment—Mean number of functioning leaves—1951.

Treatments.	Mean number of functioning leaves.	Whether 'Z' test satisfied or not (P = 0.05).	Standard error.
1 Ploughing 4 inches deep	21.2	..	..
2 Ploughing 6 inches deep	21.8	No.	0.632
3 Digging 5 inches deep and forming mounds ..	21.7	..	..

TABLE VI.—Coconuts—Depth of cultivation experiment—Interval between the production of successive leaves—1951.

Treatments.	Interval between the production of successive leaves.	Whether 'Z' test satisfied or not (P = 0.05).	Standard error.
1 Ploughing 4 inches deep	38.5	..	..
2 Ploughing 6 inches deep	38.3	No.	0.718
3 Digging 5 inches deep and forming mounds ..	38.4	..	..

TABLE VII.—Coconuts—Depth of cultivation experiment—Mean number of female flowers produced—1951.

Treatments.	Mean number of female flowers produced.	Whether 'Z' test satisfied or not (P = 0.05).	Standard error.
1 Ploughing 4 inches deep	20.8	..	..
2 Ploughing 6 inches deep	21.1	No.	1.990
3 Digging 5 inches deep and forming mounds ..	21.2	..	..

TABLE VIII.—Coconuts—Depth of cultivation experiment—Mean yield of nuts—1951.

Treatments.	Mean yield of nuts.	Whether 'Z' test satisfied or not (P = 0.05).	Standard error.
1 Ploughing 4 inches deep	1.6	..	..
2 Ploughing 6 inches deep	1.7	No.	0.483
3 Digging 5 inches deep and forming mounds ..	1.5	..	..

No significant differences due to the treatments with regard to the four characters mentioned above were obtained. The experiment will be continued.

(iv) *Under planting experiment—Object.*—Trees planted on the surface in 1918 have not yet come to normal bearing in spite of the best attention bestowed upon them. So, under planting at usual depth of 2 feet and 3 feet was taken up to find out whether such planting will prove successful in sandy soils.

Field—Block II.

Area—2.5 acres (northern half of the block).

Treatments—(1) Sixty seedlings planted at a depth of 2 feet.

(2) Sixty seedlings planted at a depth of 3 feet.

The planting was done in 1948. The seedlings received half the general dose of manures. They were under observation for the number of functioning leaves in the crown and the interval between the production of successive leaves. The mean values of the characters observed during 1951 are presented in Table IX.

TABLE IX.—Coconut—Under planting experiment—Mean number of functioning leaves and the interval between the production of two successive leaves—1951.

Treatments.	Mean number of functioning leaves.	Mean number of days between the production of two successive leaves.
1 Seedlings planted at 2 feet depth	6.15	65.3
2 Seedlings planted at 3 feet depth	6.22	64.8

The growth of both the sets of seedlings is satisfactory at this stage. Final conclusions will be drawn when the seedlings grow up and come to bearing.

(v) *Experiment to assess the loss in yield due to beetle attack—Object.*—To find out the loss in yield of nuts due to the attack of *rhinoceros* beetles.

Field—Block IV.

Materials—Two sets of 20 trees each selected at random from the experimental trees.

Treatments—(1) One set of trees is rigorously searched for beetles both morning and evening every day.

(2) Another set of trees left without search for beetles forms the control.

From the data gathered so far it has not been possible to assess the true loss in yield due to beetle attack as the yield of the trees under both the treatments was very poor.

(vi) *Green manure trials*—(1) *Seed rate trials of Crotalaria striata—Object.*—To find out the proper seed rate of *Crotalaria striata*.

Field—Block IV.

Treatments—1 lb., 5 lb., 10 lb., 20 lb. and 40 lb. of seed per acre.

Layout—Randomized blocks replicated six times. Half the dose of ash for the coconut, i.e., 15 lb. per tree was applied broadcast in the plots at the time of sowing.

Size of plot—1 cent.

Sown on—26th May 1951.

The trial conducted during the last four years did not give conclusive results as the crop suffered due to the heavy rainfall soon after the germination of seeds. The experiment has been repeated during 1952 and the seeds have germinated well.

(2) *Application of lime—Object.*—To find out the effect of the application of lime on the growth of *Crotalaria striata*.

Field—Block V.

Treatments—(a) Application of lime at the rate of 250 lb. per acre.

(b) Untreated (control).

Material for study.—One acre of land was treated with 250 lb. of lime and one acre was left as control. *Crotalaria striata* seeds were sown in both the plots at the rate of 20 lb. per acre in the last week of May 1951. Due to heavy rains during the month of June 1951 the crop completely failed. The trial is being repeated in 1952.

(3) *Other green manure crops.*—The following four green manure crops were grown in small observation plots in Block X and observed for their performances:—

(a) *Peuraria javanica*

(b) *Calopogonium muconoides*.

(c) *Crotalaria anagyroides*.

(d) *Centrosema pubescens*.

Observations made.—Out of the four green manure plants mentioned above, *Pueraria javanica* continued to produce thick vegetative growth even in summer, *Crotalaria anagyroides* was woody and the other two could not withstand the summer heat.

6. *Other crops*—(i) *Cucumber trials.*—The following varieties of cucumber seeds were tried in the office block in observation plots. The yield data are presented in Table X.

TABLE X.—*Cucumber trials—Yield data—1951.*

Variety.	(1)	Date of sowing.	Date of harvest.	Acre yield during			
				1951.	1950.	1949.	1948.
				(4)	(5)	(6)	(7)
				LB.	LB.	LB.	LB.
1 Kasaragod	..	15th Aug. 1951.	10th Nov. 1951.	11,400	6,700	4,700	7,300
2 Nileshwar	..	Do.	Do.	9,600	6,400	7,100	6,100
3 Udipi	..	Do.	Do.	7,600	5,200	5,800	4,800
4 Hagari	..	Do.	Do.	5,800	2,800	2,500	3,300
5 Pithapuram	..	Do.	Do.	3,900	4,900	6,500	5,200

Variety.	Acre yield during				Average for 1944 to 1951.
	1947.	1946.	1945.	1944.	
	(8)	(9)	(10)	(11)	(12)
	LB.	LB.	LB.	LB.	LB.
1 Kasaragod	9,196	6,718	6,534	10,325	7,859
2 Nileshwar	8,808	8,066	4,356	10,003	7,554
3 Udipi	6,615	6,668	3,388	2,151	5,278
4 Hagari	207	3,549	242	1,291	2,461
5 Pithapuram	78	1,398	8,934	560	3,971

It is seen that the "Kasaragod" type gave the highest yield during all the years under trial except during 1946 and 1949 when "Nileshwar" type gave the highest yield.

(ii) *Oil palms*—(*Elaeis guineensis*).—Sixty palms were planted at the station in 1932. Seven of them died and of the remaining 53 none has yielded any fruit so far. The oil palm does not seem to be suited to the sandy soil of the station.

(iii) *Cashewnut.*—The usufructuary rights of collecting cashewnuts from 776 trees were auctioned for Rs. 445 after reserving 18 selected trees for seed collection. The 18 trees yielded 144 lb. of nuts during the year.

(iv) *Vegetables.*—Vegetables like *Bendai*, cowpea, bitter gourd, snake gourd, etc., were grown in a total area of one acre for collecting seeds for distribution. All the vegetables were manured with 5,000 lb. of compost and cattle manure, 500 lb. of groundnut cake and 100 lb. of ammonium sulphate per acre.

(a) *Bendai (Long green variety).*—*Bendai* was sown in Block X in an area of 20 cents during the last week of May 1951 adopting a seed rate of six pounds per acre. Spacing given was two feet either way. Manuring was done as per the rates shown above. Twenty-two pounds of seeds were collected from this area for distribution.

(b) *Cowpea.*—New Era cowpea was sown during the last week of May 1951 on ridges two feet apart in an area of 25 cents in Block X. The crop received the same dose of manure as mentioned above. An acre yield of 120 lb. of seed was obtained. Early in June 1952 also New Era cowpea was sown in an acre.

(c) *Sweet potato (local variety).*—Sweet potato was planted in Block X in an area of 50 cents during the last week of June 1951. The crop was manured with 5,000 lb. of compost and 2,000 lb. of ash. The acre yield of the tubers obtained was only 1,410 lb. This is due to the poor nature of the soil. Early in June 1952 also sweet potato was planted in an area of 1 acre.

Besides the local variety, six other varieties of sweet potato, viz., *Aravam-valli*, *Karkal*, B.W., *Searanthi chuvalli*, I.B. 22 and I.B. 26 were tried in small

observation plots in the office block. The following acre yields of tubers were obtained:—

	LB.
Aruvamvalli	1,750
Karkal	1,000
B.W.	2,250
Searanthi chuvalli	1,500
I.B. 22	2,100
I.B. 26	2,250

Of these varieties B.W. and I.B. 26 were found to give higher yields than the rest. The trial of these varieties is being continued.

(v) *Malta lemon*.—The 14 plants in the office block were manured with 1 lb. superphosphate and 20 lb. of cattle manure each. A total number of 749 rooted cuttings were produced and distributed during the period. In June 1952 1,000 cuttings taken from the existing plants at the station have been potted for rooting. As the demand for the rooted cuttings is heavy, arrangements are being made to increase the production of rooted cuttings at the station.

Nepali lemons.—The two Nepali varieties (round and the other long) planted in the office block in October 1950 are putting on satisfactory growth.

(vi) *Papaya*.—The fifteen grown up papaya trees were manured with 20 lb. of cattle manure and 1 lb. of superphosphate each. A total quantity of 218 lb. of fruits were harvested and sold after collecting seeds. A total number of 606 seedlings were distributed during the period. As the demand for the seedlings is increasing a papaya nursery is being maintained.

(vii) *Cotton trials*.—The two promising perennial cotton varieties grown at the station are Moco and quebradinho. A total quantity of 4 lb. 2½ oz. of kappas was collected from 4 plants of 1947 crop of Moco and 1 lb. and 1 oz. from 3 plants of 1947 crop of Quebradinho. The Moco variety of cotton appears to be suited to this locality also as it is observed to be not very much affected by the severe drought which prevail in the sandy soil at this station.

(viii) *Passion fruit*.—The existing single plant which was planted in 1948 has not flowered so far. It is in good condition.

(ix) *Cacao*.—One plant is surviving. It was regularly pot watered during summer and is coming up well.

(x) *Mangoes*.—The graft mango trees in block VII were manured with 20 lb. of cattle manure and one pound of bone-meal each. Out of the existing 93 trees only 21 flowered this year. A total of 398 lb. of fruits were harvested and sold during the year.

(xi) *Trifolium subterraneum*.—Three varieties of seeds A.C.C. 330, A.C.C. 333 and A.C.C. 383 were sown in November 1951 in plots one cent each in the office block. The germination started three days after sowing but the stand was poor in all the plots. The few plants that came up dried away in spite of watering due to severe summer conditions. The trial is being continued in 1952.

(xii) *Hibiscus subdariffa*.—Seeds of *hibiscus subdariffa* were sown in an area of two cents in the office block during the last week of March 1952 after giving a basal dressing of 3,000 lb. of compost per acre. The plants are coming up vigorously.

(xiii) *Sesbania speciosa*.—Seeds have been sown in a two cent nursery in the office block at the end of May 1952. The seedlings are being planted in the main blocks.

(xiv) *Pueraria phaseoloides*.—Four ounces of seed were sown in nursery in the office block early in April 1952. The seedlings were transplanted in an area of 12 cents in block I in between rows of coconut trees.

(xv) *Gliricidia maculata*.—A total of 1,900 rooted cuttings were planted along the footpaths and boundaries of the station during June 1952.

(xvi) *Velvet beans*.—Four seeds were sown in pits in the office block early in March 1952. The plants are coming up well. They have already fruited. The mature pods will be reserved for seed collection.

(xvii) *Casuarina*.—Eight ounces of seeds have been sown in nursery in the office block. Above 50 per cent germinated. The seedlings are coming up well. They will be planted along the boundaries of station as a live hedge.

(xviii) *Calamus scipionum*.—Fifteen seeds of *calamus scipionum* were sown in a raised bed in the office block early in June 1952 giving a spacing of four inches between seeds. They have not yet germinated.

(xix) *Bastard sago palm*.—Half a pound of seed containing 80 seeds were sown in pits 1½' × 1½' × 1' early in June 1952 with a spacing of 15 feet between pits on the borders of blocks III and IV. The seeds were dibbled one in each pit.

(xx) *Groundnut*.—The two strains of groundnut TMV. 1 and TMV. 4 were sown in block X in an area of 4 cents each early in June 1952 in lines with one foot spacing either way. Lime was applied at 400 lb. per acre three weeks before sowing. Cattle manure was applied as basal dressing. The seeds have all germinated.

(xxi) *Mango stone nursery*.—A total number of 5,300 mango stones was sown in nursery in May 1952. They have begun to germinate.

7. *Coconut nursery*.—This station deals with the important work of raising coconut nursery. A total of 2,498 seednuts (exotic varieties, cross-progenies and west coast) were planted in the State nursery during the year.

Comprehensive coconut nursery.—The total number of seednuts procured from Malabar and South Kanara during the year was 60,310. About 46,400 seedlings are available for supply during 1952 season.

8. *Compost*.—Compost preparation was being attended to regularly during the year. All the farm wastes consisting of weeds, dry leaves of cashew and vegetable refuse were converted into compost. A total of 15 cart-loads of this manure was obtained and applied to vegetables and root crops.

9. *Hay making*.—The green grass available at the station was cut, dried and converted into hay and 2,246 lb. of hay was prepared during November 1951.

10. *Pests and diseases*.—(1) *Rhinoceros beetle*.—The crowns of coconut palms were regularly searched for beetles. During the year a total of 1,184 beetles was removed from the trees and young palms and killed.

(2) *Nephantis serinopa*.—There was a mild attack of *Nephantis serinopa* on the adult coconut trees. Timely cutting and burning of the affected leaflets kept the pest under control.

(3) *Pleceadarus ferrugineus*.—This is a serious beetle pest on the cashewnut. The borer tunnels through the root and stem and causes death of the trees. Regular search was made for the pest at the station. A total number of 422 beetles was caught and killed during the year. Both gammexane and D.D.T. were dusted round the trees as a deterrent but this did not have any effect on the pest.

(4) *Budrot disease*.—One tree in block II was affected by budrot and died in spite of timely action. To avoid further infection all the trees at the station were sprayed with zine bordeaux mixture.

11. *Seed supply*.—The following seed materials were distributed during the year:—

Coconut seedlings	45,420 Nos.
Malta lemon rooted cutting	749 "
Papaya seedlings	606 "
Crotalaria striata seeds	50 lb.
Cashewnut seeds	499½ "
Vegetable seeds	26 "

12. *Tree planting week.*—The 'tree planting week' during the 1st week of July 1951 was celebrated at the station with all earnestness. During the period the following seedlings were planted at the station:—

	NOS.
Coconut seedlings	8
Cashew seedlings	800
Gliricidia seedlings	400
Papaya seedlings	24

A total number of 100 west coast seedlings was distributed at a concessional rate of 4 annas each to the public during the week.

13. *Filter point.*—For augmenting the water-supply of the station, a filter point was successfully installed at the station in the office block very close to the well. The spot was selected by the Director of Agriculture, Madras, during his inspection of the station in December 1951. The preliminary work connected with the installation of the filter point commenced on 30th January 1952 and the work was completed by 28th February 1952. The filter point had to be driven 30 feet below ground level before full supply of water could be obtained. The water table is at the depth of 16 feet below the ground level. The filter point when worked with a 2" x 2" petrol pumpset gave a discharge of 2,500 gallons of water per hour, whereas a discharge of 5,600 gallons per hour was obtained when worked with an oil engine of 7-10 horse-power with 3 inch delivery pipe. Even after working for six hours continuously with the oil engine pump set, the same rate of discharge was maintained thus ensuring a good supply of water during summer months when ordinary wells in this area are generally dried up. The filter point will therefore, be helpful to extend the area under food crops in summer at this station.

Samples of water drawn from the filter point and the adjacent well were sent to the Government Agricultural Chemist, Coimbatore and were got analysed. It is found that both the samples are good and suitable for irrigation purposes and of the two, water from the filter point is superior. The results of analysis are given in Table XI.

TABLE XI.—Analysis of water from the filter point and well.

Particulars,	Water from the filter point.	Water from the well.
(1)	(2)	(3)
Total solids	6.00	9.6
Carbonate (CO ₂)	Nil.	Nil.
Bicarbonate (HCO ₃)	4.27	7.93
Sulphate (SO ₄)	1.34	1.88
Chloride (CL ₂)	0.71	0.71
Lime (CaO ₂)	4.48	5.88
Magnesia (Mgo)	traces.	traces.
Calculated salts—		
Calcium bicarbonate	5.67 (Caco 3) equivalent	10.53 (Caco 3) equivalent
	3.83	6.56
Calcium sulphate	2.27	2.86
Calcium chloride	1.11	1.11
P. H.	7.09	7.2

14. *Steps taken to increase the income of the station.*—All the available area where there was no coconut plantation had been utilised to grow subsidiary crops like vegetable, fruit and other economic plants. By the installation of the filter point the scope of increasing the area under food and other remunerative crops is increased. Root crops like sweet potato and tapioca are also grown in the shade of the coconut in between rows of trees during rainy months. Coconut nurseries are also raised in the main blocks in the shade of the coconut with a view to indirectly benefit the poor coconut trees due to the watering of the nursery in summer. Increase in the production of coconut seedlings is also contemplated to enhance the revenue of the station.

AGRICULTURAL RESEARCH STATION,
NILESHWAR,

10th September 1952.

AGRICULTURAL COLLEGE AND
RESEARCH INSTITUTE,
LAWLEY ROAD P.O., COIMBATORE,

15th September 1952.

P. M. SAYEED,
Superintendent.

G. V. NARAYANA,
Oil-seeds Specialist and Vice-Principal.

APPENDIX I.

COST OF CULTIVATION OF COCONUT PER ACRE OF 56 TREES AT THE AGRICULTURAL RESEARCH STATION, NILESHWAR III, 1951.

	RS. A. P.
Manures and manuring	119 12 3
After cultivation	10 11 0
Irrigation	7 13 9
Harvesting	1 4 0
Total	139 9 0
Yield of nuts per acre	86 nuts
Cost of 86 nuts at Rs. 180 per thousand	15 8 0
Loss per acre	124 1 0

APPENDIX II.

STATEMENT OF RECEIPTS AND CHARGES FOR THE FASLI 1361 (1951-52) OF THE AGRICULTURAL RESEARCH STATION, NILESHWAR III.

Receipts.

XXIX. Agriculture—Agricultural receipts—

	RS. A. P.
Agricultural Stations	4,467 8 2
Miscellaneous	9 2 0
Rent on buildings	0 4 0
Deduct refunds	182 12 0
Net receipts (total)	4,294 2 2
Free transfers	768 12 6
Total	5,062 14 8

Expenditure.

40. c. Agricultural Experimental Farms—A. Agricultural Research Stations—

Office contingencies—

	RS.	A.	P.
Dearness allowance to menials	884	11	0
Other contingencies	52	8	0
Freight charges	5	11	0
Total, Office cotingencies ..	942	14	0

Other charges—

Purchase of live and deadstock	269	14	2
Petty construction and repairs ..	57	0	0

Working expenses—

Repairs and upkeep	496	5	3
Maintenance of cattle	504	15	9
Mazdoor labour	1,340	7	5
Miscellaneous cultivation expenses	1,002	13	10
Seeds and plants	745	0	6
Manures and chemicals	3,659	5	6
Sundries	219	15	9
Total, working expenses ..	7,969	0	0
Total, other charges ..	8,295	14	2
Total, contingencies ..	9,238	12	2

ANNUAL REPORT OF THE AGRICULTURAL RESEARCH STATION,
NANJANAD, FOR THE YEAR 1951-52 (FASLI 1361).

I. SEASON.

A statement of the rainfall received during the year, furnishing weekly totals and the number of rainy days compared with similar figures for the previous year and those of the preceding ten years, is given in Table I.

TABLE I.—Statement of rainfall for fasli 1361(1951-52).

TABLE 2.							
		1951-52.		1950-51.		Average for the past 10 years.	
Month.	Week.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.
South-west monsoon.							
June	7-13	1.83	4	0.08	..	2.17	2.90
	14-20	0.64	2	0.07	..	1.19	2.80
	21-27	1.27	3	0.23	1	2.03	2.40
June-July	28-4	1.07	2	0.66	3	1.85	3.90
	5-11	2.55	5	2.15	5	3.06	4.70
	12-18	3.58	5	1.77	6	2.32	3.50
July-August	19-25	10.82	7	2.69	7	2.37	4.30
	26-1	3.36	4	5.32	6	1.83	3.10
	2-8	0.56	2	1.96	3	1.14	2.20
August-September	9-15	0.21	1	2.14	3	1.91	3.20
	16-22	0.23	1	4.14	4	2.28	4.10
	23-29	0.75	3	2.18	4	1.38	2.80
Total ..	30-5	0.06	..	0.74	2	0.99	1.50
	6-12	0.12	..	1.13	4	1.41	2.00
	13-19	2.86	5	1.00	3	1.01	1.60
Total ..	20-26	2.46	3	1.27	2	1.16	2.00
	Total ..	32.27	47	27.53	53	28.10	47.00
North-east monsoon.							
September-October	27-3	4.63	7	2.58	2	1.26	2.4
	4-10	0.21	1	1.05	3	1.16	2.2
	11-17	4.09	4	5.38	5	2.65	3.4
November	18-24	1.98	6	0.41	2	1.45	3.1
	25-31	1.04	2	..	..	0.80	1.7
	1-7	0.27	1	0.45	1	1.41	2.4
November-December	8-14	1.07	3	2.54	5	1.73	3.1
	15-21	1.19	3	0.32	2	2.36	2.0
	22-28	0.31	2	..	..	1.18	2.0
December-January	29-5	1.12	3	..	..	0.58	1.2
	6-12	..	..	..	..	0.48	1.0
	13-19	..	..	0.71	2	0.22	0.8
Total ..	20-26	..	..	..	..	0.21	0.5
	27-3	0.09	..	0.02	..	0.51	0.2
	4-10	..	..	0.02	..	0.39	0.7
Total ..	11-17	..	..	0.52	1	0.18	0.4
	18-24	..	..	..	..	0.23	0.6
	25-31	0.15	1	..	..	0.16	0.4
Total ..	Total ..	16.16	33	14.00	23	16.94	23.1
Hot weather.							
February	1-7	0.08	..	..	..	0.04	0.1
	8-14	0.10	..	0.16	1	0.11	0.2
	15-21	0.68	1	..	..	..	..
March	22-28	1.09	2	..	..	0.25	0.2
	1-7	..	..	..	..	0.04	0.2
	8-14	..	..	..	..	0.55	0.2
Total ..	15-21	0.05	..	..	..	0.66	0.2
	22-28	0.01	..	..	..	0.42	0.2
	Total ..	Total ..	0.01	..	..	..	0.66	0.2

Month.	Week.	1951-52.		1950-51.		Average for the past 10 years.	
		Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.
March-April	29-4	1.61	1	3.43	4	0.96	1.2
	5-11	1.78	6	0.79	3	0.98	2.2
	12-18	0.05	..	3.40	4	1.61	2.1
	19-25	1.24	3	0.17	1	1.18	2.3
April-May	26-2	0.53	1	0.97	4	0.90	2.2
	3-9	0.51	1	0.24	2	0.61	1.7
	10-16	0.48	1	0.44	1	0.54	1.8
	17-23	..	..	0.40	2	1.33	1.7
May-June	24-30	0.85	3	2.12	4	2.09	3.4
	31-6	0.83	3	3.83	5	1.81	3.2
Total		9.89	22	15.95	31	13.98	23.8
Grand total		58.41	102	57.48	107	59.02	98.9

The frequency and intensity of precipitation during the two monsoons and the hot weather period were satisfactory and conformed to the average. The two disturbing factors, however, were the heavy cyclone in the second-half of July, which proved detrimental to the main potato crop by damaging the haulms in their developmental stage, and the onset of ground frost early in December, which cut down the later-planted potato crop. The hot weather period received good showers which proved beneficial for the irrigated potatoes.

The cyclonic weather in July did incalculable harm to the cereal crops, damaging seedlings beyond recognition before establishment and practically wiped out their stand. It was a very bad season for the cereals in general.

A total of 58.41 inches of rain was received, spread over 102 rainy days, as compared to the amounts of 57.48 inches and 59.02 inches respectively, recorded for last year and as the mean for the past ten years.

The maximum temperatures ranged between 84° F and 54° F and the minimum between 38° F and 70° F. The first appearance of ground frost was on 4th December 1951 and the number of days of frost totalled 29 for the year. The last day of frost was on 11th March 1952.

II. POTATO—(*Solanum tuberosum*, L).

2. (i) *Seed multiplication*.—The popular commercial variety, *Great Scot*, and other important varieties were raised during the three crop seasons as usual. The varieties included Ben Cruachan, Bressie, Epicure, Golden Wonder, King Edward, Kerr's Pink, President, Royal Kidney and up to date.

The main crop was planted in April and the harvest commenced from August. The second crop was planted during August–September. Though the crop established and grew well, the plants, particularly of the later planted batches, were cut down by ground frost which set in on 4th December 1951. The irrigated crop was raised in January–February and lifted in May and June. The average yields of the variety, *Great Scot*, are presented in Table II.

TABLE II.—Average acre yield of potato (1951-52).

Season.	Area in acres.	Mean acre yield in lb. (1951-52).	Mean acre yield in lb. (1950-51).
(1)	(2)	(3)	(4)
Main crop	13.81	8,450	5,983
Second crop	9.44	4,688	3,419
Irrigated crop	2.50	10,350	4,388

(ii) *Newly imported Great Scot seed*.—A supply of 1,024 lb. of disease-free certified Class 'A' *Great Scot* seed was obtained from the United Kingdom and planted in the main crop season of 1952-53.

3. (i) *Varietal trials—Type collection*.—A total number of 69 varieties, forming the type collection, was grown in all the three seasons, to study the relative performances of the varieties under the different seasonal conditions. The following showed promise. *Epicure* in the main crop; *Ben cruachan* and *Arran Scout* in the second crop; and *Blue Flower*, *Majestic*, *Evergood* and *Coonor White* in the irrigated crop.

(ii) *New varieties received from the Netherlands*.—During the preceding year, two Dutch varieties, viz., *Alpha* and *Bintje*, were newly introduced and raised during the irrigated crop season for the first time. A total number of 24 Dutch varieties including the above two, was received from the Netherlands and grown under irrigation in 1952. Among them, the following six showed promise of good yields: *Furore*, *Industrie*, *Eigenheimer*, *Ultimus*, *Alpha* and *Moulder S. 22*. These and the others have been multiplied for seed and will be examined for their performance in the second crop season of 1952-53. The necessary phyto sanitary certificate was obtained with the imports.

(iii) *Yield trials with early varieties*.—This trial, started in the year 1948, with the object of comparing the relative yielding capacities of the four varieties, *Great Scot* (station stock and the material recently imported from England and Scotland), *British Queen*, *Dunbar Standard* and *Royal Kidney*, was concluded during the year. The variety, *Royal Kidney*, gave significantly higher yields over the other varieties, except *British Queen*. The results are given below for the second crop:—

TABLE III.—Yield trial with early varieties (1951-52).

Season.						Second crop, 1951.	
Field number and previous crop	..	..	..	..	..	27.	Rye for ergot.
Layout	..	..	..	..	..	..	Randomized replicated plots 6 x 4.
Plot size	..	..	..	..	..	..	0.25 cent (net).
Seed used	..	..	..	..	..	..	Irrigated crop seed of 1951.
Number of tubers per plot	..	..	..	..	..	..	64.
Date of planting	..	..	..	..	..	..	20th August 1951.
Date of harvest	..	..	..	..	..	..	6th February 1952.
Varieties—							
A=Great Scot (Station stock) Standard.						D=British Queen.	
B= Do. (Scotland).						E=Dunbar Standard.	
C= Do. (England).						F=Royal Kidney.	

Summary of results.

	A	B	C	D	E	F	General mean.	'Z' test satisfied or not.	Standard error.	Critical difference (P = 0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Acre yield in lb.	6,800	7,900	6,600	8,900	8,300	9,900	7,983	Yes.	604	1,288
Percentage on standard (A).	100.0	125.4	104.7	141.2	131.7	157.1	126.7	..	9.6	20.6
Conclusion—F, D, E, B, C, A.										

During the preceding years, yields were significantly in favour of *Dunbar Standard* for the main crop (1948), *Great Scot* (England) for the second crop (1949) and *Great Scot* (Scotland) for the irrigated crops (1949 and 1951).

(iv) *Yield trial with late varieties*.—This trial was also started in the year 1948, for similar reasons as under (3). Five varieties were used for the experiment, viz., *Bressie*, *Golden Wonder*, *Great Scot*, *Kerr's Pink* and *President*. Though *Great Scot* is a variety comparatively earlier to the others, it was included because of the fact that it is adaptable for all the seasons and continues to be the most popular variety. This is the final year of this trial. The variety, *President*,

gave the maximum yield and was significant over Bressie and Golden Wonder. The results are given below for the second crop :—

TABLE IV.—Yield trial with late varieties (1951-52).

Season.						Second crop, 1951.				
Layout	..	..	..	..	..	Randomized replicated plots 5 × 4.				
Plot size	..	..	..	..	..	0.25 cent (net).				
Seed used	..	..	..	..	..	Irrigated crop seed of 1951.				
Number of tubers per plot	..	..	..	..	..	64.				
Date of planting	..	..	..	..	..	21st August 1951.				
Date of harvest	..	..	..	..	..	5th February 1952.				
Previous crop	..	..	..	..	..	Rye for ergot production.				
Field number	..	..	..	..	..	27.				

Varieties—

A = Kerr's Pink (standard).

B = Great Scot.

C = President.

D = Golden Wonder.

E = Bressie.

Summary of results.

	A.	B.	C.	D.	E.	General Mean.	'Z' test satisfied or not.	Standard error.	Critical difference (P = 0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Acres yield in lb.	5,600	5,500	6,000	2,000	4,700	4,880	Yes.	548	1,196
Percentage on standard (A).	100.0	98.2	117.8	35.7	83.9	87.1	..	9.8	21.2
Conclusion—C, A, B, E, D.									

During the preceding years, yields were significantly in favour of the variety, Kepr's Pink for the main crop (1948) and the second crop (1949).

(v) *Trials with varieties and cultures received from the Potato sub-station, Simla, of the Central Potato Research Institute, Patna.*—The following seed materials were received from the Botanist, Potato Breeding sub-station, Simla, the Central Potato Research Institute, Patna, and put under trials, in accordance with the directions received from Simla to fix the promising cultures suited for the Nilgiris. The results are given below for the main crop :—

(a) *Observation rows.*—The following 34 cultures were promising out of the total of 80 under examination. C.P.S. Nos. 13, 14, 15, 21, 28, 32, 50, 54, 55, 56, 57, 83, 114, 115, 137, 140, 142, 228, 381, 388, 391, 399, 408, 413, 419, 433, 458, 472, 547, 559, 567, 1075, 1076 and 1077.

(b) *Adaptive trial.*—Twenty-nine cultures, among the 42, showed promise as follows: C.P.S. Nos. 13, 14, 63, 70, 140, 381, 1075, 1076, 1077, 1083 and 1090. Original Nos. 45, 164 (a), 164 (b), 175, 209, 374 (a), 374 (b), 375, 705, 969, 977, 1223, 1352 (a), 1352 (b), 1362, 1690, 1995 and 2090.

(c) *Yield trial.*—All the seven cultures included in the test, viz., hybrid numbers 5, 9, 10, 13, and 33, and original numbers 209 and 2090.

(d) *Replicated observation rows.*—One culture, O.N. 2090, gave indications of optimum yield among the five under comparison.

(e) *Chilean tuberosum varieties.*—Four cultures, viz., B-37, B-68, B-116 and B-126 proved promising.

(f) *Wild and cultivated species.*—Among the 14 species under observation, three, viz., E.P.C. 353, 355 and 1144, revealed superiority in yield.

All the promising cultures and varieties from the above six sets of trials have been carried over for the next year.

A total number of 31 new varieties and cultures has been received from the same source and planted in the main crop season of 1952-53.

Details of the cultural and manurial treatments adopted for the trials on potato in this section are given below :—

Cultural.—Preliminary cultivation is with two ploughings with Victory plough followed by a third ploughing with monsoon plough to cover cattle manure; ridges and furrows are formed and ridges broken up to cover the seeds

after planting. The crop is earthed up twice during growth, once when the plants are about 6 inches in height and for a second time when the crop begins to cover the drills by ridgers. For harvest, the tubers are lifted by cattle-drawn diggers.

Manurial.—Three to five tons of cattle manure or compost are applied per acre and covered up by the third and last ploughing. After planting the seeds, Nanjanad mixture at 1,610 lb. per acre is applied on a level with the seed tubers and covered, except for the manurial trials under paragraph 6, for which the different treatments adopted are given under each trial separately.

Spacing of seed.—Seeds are placed in furrows separated by ridges 2 feet apart and spaced at a distance of 8 inches in the row for all the trials and for multiplication of seed.

4. (i) *Agronomic experiments—Soil erosion agronomic trial.*—This trial was started in the year 1944 with the object of comparing the yields of potato and the cereal, *Samai* crops obtained by cultivating the land according to the recommended departmental method against that obtained by the adoption of the common ryots' practice, at stated below :—

Departmental method.—After ploughing the land twice with Victory plough, ridges are formed along the contours with a double mouldboard plough. All the operations of preparatory and after cultivations and harvest are entirely done with the use of bullock power. The total cost of the operations will come to rupees sixty per acre.

Ryots' method.—The land is opened up by forking deep and, after breaking the clods, furrows are taken along the slopes by handworking with *Guddalies*. All the operations from the start to the finish are entirely effected by hand. The charges for labour will average rupees 130 per acre.

The above practices relate to the cultivation of potatoes. For raising the cereal, the practice advocated departmentally is to plough the land along contours, broadcast the seed and cover up with a Mysore cultivator, while the general method among the ryots is to rake up the soil with *guddalies* and cover the seed with the same implement after broadcasting. The *guddali*, which resembles a hand hoe in size and working and fitted with two prongs, is the one implement that is used for all operations by the local ryot right from the preparation of the land to the stage of harvest.

The results are given below for the second crop:—

TABLE V.—Soil erosion, Agronomic trial (1951-52).

						Second crop of potato. Replicated plots.	Samai. Replicated plots.
Layout	..	..	..	..	..	2 × 12.	2 × 12.
Plot size	..	..	..	..	..	2 cents (net).	2 cents (net).
Date of sowing	..	..	..	..	..	29th August 1951.	15th May 1951.
Date of harvest	..	..	..	..	..	30th January 1952.	8th December 1951.
Field number	..	..	..	..	..	33.	33.
Previous crop	..	..	..	..	..	Samai.	Second crop of potato.

Treatments—

(1) Departmental method.

(2) Ryots' method.

Summary of results.

	Departmental method. (1)	Ryots' method. (2)
Second crop of potato acre yield in lb.	3,954	4,363
Samai—Grain acre yield in lb.	617	483
Samai—Straw acre yield in lb.	1,667	1,260

While the yield of potato was higher in the ryots' method, cereal returns of grain and straw were higher in the departmental method. For the seven-year

period, 1944—1950, while there were no significant differences in yield between the two methods with reference to potato, the cereal yields were significant in favour of the departmental method for the preceding three years, 1948, 1949 and 1950. The effect of the treatments on crop growth were not perceptibly different.

The trial has been discontinued since the usefulness of cultivation along contours and the economy of the use of cattle power have been amply proved by the department and the trial is not likely to yield any extra information.

(ii) *Soil erosion run-off plots.*—This trial was laid out during the period of north-east monsoon of the year 1950 to obtain comparative data for losses of rain water and soil under five different levels for slope (one in three, one in four, one in five, one in six and one in seven), and under three varying soil conditions, viz., (1) worked and cultivated along contours as recommended; (2) along slopes as the cultivators practice; and (3) for uncultivated fallow. The plots were protected by cement baffle walls on all the sides with provision for the collection of soil and water washed down in cement cisterns. The results obtained during the two monsoons and the hot weather period are furnished below :—

TABLE VI.—*Soil erosion run-off plots (1951–52).*

Season.	Gradient.	Departmental method.	Ryota' method.	Uncultivated fallow
(1)	(2)	(3)	(4)	(5)
South-west monsoon, 1951.	One in three	R.L. 8'441074	7'850471	5'52946
		S.L. 2'63599	3'234904	0'2505935
	One in four	R.L. 6'09705	7'372008	5'796872
		S.L. 1'471983	1'527854	0'1215194
	One in five	R.L. 6'635729	8'129552	7'048038
		S.L. 1'048681	1'424640	0'3219236
	One in six	R.L. 4'777591	6'84932	5'493652
		S.L. 1'0355994	1'3744108	0'745884
	One in seven	R.L. 5'122898	5'693750	3'760272
		S.L. 1'0347436	1'5426068	0'4239171
North-east monsoon, 1951.	One in three	R.L. 8'830703	5'112799	3'254159
		S.L. 5'4791529	12'6094950	0'1832162
	One in four	R.L. 3'73471	5'600119	2'590032
		S.L. 2'0266230	1'8154617	0'508895
	One in five	R.L. 4'717847	5'498807	4'105811
		S.L. 1'8549096	1'3489404	0'1713507
	One in six	R.L. 4'390451	4'903981	4'05726
		S.L. 0'7305208	1'5514952	0'1672490
	One in seven	R.L. 4'119696	4'86964	5'000428
		S.L. 1'2691876	1'3845853	0'4243949
Hot weather, 1952	One in three	R.L. 1'094796	0'942764	0'995358
		S.L. 2'451230	1'851289	1'080345
	One in four	R.L. 0'833716	1'29233	1'19307
		S.L. 1'1553602	1'836015	1'153150
	One in five	R.L. 1'44194	1'156836	1'259767
		S.L. 0'522644	1'366507	0'145691
	One in six	R.L. 0'603623	1'073436	1'386206
		S.L. 0'3641288	0'373713	0'219422
	One in seven	R.L. 0'483128	1'200125	1'293909
		S.L. 0'284948	0'619184	0'2737045

NOTE.—R.L.—Loss of rain water in inches per acre. S.L.—Loss of soil in tons per acre.

The experiment, in its present set-up, will be discontinued since made-up soils had been used on the plots, being only 12' × 4' in size, are too small to give any accurate picture of the soil wash. The studies will be resumed with a modified layout to serve the object better. No differences for crop growth were perceptible during the year under report.

(iii) *Rotation experiment.*—The object of this trial, which was started in the year 1942 to run for a period of six years in the main crop, was to find out the most suitable and remunerative rotational practice for potato. Nineteen different rotational treatments, replicated six times in randomized blocks, were given, as presented in the accompanying table. The conclusions for the six-year period ending 1947 may be summarized as follows :—

(a) Potato followed by potato every year gives optimum yield; but its effects on the gradual increase of pests and diseases and consequent reduction of yields, in course of time, are points to be reckoned with;

(b) the raising of a green manure crop of lupins, directly after potato every year, maintains optimum potato yields;

(c) taking a green manure crop of lupins after potato, instead of leaving the land fallow, is a desirable practice; and

(d) among the cereals grown in rotation with potato, oats reduced the potato yield to the maximum.

The experiment was resumed, for continuance for a further period of six years, on the recommendation of the Research Council in 1949, but it will be dropped in its present layout and commenced afresh during the three-year period (1953–55), limiting the number of treatments to the minimum, composed of lupins and a few of the popular cereals. The results for the current year are given below for the main crop :—

TABLE VII.—*Rotation experiment (1951–52).*

Treatment Symbol.	Two-year rotation.				Acre yield in lb. (1951–52).		
	First year (1951–52)		Second year (1952–53)		Potato.	Lupin.	Cereals.
	April.	September.	April.	September.			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A	P	P	P	P	13,000	..	All the cereals,
B	P	F	P	F	12,500	..	Korali, Resis-
C	P	F	S	F	13,050	..	tance Oats,
D	P	F	K	F	13,383	..	Ragi and
E	P	F	R	F	12,732	..	Samai failed
F	P	F	Ro	F	14,083	..	before esta-
G	P	L	P	L	13,583	5,867	blishment,
H	P	L	S	F	15,000	5,000	due to the
I	P	L	K	F	12,300	5,783	heavy cyclo-
J	P	L	R	F	13,583	3,633	nic weather
K	P	L	Ro	F	14,617	2,600	during the
L	S	F	P	L	..	..	South-west
M	K	F	P	L	..	..	monsoon.
N	R	F	P	L	..	..	
O	Ro	F	P	L	..	..	
P	S	F	P	F	..	..	
Q	K	F	P	F	..	..	
R	R	F	P	F	..	..	
S	Ro	F	P	F	..	..	

No observations were made during 1952–53, since the trials were closed.

NOTE.—F—Fallow.

K—Korali (*Setaria pallidifusca*, stapf and Hubbard.)

L—Lupin.

P—Potato.

R—Ragi.

Ro—Resistance oats.

S—Samai.

F—Fallow.

(iv) *New trial on strip-cropping (1952–53).*—A new trial on strip-cropping, i.e., cropping potato and Samai on alternate strips in the same field for studying the effect, if any, on soil erosion, has been laid out in the main crop season of 1952–53. Three strips of potato, totalling nine cents, were alternated with three of Samai totalling 3.5 cents. The progress of the crops is fair.

5. *Cultural trials.*—(i) *Trial with mature and immature seed.*—This trial, laid out from the year 1948, was designed to find out the differences in yield, if any, between the crops raised with mature and immature seed tubers and was conducted on the main and the second crops. Treatment differences were not significant. The results are given below:—

TABLE VIII.—*Trial with mature and immature seed (1951–52).*

Season.	Main crop, 1951.		Second crop, 1951.	
Layout	2 × 12 (ABBA method)	..	2 × 12 (ABBA method).	..
Plot size	0.25 cent (net)	..	0.25 cent (net).	..
Seed used	Second crop of 1950	..	Irrigated crop of 1951.	..
Number of tubers planted ..	64	..	64.	..
Date of planting	31st March 1951	..	16th August 1951.	..
Date of harvest	30th July 1951	..	10th January 1952.	..
Previous crop	Lupin for seed	..	Rye for ergot production.	..
Field number	32	..	27.	..

Treatments—

(A)—Mature seed (harvested 105 days after planting).

(B)—Immature seed (harvested 75 days after planting).

Summary of results.

	Treatments.		General Mean.	'Z' test satisfied or not.	Standard error.	Critical difference (P=0.05).
	A.	B.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Main crop, 1951—						
Acre yield in lb.	7,933	7,366	7649.5	No.	134	295
Percentage on control (A)	100.0	92.8	96.4	..	6.7	14.8
Second crop, 1951—						
Acre yield in lb.	7,334	5,334	6,334	No.	960	2,112
Percentage on control (A)..	100.0	72.1	86.05	..	13.1	28.8

During the preceding years, significant results were obtained in favour of the mature seed for the main crop (1949) and for immature seed for the second crop (1950). Foreign workers have concluded that the immature seed provides the best seed material. Since the experiments at this station have not yielded conclusive results, the investigations will be discontinued. The data of the different seasons' trials will be analysed.

(ii) *The influence of Bordeaux mixture spray on yield.*—This experiment was started in the year 1950 to investigate the possibilities of increasing the yield of the crop by spraying with 1 per cent Bordeaux mixture, as it is held that the absorption of traces of metallic elements like copper, manganese, etc., through the leaf surface had, elsewhere, led to enhanced crop returns. The yield data, obtained from the main and the second crops, are given below:—

TABLE IX.—*The influence of Bordeaux mixture spray on yield (1951–52).*

Season.	Main crop, 1951.		Second crop, 1951.	
Layout	Randomized replicated plots 4 × 5.	..	Randomized replicated plots 4 × 5.	..
Plot size	1 cent (net)	..	1 cent (net).	..
Seed used	Second crop, 1950	..	Irrigated crop 1951.	..
Date of planting	14th April 1951.	..	16th August 1951.	..
Date of harvest	10th October 1951	..	16th January 1952.	..
Previous crop	Samai	..	Rye for ergot production.	..
Field number	42	..	27.	..

Treatments—

A — Not sprayed (Control).

B — Sprayed once, 45 days after planting.

C — Sprayed twice 45 and 60 days after planting.

D — Sprayed twice 60 and 75 days after planting.

} at 100 gallons per acre per spray.

Summary of results.

	Treatments.				General Mean.	'Z' test satisfied or not.	Standard error.	Critical difference (P=0.05).
	A.	B.	C.	D.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Main crop, 1951.								
Acre yield in lb. ..	7,020	7,260	6,140	7,800	7,055	No.	60	..
Percentage on control. (A)	100.0	103.4	87.5	111.1	100.5	..	0.7	..
Second crop, 1951.								
Acre yield in lb. ..	4,120	3,630	3,840	3,840	3,870	No.	268	..
Percentage on control. (A)	100.0	89.3	93.2	93.2	93.9	..	6.5	..

There were no differences for the incidence and severity of the disease among the different treatments, due to meagre infection.

For the main crop (1950), treatment D (spraying twice 60 and 75 days after planting) had recorded significantly higher yields over the other two spray treatments and control. The experiment will be concluded in 1952.

(iii) *The influence of the time of planting on yield.*—This trial is under way from the year 1949, with the object of fixing the best time to plant the main and the second potato crops to gather optimum yields. The results are given below:—

TABLE X.—*The influence of the time of planting on yield (1951–52).*

Season.	Main crop, 1951.		Second crop, 1951.	
Layout	Randomized replicated plots 4 × 5.	..	Randomized replicated plots 4 × 5.	..
Plot size	0.05 cent (net).	..	0.05 cent (net).	..
Seed used	Second crop seed 1950.	..	Irrigated crop seed of 1951.	..
Number of tubers planted per plot	123.	..	123.	..
Date of planting	As per treatments.	..	As per treatments.	..
Date of harvest	15th October 1951.	..	7th December 1951.	..
Previous crop	Lupin for seed.	..	Rye for ergot production.	..
Field number	32.	..	27	..

Treatments—

A—Planted on 1st March 1951.

B— Do. 15th March 1951

C— Do. 1st April 1951.

D— Do. 15th April 1951.

Planted on 1st August 1951.

Do. 15th August 1951.

Do. 1st September 1951.

Do. 15th September 1951.

Summary of results.

	A.	B.	C.	D.	General Mean.	'Z' test satisfied or not.	Standard error.	Critical difference (P=0.05).
Main crop, 1951—								
Acre yield in lb. ..	16,440	16,280	22,120	17,090	17,090	Yes.	480	1,046
Percentage on control (A)	100.0	99.0	134.5	103.9	109.4	..	2.9	6.3
Second crop, 1951—								
Acre yield in lb. ..	11,840	7,280	7,520	6,240	5,220	Yes.	564	1,228
Percentage on control (A)	100.0	61.5	63.5	52.7	69.4	..	4.8	10.4

Conclusion—

Main crop .. C, D, A, B.

Second crop .. A, C, B, D.

The results of the previous years have conclusively borne out the fact that planting in the middle of April for the main crop and early in August for the second crop resulted in optimum returns for the respective crops. The experiment will be discontinued.

(iv) *The influence of mulching the potato crop on yield.*—This trial is under progress since the year 1950 to find out if mulching the land under the crop with dried vegetable refuse, such as Samai straw, has any beneficial effect on the yield

of tubers. Mulching helps in smothering weed growth, conserving soil moisture and minimising soil wash-down during heavy rains. The results are given below for all the three seasons :—

TABLE XI.—The influence of mulching the potato on yield (1951-52).

Season.	Main crop, 1951.	Second crop, 1951.	Irrigated crop, 1952.
Layout	5 × 4 randomized	5 × 4 randomized.	5 × 4 randomized.
Plot size (net) ..	1'0 cent	1'0 cent	1'0 cent.
Seed used	Second crop seed of 1950.	Irrigated crop seed of 1951.	Main crop seed of 1951.
Number of tubers per plot.	256	256	128.
Date of planting ..	30th March 1951	14th August 1951	7th February 1952.
Date of harvest ..	2nd August 1951	19th January 1952	4th June 1952.
Previous crop ..	Lupin for seed	Rye for ergot production.	Irrigated crop in 1951.
Field number ..	32	27	21.
Treatments—			
A—Unmulched (control).			
B—Mulching at 1,250 lb. per acre.			
C—Do. 2,500 lb. do.			
D—Do. 8,000 lb. do.			
E—Do. 10,000 lb. do.			

Summary of results.

(1)	Treatments.					General Mean.	'Z' test satisfied or not.	Standard error.	Critical difference. (P=0.05).
	A.	B.	C.	D.	E.				
Main crop 1951—									
Acre yield in lb. ..	14,100	4,825	6,475	9,025	11,150	9,115	Yes.	396	863
Percentage on control (A).	100.0	34.2	45.9	64.0	79.1	64.6	..	2.8	6.1
Second crop, 1951—									
Acre yield in lb. ..	3,400	3,900	5,500	7,850	8,200	5,770	Yes.	980	2,138
Percentage on control (A).	100.0	114.7	161.7	230.8	241.1	169.7	..	28.8	62.8
Irrigated crop, 1951—									
Acre yield in lb. ..	7,840	8,200	8,440	10,920	11,240	9,328	Yes.	890	1,939
Percentage on control (A).	100.0	104.5	107.6	139.2	143.3	118.9	..	9.1	19.7

Conclusions—

Main crop—A, E, D, C, B.
Second crop—E, D, C, B, A.
Irrigated crop—E, D, C, B, A.

The yield data were significantly in favour of 8,000 lb. of mulch for the second crop (1950) and for 10,000 lb. of mulch in the irrigated crop (1951). For the second crop (1951), though there were no significant differences among the treatments, it was found that the greater the quantity of the mulch used, the higher were the yields. The trial, in its present set-up, will be discontinued and modified by placement of the manure below the tuber level and will include studies on the relative weed population and moisture content of the different treatments.

(v) Two new experiments have been started on the main crop for the year 1952-53, viz., (a) studies on the effect of delayed harvest on yield and (b) investigations on the influence of different spacing of the row on yield.

6. Manurial trials—(i) *Liming experiment*.—This trial was started from the second crop season of the year 1950 to investigate the possibilities of improving the yield of potato by the application of varying doses of lime to the soil, both by broadcasting and by banding at a depth of 4 inches below the tuber level and also to the lupins preceding potato. It has been held by foreign workers that though potato loves an acid soil, the best range would be between pH 5.0 and pH 5.5 while the pH of the soil obtaining at the station is 4.6. It was found that for all the three seasons of the trial, viz., the second crop of 1950 and 1951 and for the main

crop of 1951, the results did not indicate any benefits for dressing with lime. The results are given below :—

TABLE XII.—Liming experiment (1951-52).

	Main crop, 1951.	Second crop, 1951.
Layout	Randomized blocks (7 × 4)	Randomized blocks (11 × 4).
Plot size (net) ..	0.75 cent	1.0 cent.
Seed used	Second crop of 1950	Irrigated crop of 1951.
Number of tubers per plot	192	256.
Date of planting ..	21st April 1951	20th September 1951.
Date of harvest ..	13th October 1951	2nd February 1952.
Previous crop ..	Lupin for seed	Rye for ergot production.
Field number ..	32	27.
Treatments (seven for the main and eleven for the second crop)—		
Main crop, 1951—		
A—Not limed (control).		
B—One ton of slaked lime per acre, broadcast four weeks before planting.		
C—Two tons do.		
D—Four tons do.		
E—One ton of slaked lime per acre applied in two bands, four inches deep, on either side of the ridges four weeks before planting potato.		
F—Two tons of slaked lime per acre applied in two bands, four inches deep, on either side of the ridges four weeks before planting potato.		
G—Four tons of slaked lime per acre applied in two bands, four inches deep, on either side of the ridges four weeks before planting potato.		
Second crop, 1951—		
Treatments A to G same as for the main crop.		
H—Not limed.		
I—One ton of slaked lime per acre, broadcast to the previous green manure crop of lupin followed by potato in the next season.		
J—Two tons of slaked lime per acre, broadcast to the previous green manure crop of lupin followed by potato in the next season.		
K—Four tons of slaked lime per acre, broadcast to the previous green manure crop of lupin followed by potato in the next season.		

Summary of results.

(Main crop 1951.)						
(1)	A.	B.	C.	D.	E.	F.
(2)	(3)	(4)	(5)	(6)	(7)	
Acre yield in lb. ..	13,667	13,300	14,700	14,800	13,733	12,500
Percentage on control (A) ..	100.0	97.3	107.5	108.3	100.5	91.5
G.						
General mean.						
'Z' test satisfied or not.						
Standard error.						
Critical difference (P=0.05).						
Acre yield in lb. ..	13,667	13,767	10.	1454.8	3,056	
Percentage on control (A) ..	100.0	100.7	..	10.6	22.3	
Conclusion—						
Treatment differences were not significant.						

(Second crop, 1951).

	A.	B.	C.	D.	E.	F.	G.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	
Acre yield in lb. ..	7,410	8,250	7,500	8,850	7,500	8,300	7,600
Percentage on control (A) ..	100.0	111.3	101.2	119.4	101.2	112.0	102.6
H.							
I.							
J.							
K.							
General Mean.							
'Z' test satisfied or not.							
Standard error.							
Critical difference (P=0.05).							
Acre yield in lb. ..	6,500	6,700	8,050	9,100	7,878	No.	1,484
Percentage on control (A) ..	87.7	102.6	108.6	122.3	106.3	..	9.42
Conclusion—							
Treatments differences were not significant.							

The cost of one ton of slaked lime at the present prevailing price is Rs. 80 inclusive of transport. The application of 4 tons per acre would involve an expense of Rs. 320 which is about two or three times the current rental value of the land. Already the manuring of an acre of potato works out at Rs. 300. The practice of liming will double the already high manure bill. Again the trial has returned no evidence to show that an increased pH of the soil will be beneficial to the crop. The expenses of liming will not appeal to the ryots because of the prohibitive cost. A cheaper and better way for soil amelioration will be the extended use of green manures. Considering these points, the trial has been discontinued.

(ii) *Trial with fused phosphate.*—The object of this trial, which was conducted over the main and the second potato crops during the year for the first time, was to find out if the substitution of the super phosphate content of the Nanjanad mixture with fused phosphate, on equivalent phosphoric acid basis, would result in improved yields. The results are given below:—

TABLE XIII.—Trials with fused phosphate (1951-52).

Details.						Main crop, 1951. (ABBA method.)	Second crop, 1951. (ABBA method.)
Layout	..	..	..	..	..	2 x 12	2 x 12
Plot size (net)	..	..	..	..	..	1'0 cent.	1'0 cent.
Seed used	..	..	..	..	..	Second crop seed of 1950.	Irrigated crop seed of 1951.
Number of tubers per plot	..	..	..	..	..	250	256
Date of planting	..	..	..	..	..	3rd May 1951.	16th August 1951.
Date of harvest	..	..	..	..	..	9th September 1951.	12th January 1951.
Previous crop	..	..	..	..	..	Rye for ergot production.	
Field number	..	..	..	..	..	26	27
Treatments—							
A.—Nanjanad mixture consisting of 500 lb. of ground nut cake meal, 350 lb. of steamed bone meal, 672 lb. of superphosphate, 224 lb. of potassium sulphate and 200 lb. of ammonium sulphate.							
B.—Nanjanad mixture wherein fused phosphate replaces the superphosphate on equal phosphoric acid basis. This works out at 500 lb. of ground nut cake, 350 lb. of steamed bone meal, 224 lb. of potassium sulphate, 200 lb. of ammonium sulphate and 642 lb. of fused phosphate.							

Summary of results.

	A	B	General mean.	'Z' test satisfied or not.	Standard error.	Critical difference (P=0.05).
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Main crop.</i>						
Acres yield in lb.	13,400	13,891	13,646	No.	220	484
Percentage on control (A)	100.0	103.6	101.8		1.6	3.6
<i>Second crop.</i>						
Acres yield in lb.	3,613	4,083	3,848	No.	284	464
Percentage on control (A)	100.0	113.0	107.0		7.9	12.9

Conclusion.—Treatment differences were not significant.

Though the replacing of the superphosphate with fused phosphate has given slightly higher yields, no significant increases were evident. The product is not now produced in the country, but there is good future for its manufacture in course of time when cheap hydro-electric power becomes available. The present world shortage of sulphur, which is necessary for the manufacture of superphosphate, is a limiting factor. When fused phosphate becomes available cheap and in larger quantities in India, it can be recommended for extended use only if found useful. The trial has been discontinued.

(iii) *Complex manurial experiment.*—This comprehensive trial, which is in progress from the year 1949, was designed to explore the possibilities of reduction of the dosages of the manurial ingredients of the Nanjanad mixture, and consequently of the very high present cost of manuring potatoes without, in any way, impairing the yield of the crop or the productive capacity of the soil. The amounts of nutrients removed by an acre of the potato crop are 47 lb. of nitrogen 22 lb. of phosphoric acid and 77 lb. of potash. Nanjanad mixture, which has been recommended for optimum potato yields on the Nilgiris, contains 80 lb., 200 lb., and 100 lb. of the respective nutrients. Such excessive doses are rendered necessary due to the abnormal conditions of soil and climate obtaining on the hills.

The soils of the Nilgiris, formed from laterite rocks, are generally poor in plant food and, therefore, are unable to sustain good crop growths. The soils are highly acidic (pH 4.60) and contain high percentages of iron (9.95) and alumina (19.62), which render the bulk of the phosphates unavailable for plants. The lands are very deficient in lime (0.07 per cent) and available phosphoric acid (0.009 per cent). The nitrogen content is fair, analysing to 0.32 per cent and response to application of nitrogenous manures is good.

Due to the undulating nature of the terrain, the steep slopes under cultivation and the porous nature of the soil, much of the fertilizers applied is lost by wash-down during the heavy monsoon downpours.

In the trial under report, a reduction of the quantum of nitrogen from two to one (80 lb. to 40 lb.), permuted with a reduction of the supply of phosphoric acid from five to three, one and zero (200 lb. to 120 lb., 40 lb. and nil per acre), while maintaining the quantity of potash at 100 lb., was effected in the different treatments. The effect of liming, at 2 tons per acre, was also included for the studies. In addition to the four variants for phosphoric acid, the nutrient was supplied in a single 60 lb. dose to the green manure crop of lupins which followed the cereal *Samai* in the second year of rotation, in addition to applying it direct to the potato on the assumption that this would improve the output of green leaf from the lupins and also help in the greater fixation of atmospheric nitrogen in the soil by better root nodulation due to increased bacterial activity.

The yield figures for the main crop for the different treatments, details of which are given below, have closely followed the trend for the preceding three years. Nanjanad mixture has given the highest yield and the addition of lime to it has not resulted in any increased output. Lowering the dosages of nitrogen and phosphoric acid has resulted in progressive and appreciable decline in returns.

Layout.—Both the crop forming the rotation, potato and *samai*, are designed to come simultaneously in two separate series. While the treatments are exactly the same for both the series, the crop rotated differs as follows:—

Year.						Series I.	Series II.
1949	..	..	..	..	..	Potato-lupin.	<i>Samai</i> -lupin.
1950	..	..	..	..	..	<i>Samai</i> -lupin.	Potato-lupin.
1951	..	..	..	..	..	Potato-lupin.	<i>Samai</i> -lupin.
1952	..	..	..	..	..	<i>Samai</i> -lupin.	Potato-lupin.

Series II—Potato.

TABLE XIV.—Complex manurial experiment—Yield data (1951-52).

Serial number.	Treatments.						Acres yield in lb.
1	..	..	..	L0	2N	5P 3K (Nanjanad mixture)	10,459
2	..	..	..	L1	2N	5P 3K (do. with lime)	10,400
3	..	..	..	L0	2N	3P 3K	8,552
4	..	..	..	L1	2N	3P 3K	8,944
5	..	..	..	L0	2N	1P 3K	9,095
6	..	..	..	L1	2N	1P 3K	8,524
7	..	..	..	L0	2N	0P 3K	6,311
8	..	..	..	L1	2N	0P 3K	8,055
9	..	..	..	L0	1N	5P 3K	8,093
10	..	..	..	L1	1N	5P 3K	7,741
11	..	..	..	L0	1N	3P 3K	7,498
12	..	..	..	L1	1N	3P 3K	7,824
13	..	..	..	L0	1N	1P 3K	6,966
14	..	..	..	L1	1N	1P 3K	7,740
15	..	..	..	L0	1N	0P 3K	5,776
16	..	..	..	L1	1N	0P 3K	6,946

NOTE.—L0—No lime.

L1—Lime at two tons per acre.

2N, 5P, 3K—Nanjanad Mixture (Standard) where

2N—80 lb. nitrogen

5P—200 lb. phosphoric acid } per acre.

3K—100 lb. potash.

NOTE.—(1) Dosage of potash is always kept constant at 100 lb. K₂O per acre.

(2) Dosages of nitrogen are at two levels 40 lb. (1N) and 80 lb. (2N) per acre.

(3) Dosages phosphoric acid are at four levels, NIL (0P), 40 lb. (1P), 120 lb. (3P) and 200 lb. (5P).

The yield figures for the crop in Series I, *Samai*, are not given, for the cereal was a complete failure due to adverse seasonal conditions and did not grow up to the stage of harvest.

The yield values conclusively prove that Nanjanad mixture can withstand comparison with other treatments and is necessary for keeping up production. Till future research provides a solution for the prevention of the formation of the insoluble iron and aluminium phosphates which are not available for the plant,

no reduction in the huge quantity of the fertilizers applied, or in its cost, appears possible without sacrifice of yield. The trial has been discontinued.

(iv) Three new manurial trials were started for the year 1952-53 to study the effects of (a) application of new nitrogenous fertilizers like urea and Chilean nitrate of soda on equal nitrogen basis, in place of the ammonium sulphate of the Nanjanad mixture; (b) reduction and increase of the nitrogen and phosphoric acid contents of the Nanjanad mixture on potato yield, combined with the application of lime and green leaf to the soil; and (c) application of calcium carbonate sludge or slurry (a biproduct of the ammonium sulphate industry) on potato yield, in comparison with slaked lime on the basis of equal total calcium oxide content.

(a) *Forms of Nitrogen experiment—Object.*—To determine the relative efficiency of different forms of nitrogenous fertilizers:—

Particulars of form of nitrogen to supply 80 lb. N per acre.	Green manure lb. per acre.	Lime lb per acre
Treatment—		
1 Chilean nitrate plus (P + K of Nanjanad mixture) ..	Nil.	Nil.
2 Urea plus (P + K of Nanjanad mixture) ..	Nil.	Nil.
3 Ammonium sulphate plus (P + K of Nanjanad mixture) ..	Nil.	Nil.
4 Control (Nanjanad mixture) ..	Nil.	Nil.
5 Chilean nitrate plus (P + K of Nanjanad mixture) ..	5,000	Nil.
6 Urea plus (P + K of Nanjanad mixture) ..	5,000	Nil.
7 Ammonium sulphate plus (P + K of Nanjanad mixture) ..	5,000	Nil.
8 Control (Nanjanad mixture) ..	5,000	Nil.
9 Chilean nitrate plus (P + K of Nanjanad mixture) ..	5,000	1,500
10 Urea plus (P + K of Nanjanad mixture) ..	5,000	1,500
11 Ammonium sulphate plus (P + K of Nanjanad mixture) ..	5,000	1,500
12 Control (Nanjanad mixture) ..	5,000	1,500
13 Chilean nitrate plus (P + K of Nanjanad mixture) ..	Nil.	1,500
14 Urea plus (P + K of Nanjanad mixture) ..	Nil.	1,500
15 Ammonium sulphate plus (P + K of Nanjanad mixture) ..	Nil.	1,500
16 Control (Nanjanad mixture) ..	Nil.	1,500

Number of replications—Four.

Layout—Split plot design and randomized.

Main plots—Green manure and lime.

Sub-plots—Form of nitrogen.

Size of the plot—0.5 cent.

Application of manure—Slaked lime to be applied three weeks before planting. Any green leaf can be applied ten days before planting. Manure mixture to be applied by placement 2" to 3" below the level of seed by band method.

(b) *Optimum requirement of nitrogen and phosphoric acid—Object.*—To determine the optimum dose of nitrogen and P_2O_5 required by the potato crop in the Nilgiris.

Treatments.	Dosage of super phosphate to supply P_2O_5 per acre in lb.	Ammonium sulphate to supply nitrogen per acre in lb.
1	30	60
2	30	80
3	30	100
4	30	120
5	60	60
6	60	80
7	60	100
8	60	120
9	120	60
10	120	80
11	120	100
12	120	120
13	180	60
14	180	80
15	180	100
16	180	120
17	200	60

Treatments.	Dosage of super phosphate to supply P_2O_5 per acre in lb.	Ammonium sulphate to supply nitrogen per acre in lb.
18	200	80
19	200	100
20	200	120
21	240	60
22	240	80
23	240	100
24	240	120
25	Control	(Nanjanad mixture)

Area of each plot—0.5 cent.

Number of replications—Four.

Layout—Randomised.

Basal dressing—1,500 lb. slaked lime to be applied three weeks in advance, 5,000 lb. green leaf to be applied ten days before planting. Potash in treatments 1 to 25 same as contained in Nanjanad mixture.

Application of manure—By placement 2" to 3" below the level of the seed by band method.

(c) *Calcium carbonate slurry—Object.*—To determine the efficiency of calcium carbonate slurry in neutralizing acidity of the soils of Agricultural Research Station, Nanjanad.

Treatment—	Green leaf per acre.
1 Control (Nanjanad mixture)	Nil.
2 Do.	5,000
3 Nanjanad mixture plus slaked lime 1,500 lb.	Nil.
4 Do.	5,000
5 Nanjanad mixture plus calcium carbonate slurry to supply equivalent amount of Ca O as in 3	Nil.
6 Do.	5,000
7 Nanjanad mixture plus slaked lime at 3,000 lb.	Nil.
8 Do.	5,000
9 Nanjanad mixture plus calcium carbonate slurry to supply equivalent amount of Ca O as in 7	Nil.
10 Do.	5,000

Number of treatments—Ten.

Number of replications—Five.

Layout—Split plot design.

Main plots—Green manure.

Sub-plots—Form and dose of lime.

Size of plot—One cent.

Application of manure—Slaked lime and calcium carbonate slurry to be applied three weeks in advance of planting. Green leaf ten days before planting and fertilizers by placement 2" to 3" below surface on either side by band method.

N.B.—Nanjanad mixture contains 80 lb. N, 200 lb. P_2O_5 , and 100 lb. K_2O .

No differences for growth and vigour of the crop were perceptible in all the above three trials.

7. (a) *Inhibition of sprouting in table potatoes during storage.*—A proprietary product, 'Barsprout', manufactured by Messrs. the American Cyanamid Company and containing as its active ingredient, the methyl ester of naphthaleneacetic acid constituting 2.2 per cent by weight in an inert vehicle amounting to 97.8 per cent, was taken up for trials. The preparation claimed to inhibit the sprouting of table potatoes and also to retard sprouting and root formation on root-crops like beets, carrots and turnips. The volatile chemical, it is stated, when distributed on the potatoes as they are put in storage, would vaporise into the eyes of the potatoes in sufficient strength to inhibit sprouting; and that extensive tests, conducted by the Boyce Thompson Institute for Plant Research, had shown that the chemical imparted no harmful effect to the treated tubers.

Carefully graded uniform-sized tubers of the variety, Great Scot, directly after second-crop harvest, were used for the trial and four treatments were adopted as follows:—

Treatment—A—Not treated (control)

B—Treated with *Barsprout* at 1 gram per lb. of tubers

C— " " 1.5 " "

D— " " 2 " "

After a period of four-months and a half, the samples were examined. While the untreated tubers (control A) had developed long sprouts, it was found that the treated lots maintained the dormant stage.

Again, after a total period of seven-months-and a half from the start, the samples were examined finally for quantitative determinations of loss in weight and extent of sprouting. It was seen that the percentage of loss in the untreated material due to dryage and shrinkage was as high as nearly three-fourths of the total weight of the material stored. On the other hand, the loss amounted to only about a third of the total initial weight of tubers in treatments B and C, and barely one-fourth in treatment D. Thus, the use of the preparation had remarkably cut down storage losses. Simultaneously, it was found that the extent of sprouting was also considerably less, the growth-length, which averaged 36 centimeters in the untreated material coming down to a mere 3 centimeters in the treatment D. The use of this and similar products, therefore, may be deemed to be a safe and good practice, to keep off storage losses of potatoes.

Due to lack of proper storage facilities, there are always potato growers who are obliged to sell their crop as harvested, regardless of the price they get. Thus, they are at the mercy of the merchants who depress the price at the expense of, and loss to, the farmer. By the use of similar harmless chemicals it is possible for the grower to be in a position to hold the produce for a rise in market prices and to keep his stored ware in sound condition, in the absence of good storage or warehouse facilities.

8. *Fungicidal trials against early blight (Alternaria solani) of potatoes.*—Three new brands of fungicides, viz., *Dithane D-14* plus zinc sulphate, *Dithane Z-78* and *Phygon XL* were used in comparison with Bordeaux mixture, to test their usefulness for prevention and control of early blight on potatoes and their effects on yield, if any, during the main and the second-crop seasons. Details of the experiment and yields are given below:—

TABLE XV.—*Fungicidal trials against early blight (1951-52).*

Season.	Main crop.			Second crop.		
(1)	(2)			(3)		
Layout	4 × 5 randomised	replicated plots.		5 × 6 randomized	replicated plots.	
Plot size (net)	One cent	.. .. .		One cent.		
Variety	Great Scot	.. .. .		Great Scot.		
Date of planting	10th April 1951	.. .. .		20th August 1951.		
Date of harvest	22nd August 1951	.. .. .		30th January 1952.		
Date of first spraying	1st June 1951..	.. .. .		18th October 1951.		
Date of second spraying	2nd June 1951	.. .. .		7th November 1951.		
Treatments—						
A — Dithane D-14 + zinc sulphate.						
B — Dithane Z-78.						
C — Bordeaux mixture (5: 5: 50).						
D — Control (unsprayed) <i>Phygon XL</i> .						
E — Control (unsprayed)						

Summary of results.

	A.	B.	C.	D.	E.	General mean.	'Z' test satisfied or not.	Standard error.	Critical difference. (P=0.05)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Main crop, 1951—									
Acre yield in lb.	15,320	16,680	15,280	13,840	..	15,280	No.	1.203	..
Percentage on control D.	110.7	120.5	110.4	100.0	..	110.4	..	100.0	..
Second crop, 1951—									
Acre yield in lb.	8,350	8,450	8,183	8,383	7,133	8,100	No.	600	..
Percentage on control E.	116.8	118.5	114.7	117.5	100.0	118.5	..	100.1	..

Conclusion.—Treatment differences were not significant for yield. No conclusions could be drawn on the relative fungicidal values of the spray treatments, due to the almost complete absence of the disease on the crop.

Dithane D-14. contains 19 per cent disodium ethylene bisdithio carbamate (expressed as disodium ethylene bisdithiocarbamate hexahydrate 27 per cent) with zinc sulphate (36 per cent metallic zinc equivalent); and *Dithane Z-78* contains 65 per cent zinc ethylene bisdithiocarbamate as their active ingredients. The trials were conducted by the Government Mycologist, Coimbatore.

For the season 1952-53, the trials are being continued, including the use of some more proprietary brands of fungicides.

9. *Insecticidal trials against tuber moth (Gnorimoschema operculella) on potato in the field.*—The tuber moth attacks the stored tubers as well as the tubers in the fields. The eggs are laid on the 'eyes' of the tuber and the caterpillar that hatches out riddles its way into the flesh, rendering the material unfit for seed. Four treatments with four replications using D.D.T. and B.H.C. were employed in the experiment and the tubers were examined for incidence of the pest. The results are given below for the second and the irrigated crops:—

TABLE XVI.—*Insecticidal trials against tuber moth (1951-52).*

Treatment.	Total number of tubers examined.	Total number of tubers infested.	Percentage infested tubers to total.
(1)	(2)	(3)	(4)
Second crop, 1951—			
A. DDT spray (0.1 per cent)	4,829	17	0.35
B. BHC spray (0.05 per cent)	4,783	12	0.25
C. DDT dust (5 per cent)	5,627	24	0.43
D. BHC dust (5 per cent)	5,623	12	0.21
E. Control	3,823	127	3.32
Irrigated crop, 1952—			
A.	6,149	19	0.30
B. } same	5,958	26	0.40
C. } as	6,957	9	0.13
D. } above	4,746	39	0.83
E.	5,729	145	2.60

The field infestation by tuber moth was very poor, amounting to 3.32 per cent and 2.60 per cent, respectively, for the second and the irrigated crops. The beneficial effect of the insecticidal dusts and sprays in controlling the attack was evident in the treatments A, B, C and D but, in view of the usually meagre infestation occurring in the field, the treatments may not prove economical, unless the extent of attack by the pest is considerably heavier.

The trial was conducted by the Government Entomologist, Coimbatore. The cost of application of the insecticides for the four treatments per acre, worked out as follows: (a) Rs. 6; (b) Rs. 14; (c) Rs. 15; and (d) Rs. 6.

10. *Outstation trials with varieties suited for cultivation in the plains during winter.*—Four varieties, viz., *Arran Scot*, *Up-to-date*, *President* and *Bressie* were tried in the cold weather at the Agricultural Research Station, Aduthurai, and returned the per plant yields of 7.5 oz., 7.5 oz., 8.6 oz. and 10.2 oz. respectively. Since enough seed material was not available to spare, the crop population had to be small. The culture *Hybrid 13* did well at the Arku Valley farm, returning an estimated acre yield of 6,615 lb. during the winter. The seed material was planted for trial during the moonsoon period at the end of May 1952.

The above four varieties were sent to the Agricultural Training School, Orathanad, for trial in the cold weather months. It was reported that the plants grew up normally, but were destroyed by a heavy incidence of *Epilachna* beetles.

The trials will be resumed at the above and some more centres during the winter of 1952.

III. CEREALS AND FOODGRAINS.

11. (i) *San ai (Panicum miliare, Lam.)*.—This is the most important foodgrain crop raised on the Nilgiris and forms the staple diet of the local population. It is grown in rotation with potato. Unlike as in the plains, where its duration is

comparatively shorter, the crop stands on the field for about six months. In favourable seasons it yields heavily, benefiting by the residual effects of the rich manuring given to the preceding potato crop. The initial growth of *Samai* is very slow, the plants hardly attaining a height of six inches in two months.

The season was particularly adverse for the crop. Before the plants could establish, the severe cyclone, accompanied by heavy rains in July, completely laid the crop low, eliminating all chances of survival. This resulted in the very poor return of only 831 lb. of seed for the area of 12.2 acres sown for seed multiplication. The culture *P.M. 4*, sown over a small area, also failed before establishment.

(ii) Two cultures of *Samai*, *P.M. 2* and *P.M. 4*, received from the Millet Specialist, Coimbatore, have been sown for trial during 1952-53.

12. *Weed control by chemicals in cereal fields.—Trials with Extar 'A' (Sandoz).*—Due to the recent and striking advances in Plant Chemistry various chemical preparations have been formulated to help the farmer in his battle against weeds. Many of them have not only proved successful, but some have been found specific and selective in their action, besides being cheap and easy of application.

During the year 1949, a supply of Extar 'A' manufactured by Messrs. Sandoz Limited, of Basle, Switzerland, was received through Messrs. Shaw Wallace & Co., Limited, Madras, for trials. The product was claimed to be very effective for weed-killing in cereal fields and to contain, as its active ingredient, dinitro-ortho-cresol. This herbicide was tried against the noxious weed Spurry (*Spergula arvensis*) in *Samai* fields. The product was readily soluble in water and could be sprayed with ease. Since the preliminary observational trials, started on a field scale in 1949, had given encouraging indications, detailed investigations on a replicated basis were laid out during the succeeding two years. Details of the treatments adopted for the year under report and the results obtained are given below:—

TABLE XVII.—Trial with Extar 'A' (Sandoz)—(1951-52).

Layout—Randomized replicated 4 x 6.					Date of harvest—14th to 20th December 1951.				
Plot size—1 cent.					Previous crop—Potato.				
Date of sowing—25th May 1951.					Field number—11.				
Treatments—					C 1 per cent strength solution sprayed in two doses.				
A Control (unsprayed).					D 2 per cent strength solution sprayed in single dose.				
B 1 per cent strength solution sprayed in one dose.									
Summary of results.									
	A	B	C	D	General mean.	Standard error.	'Z' test satisfied or not.	Critical difference. (P = 0.05)	
Grain.									
Acre yield in lb.	23	92	124	134	93.2	28.0	Yes.	60.0	
Percentage control (A).	100.0	400.0	539.1	582.6	405.4	6.0	..	12.8	
Straw.									
Acre yield in lb.	66	396	537	658	426.7	32.5	Yes.	72.8	
Percentage control (A).	100.0	600.0	809.4	996.9	647	2.9	..	6.1	
Conclusion—D, C, B, A.									

A review of the yield data, both for grain and straw, reveals the highly beneficial effects of the herbicide on yields of the cereal, which may entirely be ascribed to the vigour and growth of the crop as a result of weed-free sanitation it received by the sprays. While the unsprayed plots were foul with the weed, the percentages of spurrey population killed by the chemical, as measured in the three spray treatments B, C and D, were respectively 87.0, 90.0 and 94.0.

For yield of grain, all the above three treatments were not only superior to the control, but the yield increases shot up in a remarkable manner to between 400 per cent and 583 per cent. In the case of straw yields, again, the significant increases over the control were of the very high order of six to nearly 10 times. The effects of the products showed off markedly in the particularly adverse season

by the fact that, while the control plots recorded unduly below-the-average yields, the sprayed ones gave incomparably high returns.

Another point worth noting is that the product did not affect, in any way, the potato crop that succeeded the cereal in rotation, after a period of four months. The potato grew up and yielded normally, proving that no harmful residual effects were left on the soil by the herbicide.

The expenses for spraying once with 1 per cent strength, inclusive of cost of the chemical and labour, worked out at Rs. 33-12-0 per acre. Hand weeding will average Rs. 50 and the final result will never, in any event, be as thorough. Any-way, a lower price for such products may make them more popular with and acceptable to the average farmer.

13. *Oats (Avena sativa, L.).*—The variety *Resistance oats* and the culture, *Hybrid 1*, were both raised over small plots but, due to the unfavourable season, recorded the low acre yields of 100 lb. and 57.5 lb. respectively.

14. *Ragi (Eleusine coracana, Gaertn.).*—The culture, *R. 382*, received from the Millet Specialist, Coimbatore, was tried for comparison against the local variety, but the tender seedlings could not survive the cyclonic weather in July and totally failed to establish.

15. *Buckwheat (Fagopyrum tartaricum, Gaertn.).*—This useful foodgrain crop, which comes to harvest in about 100 days from sowing and which is grown as a catch crop after the main potato crop, was raised in an area of 80 cents. In line with the other cereals, this also was laid low by the cyclonic weather and heavy rains in July and recorded an acre yield of 98 lb. of grain.

The flour obtained from the above species of buckwheat possesses a sharp, astringent taste, besides being dark in colour, while the one from the other species, *Fagopyrum esculentum* (Moench.) is better preferred since, in taste and quality, it is equal to that of any cereal flour. Seeds of the latter have been procured from Coonoor for multiplication next year.

16. *Rye for ergot production.*—An area of 10.6 acres was under an Italian variety of this cereal for ergot production. Sprayings with ergot culture were done in July, August and September. Due to the very unfavourable seasonal conditions, the infection was not satisfactory and only a total yield of 1 lb. 10 oz. of ergot was obtained from the entire extent. The poor yield was partly due to the cyclonic weather, leading to the lodging of the plants and dropping of the ergot bodies. Crop growth and stand were also poor and this variety does not appear suited to the tract. Even setting of the grain was not good, only 258 lb. of seed being obtained.

For the year, 1952-53, an area of 15.7 acres has been cropped with the acclimatized variety, *Australian Black Winter*. This variety tillers freely, the growth is good and it promises better performance both for yield of ergot and seed. Another six acres will be put under a second sowing to be taken up in July 1952.

17. *Rice (Oryza sativa, L.).*—Six varieties of rice of Chinese and African origin, as detailed below, were received from the Paddy Specialist, Coimbatore, for trial during 1952-53:—

TABLE XVIII.—Rice varieties under trial (1952-53)

Type Number.	Duration of flowering in days.	Origin.
T. 972	72	China.
T. 988	76	
T. 1,007	105	
T. 1,039	77	
T. 1,040	98	
T. 2,130	108	Kenya, East Africa.

All the above types are reported to have done well in Kashmir. The seeds have been just sown and their performances will be studied.

IV. GREEN MANURE CROPS.

18. (i) *Blue bitter lupins* (*Lupinus angustifolius*).—An area of 14.6 acres was put under the crop, both for collection of seed and for supply of green leaf. Seeds were also sown over all uncultivable waste lands and on bunds. A total quantity of 5,324 lb. of seed was obtained.

Sowings were also done directly after the lifting of the main potato crop in August-September to see if, in the same year, a sizable quantity of green leaf could be obtained from the crop before the onset of ground frost in November. The plants grew up normally but, in the exposed terraces, were cut down by frost. In more protected stretches, however, the crop withstood the extreme conditions and progressed to the seeding stage.

A field examination of the population that received the full impact of the frost revealed that a few plants grew up hardy in spite of the adverse conditions. These plants were carefully marked out and seeds collected. This material will be sown during the next winter to find out if the crop raised therefrom is physiologically resistant to frost.

Normally, in this region, only one crop, either of potato or a cereal, is taken per year. Thus the land remains fallow during the winter and the dry weather periods of nearly six months in a year. But the practice of growing a green manure crop of lupins, directly after the removal of the potato or the cereal crop in the same year, instead of leaving the soil bare, is definitely desirable since, besides being helpful in supplying valuable organic matter in the shape of green leaf to these poor acid soils, lupins offer a cover to the land against wash-down during rains.

(ii) *Sweet yellow lupins* (*Lupinus termis*).—This crop, the seeds of which are edible and fit for use in the same way as the other common pulses, was grown over an area of an acre for seed. The seed obtained amounted to 377 lb. The plants bloom profusely with golden yellow flowers which emit a very sweet scent. But the crop is rather slow in growth and, therefore, as a supplier of green leaf, it is not as good as the blue bitter variety.

(iii) *Italian white lupins* (*Lupinus luteus*).—The seeds, along with those of vetch, clover and rape as recorded below, were obtained from the Italian Federation of Agricultural Co-operatives, for trial. The sowing was done early in May and the plants, after good germination, grew up very vigorously, attaining a height of over 6 feet. Leaves are much bigger than those of the common lupins and the branching is also more profuse. But the stem gets woody quickly, detracting from its value as a green manure that can be ploughed in situ. Three lb. of seed were collected from only half-a-cent for further multiplication.

19. *Italian clover* (*Trifolium species*).—Two sowings were done, the first during the south-west monsoon in May and the other just before the north-east monsoon in August. The few seedlings that came up from the former set were washed out in the heavy rains. Germination and establishment in the second set was better, but the crop did not cover the ground as expected. The plants flowered but failed to set seed.

Seeds of the following varieties of clovers are under trial for 1952-53: (1) Four varieties of clovers, of East African origin, received from the Government Lecturing and Systematic Botanist, Coimbatore, viz., *Trifolium pratense*, *T. repens*, *T. incarnatum* and *T. subterraneum*. All the first three failed, while *T. subterraneum* has established well; (2) *Ladino clover*, also from the Government Lecturing and Systematic Botanist, Coimbatore, of Australian origin. The plants have established after good germination; (3) sweet clover (*Melilotus alba*), from the Assistant Conservator of Forests (Soil Conservation), Ootacamund. This variety shows some promise; and (4) three cultures of acclimatized subterranean clovers, Nos. 330, 334 and 383, received from the Oil Seeds Specialist, Coimbatore. All the three failed for germination.

20. *Italian vetch* (*Vicia species*).—Two sowings were done, as in the case of clover. Growth was very poor though the germination was good, the plants attaining a maximum height of only 5 inches before producing flowers that withered off without setting.

Seeds of Hairy vetch (*Vicia villosa*) obtained from the Assistant Conservator of Forests (Soil Conservation), Ootacamund, were tried and the plants have established satisfactorily.

21. *Italian rape* (*Raphanus rape*).—As for clover, the seeds were sown in two instalments, but they totally failed for germination. Plants from seeds obtained afresh from the Oil Seeds Specialist, Coimbatore, and recently sown, have come up excellently.

22. *Other green manure plants*.—Cuttings and seedlings of *Gliricidia maculata* were planted but they did not establish. Seedlings raised from *Sesbania speciosa* seeds also failed to survive. These two green manure plants, which are very popular on the plains and particularly in the wetland zones, are definitely not suitable for this tract.

V. FORAGE CROPS AND GRASSES.

23. *Grasses*.—Slips of the three varieties of grasses, viz., Lemon grass (*Cymbopogon species*), Giant Star Grass (*Cynodon plectostachyum*) and Water Grass (*Brachiaria mutica*) were planted for trial. The first two varieties established well while water grass proved a failure.

24. *Lespedeza sericea*.—This perennial forage crop, reputed to be ideal for hay, pasturage and soil improvement, particularly in the eastern half of the United States, was tried for the first time. The seeds were received from the Director of Agriculture, Madras, under supply by the Division of Forage Crops and Diseases of the United States Department of Agriculture. Sowings were done in four batches in the dry weather, hot weather, south-west monsoon and north-east monsoon seasons. While the germination and growth in the first two periods recorded above were poor, the crop raised during the rains was healthy. The flowers did not set seed.

A new consignment of seeds has been obtained for trial during 1952-53 and the first sowings were done after scarifying the seed and treating the soil with lime and phosphate.

VI. ECONOMIC PLANTS.

25. *Eucalyptus varieties*.—Five species, viz., *Eucalyptus globulus*, *E. ficifolia*, *E. citriodora*, *E. rostrata* and *E. robusta* were sown in beds. Except in the last two, the germination was good and the seedlings are due for planting shortly.

26. *Wattle* (*Acacia species*).—Nurseries were sown and the seedlings will be transplanted to grow and serve as wind-breaks. Further, seeds have been collected from outside for broadcasting on all vacant, uncultivable stretches.

27. *Cypress* (*Cupressus species*).—Seedlings were raised in beds for planting. Seeds were obtained from outside for broadcasting along the boundary.

28. *Ocimum camphora*.—Seedlings raised in beds have come up well and are due for planting.

29. *Balsa* (*Ochroma lagopus*).—Though the seeds raised in beds recorded good germination, the planted seedlings were cut down by frost. Another trial will be made under more favourable seasonal conditions.

30. *Scented geranium*.—Cuttings obtained from the Pomological Station, Coonoor, were totally cut down by frost before establishment.

31. *Rosella* (*Hybiscus sabdariffa*).—The seedlings, after forming their first pair of leaves, did not progress further and withered away. This plant appears unsuitable for the locality.

VII. PULSES.

32. The following crops, raised from seeds received from the Pulses Specialist, Coimbatore, are under trials for the first time: (1) Eight varieties of soybean (*Glycine max.* Merr.), viz., *Perfume*, *Acclimatised Black*, *Nanking 332*, *Woods Yellow*, *Mandalay*, *Mis. 28*, *Behrum* and *Tata 5*, both with and without treatment with bacterial inoculum; (2) three varieties of red gram (*Cajanus cajan*, L.) from Araku Valley, Thadagam and Wynaad, and a perennial culture; No. 37; (3) two varieties of green gram (*Phaseolus aureus*, Roxb.), viz., *Moong Type No. 49* and another type.

The above seeds have been sown in April-May 1952, and their progress is being studied.

VIII. VEGETABLES AND FRUITS.

33. An area of half-an-acre was put under the radish variety, *Celestial*, for seed and resulted in an yield of 65 lb. of seed. The variety is early-maturing and white-rooted with good taste, but the preference on the hills is for red-coloured types. In the plains, this would find better favour.

Cabbage, cauliflower, *knolkhol*, peas and carrots were raised in small areas, mainly for disposal for table.

The area under vegetables will be increased in the coming year. Sowings of cabbage, cauliflower, *knolkhol*, tomato, sweet peas, dwarf French beans, turnip, carrot, radish, beetroot and Brussels sprouts have already been taken up for 1952-53.

IX. MISCELLANEOUS.

34. *Work animals*.—Out of the eight pairs of work cattle, one old animal died as a result of pericarditis and enlargement of the liver. The other animals maintained a satisfactory state of health and worked for 179 days during the year.

35. *Pisciculture*.—The fingerlings of mirror carp in the fish pond are developing slowly. One pound of fish was caught and disposed of.

36. *Apiculture*.—The one active colony, which was periodically examined and the hive cleaned, yielded 4 lb. 14 oz. of honey. The number will be multiplied by hiving wild colonies.

37. *Tree-planting*.—A total number of 4,150 blue gum seedlings was planted on the Station during the *Vanamahotsava Week* in August 1951. They are making steady progress.

38. *Seed supply*.—The quantities of the different kinds of seed material disposed of by sale and transfer are given below:—

TABLE XIX.—Seed supply statement (1951-52).

Details.	Transfer.		Sale.		Total.	
	LB.	OZ.	LB.	OZ.	LB.	OZ.
Potato	37,830	0	14,113	12	51,943	12
Radish	65	0	..	..	65	0
Samai	200	0	442	0	642	0
Rye	277	4	..	..	277	4
Lupin	2,776	0	465	0	3,241	0
Buckwheat	32	0	..	..	32	0
Beans	1	0	..	..	1	0
Kikuyu grass	5,000 (slips)	..	..	..	5,000 (slips)	..

39. *Disposal of farm produce*.—Particulars of the quantities of farm produce disposed of are presented in the accompanying table.

TABLE XX.—Return of sales of farm produce other than seed material (1951-52).

Details.	Quantity.	
	LB.	OZ.
Table potato	25,402	4
Potato (chats)	29,230	0
Potato (rejects)	29,921	4
Vegetables	218	8
Strawberry	12	11
Plums, peaches, tree tomatoes	424 Nos.	..
Blue gum leaf	1,150	0
Honey	4	14
Fish (mirror carp)	1	0
Firewood	14.5 lots.	..

40. *Publications*.—The following three articles were published in the *Madras Agricultural Journal* during the year:—

(i) "Influence of seed size and spacing on the yield of potatoes" (Volume XXXVIII, November 1951).

(ii) "potato cultivation at Kodaikanal" (Volume XXXIX, January 1952).

(iii) "Control of sprouting and loss of weight in table potatoes during storage" (Volume XXXIX, May 1952).

The following nine articles were approved by the Director of Agriculture for publication:—

(i) "Buckwheat. A Useful Foodgrain crop";

(ii) "Preliminary studies on the influence of depth of placement of potato seed on yield";

(iii) "Use of 'cut sets' and 'whole seed' for sowing potato";

(iv) "Breaking the rest period of potato seed";

(v) "Influence of the time of planting on the yield of potato";

(vi) "Influence of mulching on yield of potato";

(vii) "Effect of sprout inhibiting hormone on potato seed germination, growth and yield";

(viii) "Off-season bearing in plums at the Agricultural Research Station, Nanjanad"; and

(ix) "Weed control by chemicals—Trials with 'Extar' Sandoz".

41. *Exhibitions*.—Four exhibitions were held at the station, in connexion with the quarterly Farmers' day during the year. On all the occasions, outside cultivators were invited to display their home-grown produce and prizes were awarded to the best exhibits. The station also partook in the Annual Spring Flower Show held at the Government Botanic Gardens in May 1952, and the Park Fair Exhibition, Madras, in January 1952. Exhibits were also sent to different places in and outside the district.

42. The financial statement for the *fasli* year is given in Appendix I.

The profit and loss account of the different bulk crops is given in Appendix II.

AGRICULTURAL RESEARCH STATION, NANJANAD.

12th August 1952.

LAWLEY ROAD P.O. COIMBATORE,

1st November 1952.

K. SAPTHARISHI,

Superintendent..

S. S. KATCHAPESWARAN,
Deputy Director of Agriculture.

GLOSSARY.

<i>Guddali</i>	Two pronged hand hoe commonly used for cultivation on the hills.
<i>Kikuyu grass</i>	<i>Pennisetum clandestinum</i> , Hochst.
<i>Korali</i>	<i>Setaria pallidifusca</i> , Stapf and Hubbard.
<i>Knolkhol</i>	(Hindi) <i>Brassica oleracea</i> , L. var. <i>gongyloides</i> , L.
<i>Ragi</i>	Finger millet (<i>Eleusine coracana</i> , Gaertn).
<i>Samai</i>	Little millet (<i>Panicum miliare</i> , Lam).

APPENDIX I.

STATEMENT OF RECEIPTS AND CHARGES (1951-52).

Particulars.		RS. A. P.		
Receipts.				
By sale of farm produce		12,348	2	3
Miscellaneous receipts		1,174	1	0
Rent of buildings		25	8	0
Value of stock transferred		10,535	3	0
Recoveries of overpayments				
Sales tax		56	11	6
Total		24,139	9	9
Deduct Refunds		113	4	0
Net receipts		24,026	5	9
Charges.				
40. C. Agricultural—Experimental Farms—				
Pay of officers		2,248	6	0
Pay of establishment (Permanent)		6,282	3	0
Do. (Temporary)		1,385	13	0
Dearness allowance of officers		489	11	0
Dearness allowance of establishment		2,754	0	0
Travelling allowance of officers		839	10	0
Other compensatory allowance and travelling allowance of establishment		2,827	4	0
Petty construction and repairs		4,180	11	9
Other contingencies		3,797	8	0
Capital outlay		13,581	8	4
Dearness allowance to menials		4,739	15	0
Working expenses		35,991	3	6
Service postage		330	0	0
Freight charges		303	10	3
Total		79,931	7	10

APPENDIX II.

COST OF CULTIVATION OF CROPS (1951-52).

Crop.	Area in acres.	Cost of Culti- vation.			Gross Receipts.			Profit (+) or Loss (-).		
		Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.
Potato.										
Main	15.21	11,455	4	4	17,371	0	5	+	5,915	12 1
Second	13.54	11,792	8	3	10,638	0	5	-	1,154	7 10
Irrigated	2.50	3,681	4	3	3,967	6	2	+	286	1 11

Crop.	Area in acres.	Cost of culti- vation.	Gross receipts.	Profit (+) or Loss (—).
Cereals.				
		RS. A. P.	RS. A. P.	RS. A. P.
.. .. .	12.68	463 10 6	32 8 0	— 431 2 6
ergot production.	12.90	761 7 3	91 5 6	— 670 1 6

Remarks.—The main potato crop recorded a profit of Rs. 400 per acre. The second crop worked at a loss of about Rs. 80 per acre, while the proceeds from the irrigated crop amounted to Rs. 100 per acre.

The second crop always proves a loss, since it is cut down by ground frost which normally sets in during November. The crop is not of commercial value, since it is raised mainly as a 'seed crop' to meet the requirements of the next main crop. The irrigated crop, again, is damaged by ground frost in its early stages, particularly if the frost persists, which is the rule up to March. But here too, the produce is primarily intended to provide the seed for the incoming second crop. Thus, though the second and the irrigated crops are of no value as a commercial proposition, still they have to be raised for seed, albeit at a loss.

The inordinately unfavourable seasonal conditions were responsible for the failure of the cereals and the loss for returns of *Samai* and rye. *Samai* is never found to be profitable to cultivate, either on the station or outside, and is cropped in small areas near homesteads for food, since it is the staple foodgrain of the local population.

APPENDIX III.

STEPS FOR INCREASING THE INCOME AND REDUCING THE EXPENDITURE OF THE STATION.

Several factors contribute to the heavy expenditure of the station, such as the large area of 180 acres nearly half of which is under intensive cultivation, in contrast to the other stations with much smaller extent. *Kikuyu* grass, introduced decades ago to protect the bunds, has now become a menace occupying nearly a third of the cultivated area. The clearing of this from the potato area alone amounts Rs. 200 to Rs. 300 per acre every year. This is the main factor for the heavy expenditure on the cultivation of potato which, even normally, is higher than that of the other commercial crops. Since the station is located very far from Ootacamund nearly 11 miles distant, the expenses incurred for transport of office effects and for treasury work considerably add to the charges.

It is proposed to reduce the expenditure on cultivation by ploughing up the entire cultivable area with tractor and relay the bunds along contours, after total eradication of *kikuyu* grass. Besides getting rid of the grass, the recurring expenses on cultivation in future years will be greatly reduced thereby. The area under *Samai* has been cut down and the extent under rye (for ergot production) increased for 1952-53. In addition, large scale cultivation of vegetables on a commercial scale, both for seed and food purposes, has been started. All these steps would help to increase the income of the station.

**ANNUAL REPORT OF THE CENTRAL FARM AND COLLEGE DAIRY,
COIMBATORE, FOR THE YEAR 1951-52 (FASLI 1361).**

Area of the farm.—The area of the farm remained unchanged during the year viz., 262·8 acres. Though a plot of 20 acres of tank bed area was handed over by the Revenue department for cultivation under temporary assignment, cultivation could not be done as this plot was handed over late and in a condition requiring lot of improvement before cultivation could start. The net area cultivated by the Central farm was 164·55 acres comprising of 88·10 acres dry land, 59·43 acres garden land and 17·02 acres of wet land. The area cropped by Specialists was 10·78 acres of dry land, 22·10 acres of garden land, and 25·08 acres of wet land. The area proposed to be acquired east of the farm was not acquired during the year as proceedings were not completed.

2. *Season.*—A fall of 16·50 inches of rain spread over 64 days was recorded in the year as against 22·06 inches in 83 days in 1950-51 and the 44-year average of 21·24 inches. The rainfall was insufficient, especially the summer rains, which was 1·65 inches, far below the average of 5·54 inches. This has affected the cropping very much and resulted in increased expenditure and reduced yield. The water-table went down considerably and even the bores were affected. The crops could not be irrigated as required and the area had to be reduced to the minimum. The perennial grasses which were being raised with the sullage water did not receive the water required and there was reduction of yield and they showed signs of drying up. Every effort was made to increase the water supply by increasing the number of bores, cleaning the existing bores and tapping the source at a lower level. Pump-sets were fixed wherever necessary and possible. With all this it was found that the water position was precarious.

3. *South-west monsoon.*—There was 4·54 inches of rain in 26 days during this period as against 6·35 inches over 32 days during the same period of last year. Late rains distributed unevenly and falling below average resulted in late cropping.

4. *North-east monsoon.*—This also was not very good as only 10·31 inches over 27 days was received as against 11·18 inches over 27 days of last year. Yet the water-table went up. But for the continuous drought that followed, the conditions would have been better.

5. *Hot weather.*—The rainfall was only 1·65 inches over 11 days as against 4·53 inches over 24 days of last year and an average of 5·54 inches for the last 44 years. Due to the insufficient precipitation the water-table went down resulting in want of water in the wells and bores.

TABLE I.—*Rainfall statement.*

Month.	Week.	1951-52.		1950-51.		Average rainfall for the past ten years.	Average rainfall for the past forty-four years.
		Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.		
South-west monsoon.							
June	7-13	0·48	4	..	..	0·20	0·39
	14-20	..	..	..	..	0·14	0·30
	21-27	0·02	1	0·32	1	0·20	0·26
June-July	28- 4	..	..	9·01	1	0·16	0·23
	5-11	0·01	1	0·35	6	0·33	0·36
	12-18	0·03	1	0·22	2	0·42	0·54
July-August	19-25	1·96	7	1·65	5	0·54	0·61
	26- 1	0·03	1	0·75	4	0·27	0·29
	2- 8	..	..	0·35	1	0·73	0·36
	9-15	0·10	1	0·04	1	0·18	0·23
	16-22	..	..	2·10	4	0·55	0·46
August-September	23-29	0·09	2	0·04	1	0·12	0·23
	30- 5	..	..	0·09	2	0·43	0·25
	6-12	..	..	0·09	2	0·09	0·21
	13-19	1·26	5	0·02	1	0·30	0·43
	20-26	0·56	3	0·92	1	0·37	0·46
Total ..		4·54	26	6·35	32	5·08	5·72

Month,	Week.	1951-52.		1950-51.		Average rainfall for the past ten years.	Average rainfall for the past forty-four years.
		Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.		
North-east monsoon.							
September-October.	27- 3	0.34	4	4.21	4	1.01	0.78
	4-10	2.53	2	0.20	1	0.83	0.94
	11-17	0.04	1	1.50	7	1.22	1.44
	18-24	1.03	2	1.28	3	1.39	1.43
	25-31	0.07	1	..	..	1.15	1.72
November	1- 7	2.50	3	0.06	1	1.08	1.24
	8-14	2.18	5	2.07	4	1.60	1.27
	15-21	0.64	3	1.72	3	0.74	1.19
	22-23	0.01	1	..	..	0.68	1.00
November-December.	29- 5	0.87	3	..	..	0.45	0.67
	6-12	..	..	..	..	0.33	0.62
	13-19	0.05	1	0.13	3	0.31	0.44
	20-26	..	..	..	..	0.13	0.19
December-January ..	27- 3	..	..	..	..	0.05	0.08
	4-10	..	..	..	..	0.31	0.19
	11-17	..	..	0.01	1	0.13	0.19
	18-24	..	..	..	..	0.16	0.10
	25-31	0.05	1	..	..	0.05	0.11
Total ..		10.31	27	11.18	27	11.62	13.60
Hot weather season.							
February	1- 7	..	..	..	1	..	0.21
	8-14	..	..	0.09	..	0.11	0.08
	15-21	0.04	1	..	..	0.05	0.03
	22-28	0.64	4	..	..	0.14	0.11
March	1- 7	..	..	..	..	0.03	0.10
	8-14	..	..	..	..	0.01	0.03
	15-21	0.34	2	..	..	0.07	0.21
	22-28	..	..	0.13	1	0.11	0.13
March-April ..	29- 4	..	..	0.18	2	0.23	0.31
	5-11	0.47	1	0.47	4	0.27	0.37
	12-18	0.09	1	1.77	4	0.77	0.46
	19-25	..	..	..	..	0.50	0.47
April-May	26- 2	..	..	0.04	2	0.38	0.47
	3- 9	..	..	0.03	1	0.27	0.65
	10-16	..	..	0.22	1	0.32	0.62
	17-23	..	..	0.74	3	0.51	0.61
May-June	24-30	..	..	0.40	3	0.53	0.35
	31- 6	0.07	2	0.46	2	0.24	0.33
	Total ..		1.65	11	4.53	24	4.54	5.54
Total for the year ..		16.50	64	22.06	83	21.24	

I. EXPERIMENTS.

(i) Compost experiments.

6. (a) *Wet lands.*—This experiment was started in the year 1949-50 in 'K' block of the wet land area and this is the third year of the experiment. The main object of the experiment is to compare the yield of sugarcane and paddy when the crops are manured with equal quantities of farmyard manure and night soil compost on *Nitrogen basis* with no manure plot as control. The sugarcane crop received 250 lb. of Nitrogen in two doses, i.e., one-third at the time of planting and two-thirds at the time of earthing up; and the paddy crop received 60 lb. of nitrogen, in one dose as basal dressing. The rotation adopted was sugarcane, paddy, paddy, sugarcane. The sugarcane strain tried was Co.419 and paddy Co. 14.

7. Analysis of the yields for sugarcane revealed no significant differences between the different treatments. For the crop of paddy, the farm yard manure plots proved superior to both night soil compost and no manure plots with reference to both grain and straw yields.

Details of experiment—First and second series (first and second areas).

Field No.—'K' Block, wet lands.	Size of plots—100 links × 25 links (2.5 cents).
Strain—Co. 14 paddy.	Date of sowing nursery—18th July 1951.
Layout—Randomized block.	Date of transplanting—5th, 6th, 7th September 1951.
Replications—Six.	Date of harvest—3rd, 4th, 5th, 6th January 1952.
Treatments—Three—A. Night soil compost at 60 lb. of Nitrogen.	
B. Farmyard manure at 60 lb. of Nitrogen.	
C. No manure (control).	

Details of experiment—third series (third area).

Field No.—'K' Block, wet lands.	Size of plots—100 links × 25 links (2.5 cents).
Strain—Co. 419 sugarcane.	Date of planting—13th, 14th April 1951.
Layout—Randomized block.	Other operations—Earthing up on 2nd, 3rd September 1951.
Replications—Six.	Date of harvest—17th May to 7th June 1952.
Treatments—Three—A. Nightsoil compost at 250 lb. of N trogen	
B. Farmyard manure at 250 lb. of Nitrogen.	
C. No manure (control).	

8. (b) *Garden lands.*—Two crops were taken during the period under report, namely, ragi and sunn hemp, in garden lands. The object of the experiment is to study the comparative responses of principal crops (sugarcane, paddy, ragi and cholam) to the application of farm-yard manure and compost. Experiments on sugarcane and paddy were conducted in wet lands. The last crop of cholam under this experiment was covered in the report for 1950-51. Analysis of the results for the first area indicate that farm-yard manure and night soil compost plots which are on pargive higher yields than the no manure plots with reference to straw. Results for the other area are not significant. This abnormal performance of the crop appears to be mainly due to the water scarcity as evident from the low yields of about 600 lb. only (the normal yield should be about 1,000 lb.).

Details of experiment—First series (i.e., first area).

Field No.—68.	Size of plots—100 links × 25 links (2.5 cents).
Strain—Co. 1 ragi.	Date of sowing nursery—2nd July 1951.
Layout—Randomized block.	Date of planting—31st July 1951.
Replications—Six.	Other operations—19th August 1951 weeding.
Treatments—Three—A. Control (no manure).	Date of harvest—24th October 1951.
B. Nightsoil compost at 60 lb. of Nitrogen.	
C. Farmyard manure at 60 lb. of Nitrogen.	

Details of experiment—Second series (i.e., second area).

Field No.—74.	Size of plots—100 links × 25 links (2.5 cents).
Strain—Co. 1 ragi.	Date of nursery—2nd July 1951.
Layout—Randomized block.	Date of transplanting—23th and 29th of July 1951.
Replications—Six.	Other operations—23rd August 1951 weeding.
Treatments—Three—A. Control (no manure).	Date of harvest—26th October 1951.
B. Night-soil compost (to supply 60 lb. of Nitrogen).	
C. Farmyard manure (to supply 60 lb. of Nitrogen).	

TABLE 2.—Summary of results.

Compost experiments—First series—Field No. 68—Ragi Co. 1—1951-52.

Particulars.	Control (A).	Night soil compost (B).	Farm yard manure (C).	'Z' test.	Standard error.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mean yield of grain in lb. per acre.	630	618.2	606.6	Not significant.	..	..
As percentage on control.	100	97.8	96.3	..	..	..
Mean yield of straw in lb. per acre.	4,840	5,503	5,316	..	133.4	435.6
As percentage on control.	100	113.7	109.8	Satisfied.	2.86 per cent.	9 per cent.

TABLE 3.—Summary of results.

Compost experiments—Second series—Field No. 74—Ragi Co. 1—1951-52.

Particulars.	Control (A).	Nightsoil compost (B).	Farmyard manure (C).	'Z' test.	Standard error.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mean yield of grain in lb. per acre.	513.3	590	536.6	Not satisfied.	..	..
As percentage on control.	100	115	104.5	..	..	..
Mean yield of straw in lb. per acre.	2,316	2,856	2,530	Not satisfied.	..	..
As percentage on control.	100	123.3	109	..	..	..

(ii) *Irrigation experiments on ragi.*

9. This is the second year of the irrigation experiments started as per the instructions of the Director of Agriculture.

10. *Object.*—To obtain information as to the optimum interval between two successive irrigations and the depth of such an irrigation for ragi.

Lay out.—Split plot design.

Details of treatment.

1. Main treatment (i.e., intervals)—Three—
 - (1) 10 days.
 - (2) 15 days.
 - (3) 20 days.
2. Sub-treatments (i.e., depths)—Two—
 - (1) 2 acre inches.
 - (2) 3 acre inches.

Details of experiments.

Strain No.—Co. 1.
 Field No. 40 (west).
 Nature of soil—Clay loam (alkaline).
 Experimental area—0.36 acre.
 Size of plots for irrigation 50 × 30 links (1.5 cents).
 Size of plot for harvest—42 links × 22 links (0.924 cents).
 Total area for harvest—22.176 cents.
 Previous crop—Sunn hemp.
 Date of harvest of previous crop—10th March 1951.
 Date of first digging—14th March 1951.
 Dose and kind of manure—Farmyard manure at tons 5 per acre.
 Date of application of manure—7th July 1951.
 Date of sowing nursery—12th June 1951.
 Date of transplanting—9th July 1951.
 Other operations—First weeding—6th August 1951, 8th August 1951 and 15th August 1951; second weeding—25th and 26th September 1951.
 Date of harvest Earheads 11th October 1951.
 Straw 13th October 1951.

11. The results indicate that—

- (1) The ten days interval gives a significantly higher grain yield than both 15 and 20 days intervals.
- (2) There is no significant difference between the grain yield of 15 and 20 day interval plots.
- (3) Both 10 and 15 days interval plots give a significantly higher straw yield than a 20 day interval plot.
- (4) There is no significant difference between the straw yields of 10 and 15 day interval plots.
- (5) Irrigations with a 3 inches depth give significantly higher yields of grain and straw than with a 2 inches depth.

Irrigation experiments on Ragi—Summary of results, 1951–52.

TABLE 4.—I. Main treatment—Grain yields.

Particulars.	10 days (A)	15 days (B)	20 days (C)	General mean.	'Z' test satisfied or not.	Standard error of treatment.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mean yield in lb. per acre.	1,281	886	730.5	965.8	..	121	292.2
As percentage on general mean.	132.6	91.7	75.6	..	Yes.	12.53 per cent.	30.28 per cent.
Conclusion—A B C.							

TABLE 5.—II. Sub-treatment—Grain yields.

Particulars.	2" (A)	3" (B)	General mean.	'Z' test satisfied or not.	Standard error of treatment.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mean yield in lb. per acre.	798	1183.6	965.8	..	35.3	113
As percentage on general mean.	82.6	117.4	..	Yes.	3.66 per cent.	11.7 per cent.
Conclusion—BA						

TABLE 6.—III. Interaction—Grain yields.

Particulars.	10 days.		15 days.		20 days.		General mean.	'Z' test satisfied or not.	Standard error.	Critical difference.
	2 Ac."	3 Ac."	2 Ac."	3 Ac."	2 Ac."	3 Ac."				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Mean yield in lb. per acre.	1108.8	1453.8	723.8	1048	561.2	899.4	965.3	No.	..	..
As percentage on general mean.	114.8	150.5	74.9	108.5	58.1	93.1	100.0	No.	..	..

TABLE 7.—I. Main treatment—Straw yields.

Particulars.	10 days (A)	15 days (B)	20 days (C)	General mean.	'Z' test satisfied or not.	Standard error.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mean yield in lb. per acre.	7608	6710	5166	6494.6	..	314.4	1088
As percentage on general mean.	117.1	103.3	79.5	100	Yes.	4.84 per cent.	16.76 per cent.
Conclusion—A B C.							

TABLE 8.—II. Sub-treatment—Straw yields.

Particulars.	2 Acre. (A)	3 Acre. (B)	General mean.	'Z' test satisfied or not.	Standard error of treatment.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mean yield of straw in lb. per acre.	5937.1	7002.1	6494.6	..	207.7	289.6
As percentage on general mean.	92.2	107.8	100	Yes.	3.4 per cent.	13.71 per cent.

TABLE 9.—III. Interaction—Straw yields.

Particulars.	10 days.		15 days.		20 days.		General mean.	'Z' test satisfied or not.	Standard error.	Critical difference.
	2 Ac."	3 Ac."	2 Ac."	3 Ac."	2 Ac."	3 Ac."				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Mean yield of straw in lb. per acre.	7020	8106	6546	6871	4398	5937	6494.6	No.	..	..
As percentage on general mean.	103.1	126.2	100.8	105.8	67.7	91.4	100.0	No.	..	..

12. *Potato trials (adaptive).*—Last year (i.e.) 1950–51, the Director, Central Potato Research Institute, sent four varieties of potatoes, namely, Satha, Lambri, Darjeeling Red and Craig's Defiance for trial. The object of the trial was to find out which of the four varieties were suited to Coimbatore conditions.

13. This year 30 varieties were sent for trials.

14. Ten good tubers in each variety were selected and planted on the same day in ridges one and half feet apart. The germination of the tubers was not, however, uniform. The crop was dusted once with D.D.T. against attack of *Epilachna* beetles and sprayed with bordeaux mixture against mosaic. Harvesting was done

on two dates. Only three varieties were harvested on 2nd January 1952, namely, Voran, Industrie and S. Checoense. All the rest were harvested on 24th December 1951. Results are as follows:—

TABLE 10.—*Potato yields—Adaptive trials, 1951-52.*

Serial number and name of variety.	Weight of produce in Oz.	Number of plants from which harvest made.	Number of tubers with a diameter above 2".	Number of tubers with a diameter between 1" and 2".	Below 1".	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 Sneeuw	17	10	3	19	5	..
2 Bintje	16	10	1	18	6	..
3 Eigenheimer	14	10	..	19	8	..
4 Saskia	9	10	..	11	7	..
5 Voran	8½	10	3	5	9	..
6 Ideal	8	6	..	9	8	..
7 Alpha	8	10	1	9	6	..
8 O.N. 2236	13	9	2	14	11	Tubers irregular
9 Satha	7	10	..	1	89	Very small in size.
10 S. Checoense	7	4	..	6	31	..
11 Craig's Defiance	7	10	1	8	13	..
12 Lambri	7	6	..	11	2	..
13 O.N. 1080	5	10	..	6	13	..
14 Ari	5	8	..	6	4	..
15 Erdgold	5	9	..	6	7	..
16 Hybrid 27	4	10	..	2	23	..
17 O.N. 249	4	8	..	6	12	..
18 O.N. 1202	4	9	..	6	25	..
19 O.N. 2145	4	6	..	7	7	..
20 Industrie	3½	10	..	5	5	..
21 Strema	3	10	..	3	10	..
22 Furoro	3	10	..	4	6	..
23 O.N. 636	1	10	..	..	11	..
24 O.N. 1099	1	9	..	..	13	..
25 O.N. 1219	1	6	..	1	4	..
26 O.N. 1996	1	9	..	1	2	..
27 O.N. 1645	½	6	..	..	12	..
28 Darjeeling Red	½	10	..	..	6	..
29 O.N. 2186	..	10	No tubers formed.	..	..	..
30 O.N. 2318	..	9	No tubers formed.	..	..	..

15. Last year, out of the four varieties tried, Darjeeling Red recorded the highest, namely, 1,500 lb. per acre. Craig's Defiance recorded the lowest yield of 125 lb. per acre. This year the tubers have been planted only in very small strips of 3' × 3'. Acre yields, calculated on the performance over these strips, show the highest for the varieties Sneeuw and Bintje with 5,140 lb. and 4,840 lb., respectively. Darjeeling Red which recorded 1,500 lb. per acre last year gave only 150 lb. per acre this year whereas Craig's Defiance gave 2,120 lb. this year against last year's 125 lb. per acre. Further trials may perhaps be necessary for two or three more years for definite results. Twenty out of the thirty varieties tried this year have given a yield of 1,000 lb. and above per acre.

16. *Comparative trials for fodder grasses.*—This was started in 1950 to study the comparative merits of five major fodder grasses, namely, Guinea grass, Napier grass, Water grass, Cumbu × Napier grass and Kolukattai grass.

Details of experiment.

Field No. 70.
Layout—Randomized Block.

Replications—Six.

Treatments—Five—A. Napier grass.

B. Guinea grass.

C. Cumbu × Napier grass.

D. Water grass.

E. Kolukattai grass.

Size and area of each plot—30 links × 25 links (0.75 cents).

Date of planting the grass slips—23rd May 1950.

Date of first cutting—6th September 1950.

Date of last (13th) cutting—20th May 1952.

Total yield for 13 cuttings—

	LB.
Napier grass	21,735
Guinea grass	9,990
C.X.N. grass	15,390
Water grass	13,703
Kolukattai grass	4,272

17. All the grasses are maintained by sillage irrigation supplemented some times by well water. All the irrigations were given uniformly to all the plots. Cuttings were taken once in 50 days. Thirteen cuttings were taken so far. Results of the analysis of the first ten cuttings are worked out as follows:—

TABLE 11.—*Summary of results—Comparative trials of fodder grasses, 1951-52.*

Particulars.	N. Grass (A)	G. Grass (B)	C.X.N. Grass (C)	W. Grass (D)	K. Grass (E)	General mean.	'Z' test satisfied or not.	Stand-ard error.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Total yield for the first ten cuttings in lb.	17,437	7,704	12,575	11,579	3,413	10,542	..	..	..
As percentage on general mean.	165.4	73	119.3	109.8	32.4	100	Satisfied.	11.8	34.8

Conclusions—A C D B E

18. *Crop weather experiments.*—These experiments were conducted for the fourth year in succession by the Agricultural Meteorologist. The crops included in this experiment are paddy, cotton, cholam, the last two purely under rain-fed conditions. In each crop two popular local varieties were included for studies. Details regarding the varieties brought under crop weather experiments are given hereunder with their average acre yields obtained in the year under report:—

(1) Paddy ('C' Block, wet lands)—

Co. 16 (3,417 lb. of grain per acre).

Co. 25 (3,493 lb. of grain per acre).

(2) Cholam (Field No. 58, western block)—

Co. 1 (125 lb. of grain per acre).

Co. 3 (177 lb. of grain per acre).

(3) Cotton (Field No. 53, western block)—

K. 2 (264 lb. of kapas per acre).

K. 5 (320 lb. of kapas per acre).

19. Detailed precision growth observations at various stages of crop growth were made on every one of the above varieties. Besides, elaborate data on the meteorological factors, soil moisture and incidence of pests and diseases on the crops included in the experiments are also being carefully collected. There is a separate observatory located in field No. 61, western block, for these crop weather experiments.

20. *Tuber Crop Scheme (Indian Council of Agricultural Research).*—The tuber crop scheme financed by the Indian Council of Agricultural Research was under the control of Paddy Specialist. The Scheme came into operation from November 1950 onwards. An area of 4.5 acres under irrigation was provided in the Central Farm for laying out the experiments in sweet potato and tapioca for the year 1951-52. The following items of work were pursued.

21. (a) *Sweet Potato Varietal collection.*—To the type collections totalling 73 in number and 25 seedlings maintained during 1950-51 season, another ten more types from South Kanara and Pattukottai taluks and some seedlings raised from naturally and artificially cross pollinated seeds were added. Morphological characters for all the types were recorded.

22. A randomized replicated varietal trial was laid out with nine promising types using local as standard. Yields were less and poor due to the failure of the monsoon and less water supply in the wells. In tuber yield four types, namely, V2, IB22, V12 and B21 were significantly superior to local. Four other types were equal to local and one type was significantly inferior to local.

23. In another trial laid out with seedling types only IB33 was found to be significantly superior to IB22 the control. In the cultural trial where bed system of planting was compared with furrow system of planting, the 'Z' test was not satisfied. In the trial where vines from vines have been compared with vines from tubers, the differences were not significant. In the storage experiment tubers were

found to well for store over a month when kept between alternate layers of sand and saw dust. In the manurial trial conducted with three basal dressings in combination with N P and K at different levels it was found that nitrogenous fertilisers were not effective and FYM in combination with pottasie manure gave higher yields than control.

24. (b) *Tapioca*.—During 1951-52, 36 types were maintained. Morphological characters were recorded for all these. A cultural trial and manurial trial was laid out with variety velanca. In the cultural trial where cuttings were planted in mounds and ridges with different spacings, the 'Z' test was not satisfied. Manurial trial crop has not yet been harvested.

BULK CROPS.

(a) *Wet lands*.—Area 42.10 acres.

The cropping was as follows:—

	ACS.	
Paddy	36.20	The Paddy Specialist had 13.67 acres for seed multiplication. The cultivation was done by the farm in consultation with the Paddy Specialist.
Sugarcane	3.55	
Sunn hemp	1.40	
Banana	2.95	
	44.10	The Government Mycologist had 2.10 acres for Piricularia trials. The expenditure was met by him.
Reduce for 2nd crop.	2.00	
	42.10	

25. The Government Agricultural Chemist had his experiments over 3.48 acres and the Meteorologist on 0.82 acres. The Fruit Specialist continued to have his 2.50 acres under bananas. The full expenditure was met by the Fruit Specialist. The Government Entomologist had a 2 acre plot under sugarcane for the borer trials. The cultivation expenses were met by the farm.

26. During the year, the Chitrai Chavadi irrigation system which supplies water to the wet lands was not of much use. Due to varied reasons, the turn system was not properly operated by the panchayat and the wet lands did not get water for more than four turns during the period of growth of the paddy crop. This meagre supply was insufficient to give a flooding to the fields. Therefore, the wet land crops can be said to have been completely raised under well irrigation. The bores in 'J' and 'M' blocks were very active and the pumping units were worked to their full capacity. The well in 'A' block failed as the water-table went far below due to drought from December 1951. Even the 'M' block well showed signs of reduced supply at the end of the year. So the only dependable source was the 'J' block bore, and that was the main stay of the wet lands and the summer cropping was so arranged as to be able to be commanded by this.

27. *Manuring of the paddy crop*.—In addition to the standing green manure crop which was found to vary from field to field, green leaf manure was applied by cutting from trees and shrubs in the vicinity. Almost all the bulk fields received artificial manure. Details are given below:—

Basal dressing.		Manure applied.		
Block.	Area.	Groundnut cake.	Super-phosphate.	Sulphate of ammonia.
	ACRES.	LB.	LB.	LB.
A	1.95	400	..	..
B	3.61	700	..	..
C	1.21	136	..	..
N	3.30	330	228	274

Basal dressing—cont.

Block.	Area.	Manure applied.	
		Sulphate of ammonia.	Rate per acre.
	ACS.	LB.	LB.
B	1.00	100	100
C	2.91	194	70
D	0.84	42	50
E	1.71	86	50
F	4.95	250	50
G	0.85	85	100
H	1.00	34	34
L	3.50	135	39
N	3.30	275	50
C	1.25	125	100

(second crop).

28. The application of sulphate of ammonia was done twice for some fields, the first dose was in the early stage and the second dose at 50 lb. an acre was given at the time of flowering. The dosage was reduced for blocks which had more of green manure incorporated in them.

29. *Green-manure crops*.—The green-manure crop raised by sowing in May 1951 expecting rains and channel water was very successful and some plots gave a good tonnage. Almost all the fields, where there were no experiments, had the crop.

30. The Government Agricultural Chemist's plots had the usual daincha, sunn hemp, cowpea and pillipesara experiments in plots of 5 cents in A block and 6.25 cents in D block replicated five times.

31. It was seen that for raising dry nursery of GEB. 24, sowing in the first week of July will be better than earlier sowings. This will reduce the nursery period because water is usually received in the channel rather late; and the seedlings have to remain in the nursery till that time.

32. The strains of paddy raised were in accordance with the requirements of seed for distribution to the districts. The yields of paddy varied from 1,500 lb. an acre to 4,650 lb. an acre with an average of 2,750 lb. an acre for the 34.21 acres raised during the year.

33. The channel water was not received in time and when received it was in insufficient quantities. The whole area therefore had to be managed by lift irrigation. The experience gathered during the year showed that the eastern portion should be grown with early strains like Co. 2 which can be raised with less amount of water. All the fields planted with paddy had *Sesbania* planted close to the bunds inside the field.

Nursery for the 1952-53 crop.

GEB. 24 .. 42 cents	MTU. 19 5 cents	} Dry
Co. 3 .. 25 cents	Co. 1 8 cents	

TABLE 12.—Paddy yields, 1951-52.

Name of block.	Strain of paddy grown.	Area in acre.	Yield for the block in lb.		Yield per acre in lb.	
			Grain.	Straw.	Grain.	Straw.
A	GEB. 24	2.75	5,340	6,228	1,945	2,300
	Co. 14	0.34	1,100	782	3,235	2,300
	ASD. 5	0.19	300	437	1,570	2,300
	Co. 13	0.37	662	851	1,780	2,300
B	Co. 3	2.25	4,779	8,222	2,124	2,640
	MUT. 19	0.54	1,404	1,965	2,600	3,640
	GEB. 24	0.86	1,688	3,130	1,963	3,640

entire field. After 50 days, these green-manure crops were pulled out and incorporated into the soil. The green-manure crops gave an acre of yield 28,750 lb. Good yield is expected from this banana crop.

Name of block.	Strain of paddy grown.	Area in acres.	Yield for the block in lb.		Yield per acre in lb.	
			Grain	Straw.	Grain	Straw.
C	Co. 25	2.62	8,545	17,685	3,285	6,750
	Co. 16	0.42	1,357	2,835	3,231	6,750
	Co. 2	0.48	762	3,240	1,596	6,750
	Co. 14	0.04	130	270	3,250	6,750
	ASD. 5	0.40	1,119	2,700	2,798	6,750
D	Co. 13	1.20	2,668	8,100	2,223	6,750
	Co. 18	0.40	1,144	2,700	2,860	6,750
	Co. 20	0.45	849	1,140	1,887	2,533
E	GEB. 24	2.41	4,517	6,080	1,874	2,533
	Co. 26	0.75	2,043	7,532	2,724	10,043
F	Co. 19	1.71	8,137	17,174	4,650	10,043
	Co. 25	4.95	16,198	27,020	3,070	5,460
G	Co. 2	0.30	1,017	1,336	3,390	4,453
	Co. 26	0.55	1,927	2,876	3,504	5,230
H	ASD. 5	0.32	1,024	702	3,200	2, 96
	Co. 2	0.20	238	439	1,190	2,196
	Co. 25	0.32	402	702	1,256	2,196
	Co. 26	0.16	4	353	25	2,196
K	Co. 14	1.00	2,252	4,958	2,252	4,958
	Co. 1	1.76	3,011	4,155	1,711	2,361
L	Co. 2	0.60	1,649	1,417	2,748	2,361
	Co. 25	1.14	4,297	2,692	3,726	2,361
M	Co. 2	0.60	1,167	1,800	1,948	3,000
	GEB. 24	3.30	7,495	11,240	2,271	3,406
N	GEB. 24	0.05	87	150	1,740	3,000
	Co. 2	0.08	81	374	1,013	4,474
O	Co. 25	0.50	632	2,237	1,264	4,474
	ASD. 5	0.20	226	895	1,130	4,474
Total area		34.21				

Details of the experiments by the Government Agricultural Chemist will be found in his report.

34. *Sugarcane*.—The area under this crop was 3.55 acres. There were 80 cents under farm bulk and the rest under the entomology experimental plot where borer attack was being studied in relation to the weather and varieties. The 2.80 acres have given an acre yield of 30 tons. The yield of cane and quantity of jaggery were affected to some extent due to the plants being removed periodically for examination.

35. The 80-cents bulk yielded at the rate of 35 tons an acre. The crop in 'K' block under the nightsoil compost experiments was also a little below normal. The details of the compost experiments have already been given separately. The best yield was 40 tons an acre. The non-experimental sugarcane crop received basal dressing of 60 lb. N and top dressing of another 120 lb. N. in the shape of groundnut cake and sulphate of ammonia. In the initial stages, the crop had a green-manure crop as an inter-crop. After the harvest of the bulk area of 80 cents a new area of 80 cents has been planted with canes. The entomology experimental plot was changed from 'M' block to 'J' block and 1.60 acres have been planted. The 'J' block had a previous crop of sunnhemp and the land was kept well ploughed after incorporation of the green manure crop.

36. This year crop has given 68 per cent extraction and 13 per cent jaggery to cane.

37. *Bananas*.—This crop was raised in 2.95 acres. The area under old crop was 2.55 out of which 2.00 acres was under the Fruit Specialist. An area of 40 cents in 'M' block was planted this year to this crop. This 40 cents gave 1,439 lb. of bananas and 1,327 leaves and 63 lb. of stem. The banana area was manured with groundnut cake and sulphate of ammonia at the rate of 2 lb. and 1/2 lb. respectively and 5 lb. of compost manure per plant. The manures were applied round the stem and earthed up. The young plants received the manure as a general dose. In addition to this, daincha and sunnhemp were sown over the

TABLE 13.—Green-manure crops raised during 1952.

(1)				Block.	Area.	Quantity of seed sown.
				(2)	(3)	(4)
					ACS.	LB.
Sunnhemp	..	..	..	A	0.40	15
Do.	..	..	..	C	0.40	20
Daincha	..	..	..	C	1.20	60
Pillipesara	..	..	..	E	2.46	120
Do.	..	..	..	F	1.50	20
Do.	..	..	..	H	0.50	20
Do.	..	..	..	L	1.20	53
Do.	..	..	..	N	1.00	40
Sesbania	..	..	..	N	2.00	50
Sunnhemp	..	..	..	J	0.15	6

38. Due to the absence of summer showers the sowing of green-manure crops could not be done extensively. So, the major portion of the wet lands did not have the good stand of green manure. The application of basal dressing of groundnut cake will have to be resorted to for the 1952-53 crop.

39. Finding that *Glyricidia* and *Sesbania* had come up well in the bunds last year the planting of *Glyricidia* was continued. The planting along the newly formed road in the middle of the wet lands has shown that in a short time, good growth is possible. *Glyricidia* seedlings were planted in large numbers along road side and bunds, especially those by the side of the water channels. According to the suggestion of the Director of Agriculture, *Sesbania* seedlings were planted along the sides of the bunds in all fields planted with paddy. The plants though submerged partly in water, came up well and produced pods after the harvest of the paddy crop. So far both *Glyricidia* and *Sesbania* have been grown in all possible places with the idea of collecting as much of seed as possible. This year the collection of *Glyricidia* pods from wet lands was 665 lb. and *Sesbania* pods was 6,409 lb.

40. *Cotton*.—Cotton P. 216-F and other varieties were tried in the wet lands for the first time this year. The Cotton Specialist laid out comparative trials with regard to time of sowing, and method of sowing. The seeds were dibbled within three days after the harvest of the paddy crop. The idea was to take advantage of the moisture to have good germination and save irrigation for at least 15 to 20 days. It was found that under the wet-land condition here, the soil was such that after the seeds were put in the holes it becomes stiff and impairs germination. Red loam was therefore put in the hole along with the seed and watered. Though this gave a good germination, irrigation was still necessary. The crop had a stunted growth till the end of January after which it pulled up and gave good results. The Paddy Specialist also raised the cotton in the 'N' block in 20 cents. The field was ploughed and thrown into ridges and furrows and the seed dibbled. Though the sowing was done as late as the end of January, the crop has fared well and has given 155½ lb. of kapas.

41. *Groundnut*.—Again for the first time groundnut (TMV. 2) was sown by the Oilseeds Specialist in 52 cents and three methods were tried: (1) Sowing just after harvest of paddy without any cultivation, (2) sowing dry after preparing the land and (3) sowing after irrigation after preparatory cultivation. The third method gave good germination and good stand. The experiment was conducted by the Oil seeds Specialist. The farm sowings were done in March, but due to difficulty of water, the crop did not fare well.

42. *Gingelly*.—This was also tried for the first time by the Oilseed section. Sowing with preparatory cultivation and without preparatory cultivation were done. It was seen that the latter method was good. The yield figures will be incorporated in the report of the oil seed Specialist.

(b) Garden lands—77·60 acres.

43. Chalam, ragi and cotton were the main crops raised under irrigated condition.

44. Chalam.—Eight strains and nine selections were grown. The total area was 15·71 acres. The strains and selections were raised to meet the needs of the Millet Specialist. The selections were grown on equal areas and the results watched by the Millet Assistants. The following statement will give an idea of the performance of this crop:—

TABLE 14.—Yield of chalam, 1951-52.

Strain.	Area in acres.	Acre yield.	
		Grain in lb.	Straw in lb.
(1)	(2)	(3)	(4)
Co. 4	1·00	110	4,004
Co. 5	1·75	335	2,057
Co. 6	0·46	400	12,300
Co. 7	0·75	76	7,270
Co. 8	0·75	882	5,653
Co. 9	5·20	1,045	3,180
Co. 11.. .. .	1·00	53	2,304
Co. 13.. .. .	1·00	46	2,820
AS. 7589	0·75	1,844	5,979
AS. 8159	0·75	1,837	6,133
AS. 8155	0·25	1,112	5,072
AS. 7441	0·25	824	5,424
AS. 7442	0·75	744	5,752
AS. 7561	0·25	1,068	4,736
AS. 7562	0·25	808	4,272
AS. 7934	0·25	680	3,488
AS. 7905	0·60	1,710	5,825

45. The strains were grown in the Chitrai season mainly under well irrigation. Most of them except Co. 4, Co. 11 and Co. 13 which were in a corner far away from the wells, have done fairly. The strain Co. 7 had a set back. Though the yield of grain was low, the straw yields were satisfactory. Among the selections AS. 7,589 and AS. 8159 had better condition as they were near the well and there was not much of difficulty at the time of its growth to irrigate it as and when required. The others had some difficulty and that is evidenced in the yield being affected much. On the whole chalam crop fared satisfactorily. Most of the produce was sent as earheads to the Millet Station for threshing and preservation as seed. Roguing was done by the Millet Section.

46. Ragi.—The total area under this crop was 13·26 acres. The strains were Co. 1, Co. 2 and Co. 3.

TABLE 15.—Yields of Ragi—1951-52.

Strain.	Area.	Acre yield.	
		Grain.	Straw.
	ACS.	LB.	LB.
Co. 1	5·50	640	7,304
Co. 2	6·26	1,521	5,925
Co. 3	1·50	1,291	10,189

47. The summer crop of ragi is on and it has not done well due to restricted water-supply.

48. Cotton.—The strains grown were MU. 1 and Co. 2 (area 13·20 acres). The major portion was under MU. 1 and the performance justified the growing of greater area under this. It has given 1,250 lb. kapas an acre as against 686 lb. of kapas for Co. 2.

49. The cotton crop was given an application of 100 lb. sulphate of ammonia at the time of sowing and another application of 100 lb. sulphate of ammonia at the time of flowering.

50. Cumbu.—The area under this was 2·50 acres. Selections 411 and 350 were grown in one acre and 1·50 acres respectively. Selection 350 gave an acre yield of 980 lb. grain and 5,722 lb. straw. Selection 411 gave an acre yield of 1,030 lb. grain and 5,552 lb. straw.

51. Wheat.—An area of 1·50 acres was grown to this. The yield was very poor. This was cultivated for the purpose of the Mycologist's experiments only.

52. Maize for seed.—An area of 64 cents was sown with maize. The acre yield worked out to 3,150 lb. cobs and 4,450 lb. straw.

53. Fodder crops—Maize for fodder.—This was grown in 4·13 acres and the average acre yield worked out to 15,200 lb. The yield ranged from 8,000 lb. an acre in field No. 43-B to 25,000 lb. in field No. 69. The whole of the maize was fed to the dairy herd.

54. Chalam for fodder.—An acre of this gave 16,976 lb. of green matter. This may be considered as a fair yield. Seed rate was 100 lb. per acre. This was grown under irrigation.

55. Lucerne.—The crop in field No. 60 being too old was removed. Here the acre yield was only 5,200 lb. The crop in field No. 77 was kept on. Here also the yield was below normal as the water scarcity affected this crop much. Fresh sowings were done in field No. 57-A and the crop has given for its second cutting 4,400 lb. an acre.

56. Perennial grasses.—The area under perennial grasses was 6·84 acres. Guinea grass occupied 4·45 acres, Napier grass 0·80 acre, water grass 1·57 acres and Cumbu × Napier grass 0·02 acre. Water grass gave the highest yield of 1,28,713 lb. an acre. Napier grass was next with an acre yield of 87,459 lb. Guinea grass followed with an acre yield of 69,044 and last was Cumbu × Napier as it gave only 67,458 lb. an acre. Kolukattai grass also was raised in a small area. This cannot be considered suitable to the sullage condition.

57. The grasses did not get the full advantage as the sullage water got reduced and there was no possibility of supplementing this with well water.

58. Vegetables.—Several varieties of vegetables were grown in 3·50 acres. Out of this the Government Entomologist had 1·50 acres. The total yield was 23,877 lb. working to an acre yield of 6,822 lb. The good performers were tomato, brinjal, Bellary onion, radish and Amaranthus. Cabbage and cauliflower also were grown but the head formation was not good.

59. Sunnhemp.—This was grown over an area of 1·85 acres for fodder and the yield was 3,000 lb. of green matter an acre. As a green manure crop it gave 12,450 lb. an acre in field No. 71.

60. Daincha.—This crop was sown as green manure in 3·25 acres and gave an acre yield of 13,750 lb. in field No. 75 when two irrigations were given. Without irrigation the growth was not good and the acre yield was low.

(c) Dry lands—93·25 acres.

61. The year was bad for dry land crops. Rains were received late and were unevenly spread. The setting of grain was affected, though straw yield was good.

62. Co. 1 Chalam.—The area cultivated was 30·55 acres. The yield of grain varied from 15 lb. to 300 lb. an acre. Some favourably situated fields gave increased yield. On the whole the grain yield was very poor working to 85 lb. an acre. The straw yield was not so bad, with an average of 4,250 lb. an acre. In the tank bed area the acre yield of straw went up to 5,144 lb.

63. Co. 2 and Co. 3 chalam.—The area was one acre each. The performance of these were not in any way different from that of Co. 1.

64. Cumbu Co. 1 (area 4·14 acres).—The yield was very poor. Fifty-four lb. grain and 560 lb. straw per acre was all that was got. Seed rate used was 10 lb. per acre.

65. *Cotton (Karunganni) K. 5.*—This crop did not have the suitable conditions. 10-13 acres were grown this year. The acre yield was 100 lb. of kapas.

66. *Bengal gram.*—The sowing was delayed due to excess rain during the north-east monsoon and the crop was later affected by the leaf-eating caterpillar (*Laphygma*). Any amount of dusting could not prevent damage. The attack was very severe in some places and the yield was affected giving 208 lb. an acre in field No. 36-A and 435 lb. an acre in the tank bed area.

67. *Pests and diseases.*—The attacks of pests and diseases were remedied by the Government Entomologist and Government Mycologist whenever and wherever necessary on being approached for help. Adverse seasonal conditions were responsible to some extent for these attacks. Mostly, these were on vegetable crops.

68. *Livestock.*—The year started with 41 pairs. Since nine pairs were found uneconomical they were sold out in public auction. There was one casualty. Two pairs of calves were transferred from the dairy and are being reared as work animals. Three pairs were purchased. The strength at the end of the year was 36½ pairs. Animals maintained good condition throughout the year. The animals were fed on green fodder for more than three months in the year. Due to judicious planning and adjustment it was possible to save some green fodder and demonstrate silage making for the students. Water grass, ragi, straw and Guinea grass were used. The silage was good and was used during the summer months.

69. *Miscellaneous.*—Manure preservation work was attended to as a routine affair. Composting of night soil and rubbish in the wet lands; and preservation of dung and urine by removal to pits received good attention. All sorts of waste matter was carted to suitable places and composted. Bonemeal and sulphate of ammonia were also added to compost heaps to increase the manurial value.

70. Growing *Glyricidia* and *Sesbania* in all possible places was given special attention. Roadsides, waste places and channel bunds were planted with *Glyricidia*. *Sesbania* seedlings were planted along irrigation channels in garden lands. Collection of pods without allowing bursting was done. So far these have been raised only for seed purposes. Good quantity of seeds of both have been distributed. *Prosopis* pods collected from the yard paddock were used for raising live fence, especially in the tank-bed area and other places where fencing was not existing. Even along wire fence trenches were dug and sowing was done. The length covered was 1,039 yards. The existing fence was properly pruned and intertwined.

71. Proper maintenance of avenue trees, hedges and allied plant life in the estate was attended to by the staff set apart for that. There was great difficulty in watering due to the water carts being required by the Research Sections and the hostel. The several activities under this are detailed below:—

(i) Procurement of ornamental plants from Bangalore as well as the local parks. (Crotons, Dieffenbachias, Cannas, *Jatropha*, *Caladiums*, etc.)

(ii) Multiplication of crotons and other such plants for planting in vantage points in the estate.

(iii) Prompt removal of dead avenue trees and their replacement with fresh seedlings.

(iv) Collection of seeds of plants of economic importance.

(v) Planting of *Glyricidia* in all possible places according to the availability of water.

(vi) Occasional pruning and maintenance of the hedges in the College estate.

72. *Vanamahotsavam* was celebrated for the second year in July 1951. About 1,000 numbers seedlings were distributed to several officers in the town

and planting in the estate was also done. Care was taken to have the seedlings regularly watered and attended.

73. *Farmers' Day* was conducted in December 1951 and a good exhibition was put up. The Research sections participated. Several ryots from adjoining villages visited the farm on the occasion.

74. *Petty construction and repairs.*—Increasing the water-supply by tapping new sources and improving the existing ones have been the main items tackled this year.

75. *Deepening well in 'M' block.*—The bore in the south-eastern corner of the well was giving a very good supply and it was found that if the capacity of the well was increased more water would flow in during the night making it possible to work the pump-set for more number of hours. Therefore the work was got sanctioned. Three thousand and one hundred fifty-five cubic feet of earth was removed, deepening 28 feet long and 28 feet wide by 6' 6". The cost of the work was Rs. 807-0-0. Though the estimate was for deepening 12 feet it was found impossible to empty the water from the well to allow the workmen to proceed further.

76. *Bore in field No. 62.*—The power-boring set cleaned the bore in field No. 62 to the entire depth and even increased the diameter. Finally, it was found that the water-cable was too low and the output also was small.

77. *Bore in field No. 50.*—The power-boring set cleaned the bore in field No. 50 and the test gave good results. The 152 feet bore has the water at 35 feet and construction of a cement block round the bore to fit up the deep-well pump-set was completed at a cost of Rs. 101-13-0. This will help in increasing the area under the garden land cultivation if the pump is fitted up.

78. *Bore near well in field No. 57.*—The set next worked near well in field No. 57. Boring was done up to 97 feet and the cost was Rs. 1,834-11-6. The shell test gave satisfactory result. It was not possible to test with air compressor. The water was standing at 34 feet. The bore was connected to the well by a horizontal bore at the bottom of the well and supply continued till the end of May 1952 from this when the water-table went further down and supply stopped.

79. *Bore in field No. 42.*—By power-boring in field No. 42, at a cost of Rs. 1,817-3-0 a depth of 101 feet was reached and shell tests gave fair results. Since the set was not working efficiently and since the financial year was coming to a close it was decided to continue the work later if found necessary after testing with air compressor.

80. *Hand boring set* worked in wells in field Nos. 68, 75 and 40.

81. *Well in field No. 68.*—A fresh bore was put in the well in field No. 68 at a cost of Rs. 380-14-0 with the hand boring set of the Industries department. The depth reached was 47 feet 6 inches and the test gave satisfactory results. A pumpset was fitted direct to the bore and was found to yield 10,000 gallons of water an hour. A shed for the existing pumpset has been got sanctioned and will be fitted up soon.

82. *Well in field No. 40.*—Finding that the two existing bores in this well were not capable of supplying sufficient water to the reservoirs and the fields, the Director of Agriculture fixed up a site for boring in this well, and the bore went to a depth of 82 feet and gave a supply of 3,600 gallons an hour. The expenditure was Rs. 693. As instructed by the Director of Agriculture, the three bores were tackled at the same time by having three suction tubes and joining them to one pumpset working at the bottom of the well. The supply was found to be 8,500 gallons per hour. Thus the water problem in the western block has been solved to some extent.

83. *Well in field No. 75.*—A fresh bore was put in this also. This did not prove very satisfactory as the test by having the suction directly in the bore gave very poor results. This was dropped after going 66 feet 8 inches below well level and spending Rs. 523-12-0. Of course this has increased the supply of water in the well to some extent.

84. *Other works.*—Annual repairs to the Central Farm buildings were done incurring an expenditure of Rs. 206.

85. Special repairs to the Central Farm were done at a cost of Rs. 1,888-7-0. The lean-to shed was extended from the farm office veranda up to the store rooms. This is very helpful in the execution of normal work, even during the rainy season without inconvenience. The repairs to the roofing and floor of the reserve cattle shed behind the yard was of great help in housing the sick animals of the veterinary hospital where space was insufficient.

86. Cement benches were constructed for the use of students while in the farm; and to avoid crowding in the farm office.

87. Seed distribution statement, statement of profit and loss accounts, statement of methods adopted to step up production are appended.

88. *College dairy.*—The dairy attached to the Central Farm, Coimbatore, is run solely for educational purpose for imparting instructions to the students of the B.Sc. (Ag.) course in the science and practice of dairying. A few ryots are also trained every year in the improved methods of breeding and feeding of dairy animals, as well as the production of butter and other dairy products by improved methods. Accounts on the commercial aspect are however maintained and submitted to Government every year.

89. *Cattle.*—The strength of the herd at the commencement of the year was 67. Nine calves were added to the herd by birth. Twelve animals were purchased during the year under report. One Scindhi bull was got by transfer from Hosur Livestock Research Station. Thirty-one animals were sold in public auction as they were either uneconomical or old. Four animals were transferred to Central Farm, eight animals to Hosur, two animals to Bapatla and one to the Veterinary Hospital, Coimbatore (total transferred outside being 15). One calf died and thus the closing balance was 42.

90. *Goats.*—There were seven goats at the beginning of the year. Ten goatlings were added by birth. One he-goat was purchased. Fourteen goatlings were sold in auction thus making the closing balance four.

91. *Services.*—Scindhi bull No. 1 served 21 outside animals. Murrah buffalo bull No. 20 served 42 outside animals. Goat No. 1 served 39 outside goats. Goat No. 2 served 18 outside goats. Murrah buffalo bull No. 20 served four of our animals. No. 1 goat served two goats belonging to the dairy.

92. *Poultry.*—The poultry attached to the college dairy opened with 111 birds. Seventy-one chicks were added to the flock by hatching. Twenty-four birds were got by transfer from Teynampet. Sixty-eight birds were sold during the year. Fifty-nine birds died during the year, thus making the closing balance 79.

Egg production—				Disposal—			
Opening balance	..	..	50	Sales	..	..	4,361
Receipts	..	..	4,625	Incubation	..	..	114
				Fed to stock	..	..	182
Total	..		4,675	Total	..		4,657

Closing balance—18.

93. *Hatching.*—One hundred and fourteen eggs were set for hatching and 71 chicks were got as shown below:—

Rhode Islands Red.		White Leghorn.		Black Minorca.	
Eggs set.	Hatched.	Eggs set.	Hatched.	Eggs set.	Hatched.
48	24	41	36	25	11

94. *Practical classes for final year students.*—Practical lessons in butter making, ghee making, khoa manufacture, etc., were given to the students. Practical classes for ryots were held for the month during the vacation of the College. The College reopened on 16th June 1952 and classes for the final year students are being conducted.

A statement showing outturn and disposal of dairy produce is appended (Appendix VI).

CENTRAL FARM, COIMBATORE,
6th March 1953.

K. RAMASWAMY,
Superintendent.

APPENDIX I.

SEED DISTRIBUTION STATEMENT.

Serial number and kind.	Sales.	Transfers.	Total.
	LB.	LB.	LB.
1 Paddy	..	70,586 lb.	70,586 lb.
2 Chulam	165 lb.	..	165 "
3 Maize	48 "	144 "	192 "
4 Prosopis pods ..	143 "	125 "	268 "
5 Green manure seeds ..	12 "	277 "	289 "
6 Vegetable seeds ..	53 "	70 "	123 "
7 Glyricidia seeds ..	7 "	44 "	51 "
8 Sesbania seeds ..	67 "	1,785 "	1,852 "
9 Agathi seeds ..	16 "	62 "	78 "
10 Glyricidia seedlings ..	4 Nos.	6,305 Nos.	6,309 Nos.
11 Glyricidia cuttings ..	725 "	2,700 "	3,425 "
12 Grass slips	94,950 "	172,200 "	267,150 "
13 Paddy seedlings ..	42½ cents.	..	42½ cents.
14 Ragi seedlings ..	30 beds.	..	30 beds.
15 Transferred to Millet Breeding Station chulam earheads.	..	32,683 lb.	32,683 lb.
Transferred to Millet Breeding Station ragi earheads.	..	19,140 lb.	19,140 lb.
Transferred to Millet Breeding Station cumbu earheads.	..	5,729 lb.	5,729 lb.

APPENDIX II.

METHODS ADOPTED TO STEP UP PRODUCTION IN THE CENTRAL FARM DURING THE YEAR 1951-52.

1. Sowing of green manure crops in all the wet land blocks in the month of May 1951 anticipating rain. This gave a stand of green manure varying from 6,000 lb. to 15,000 lb. an acre. The cutting and transporting of green leaf manure was thereby avoided.

2. Sowing of green manure crops in garden lands in between crops to add to the manurial value of the land thereby reducing the quantity of cattle manure to be applied. The quantity thus saved was used for the dry lands which had not received manure for long.

3. Increasing the quantity of farm yard manure and compost by judicious gathering of waste material and composting wherever possible. Regular attention was paid to night-soil composting thus increasing the quantity.

4. Increasing the water-supply in the existing wells by cleaning bores and putting fresh bores. Ten more acres were brought under garden land conditions.

5. Raising of Madras Uganda in nine acres.

6. Proper and systematic cropping of green fodder crops has reduced the use of dry fodder and a good reserve has been built up thus preventing the necessity of purchasing straw from outside for the coming year. The dairy which used to purchase straw from outside was supplied with straw from the farm.

7. Proper fencing by using the material on hand has made it possible to have cholam and cotton crops in 67-A and B. Growing of live-fence wherever facilities exist was taken up to prevent pilfering.

8. Growing of sesbania alongsides of channels in garden lands and in the planted paddy fields along the bunds in wet lands produced good supply of seed.

9. Planting of glyricidia in all possible places along roadsides, water channels, bunds, and irrigation channels.

10. Reduction in the number of pairs by disposing uneconomical ones and not replacing them. Transfer of two young pairs from the dairy to be brought up as work animals.

APPENDIX III.

PROFIT AND LOSS ACCOUNT OF BULK CROPS—EASTERN BLOCK, 1951-52.

Field number.	Area in acres.	Crops grown.	Actual cost of cultivation.	Actual return for crop.	Net gain or loss. (* indicates loss.)	Profit per acre.	Loss per acre.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
36-A	24.67	Cholam Co. 1, Cotton K. 5, Bengalgram, AS. 7081, Horsegram.	1,614 6 0	1,800 12 0	186 6 0	7 9 0	..
63 & 64.	1.70	Cumbr, Tenal, Cholam Co. 1	109 11 6	55 1 6	* 54 10 0	..	32 5 3
67-A	1.60	Cotton MU. 1	197 3 6	958 12 0	761 8 6	476 10 0	..
67-A	1.72	Ragi Co. 2	292 9 3	705 11 0	413 1 9	154 2 0	..
67-B	1.50	Cholam Co. 1	221 3 0	486 0 0	264 13 0	176 9 0	..
67-B	1.50	Cholam Co. 7 and Co. 8.	111 15 6	363 1 0	251 1 6	168 0 0	..
67-B	0.25	Napiergrass	40 13 0	175 4 0	134 7 0	537 12 0	..
68	1.10	Maize fodder	109 0 0	295 9 0	186 9 0	169 9 0	..
68	1.75	Cholam Co. 9	368 15 0	410 14 6	41 15 6	24 0 0	..
69	1.40	Cotton MU. 1	562 14 0	1,033 0 0	470 2 0	336 1 0	..
69	1.00	Fodder cholam	123 2 0	454 6 0	331 4 0	831 4 0	..
69	1.50	Ragi Co. 3	195 3 6	507 5 6	312 2 0	203 2 6	..
70	2.62	Fodder grass	699 12 0	2,433 10 0	1,733 14 0	681 13 0	..
70	2.40	Cholam Co. 9 and fodder maize.	353 4 0	325 13 0	*27 7 0	..	11 8 0
71	1.00	Ragi Co. 1	268 5 0	275 5 0	7 0 0	7 0 0	..
71	1.00	Cholam Co. 9	250 11 0	278 5 6	27 10 6	27 10 6	..
71	1.85	Cotton MU. 1	419 7 0	1,208 9 0	789 2 0	426 8 0	..
72	4.50	Cholam Co. 1	488 8 0	489 8 0	1 0 0	0 3 6	..
73	3.27	Cholam Co. 4, Co. 11 and Co. 13.	346 13 0	265 7 0	*81 6 0	..	24 11 6
73	3.27	Cholam Co. 1, Co. 2 and Co. 3.	478 13 0	534 0 0	55 3 0	17 1 0	..
74	1.53	Cotton MU. 1	498 13 6	683 0 0	184 2 6	120 10 0	..
75	2.25	Cotton MU. 1	841 6 0	1,525 3 6	683 13 6	303 15 0	..
75	1.25	Fodder maize	343 10 0	1,124 0 0	*219 10 0	..	175 13 0
75	1.25	Cholam Co. 9	157 4 0	376 3 0	218 15 0	175 2 0	..
77	1.00	Lucerne	140 9 0	232 8 0	91 15 0	91 15 0	..
77	2.00	Ragi Co. 1	347 11 0	268 10 0	*79 1 0	..	39 8 6
77	1.00	Cotton MU. 1	122 12 0	206 10 0	83 14 0	83 14 0	..
78	1.33	Cholam Co. 1	59 1 0	189 14 0	110 13 0	82 5 0	..
Total.	71.21		9,763 11 9	16,642 6 6	6,878 10 9	..	..
		Total profits	..	..	..	RS. A. P. 7,340 12 9	..
		Total losses	..	..	..	462 2 0	..
		Net profit	..	..	..	6,878 10 9	..

Remarks.	(8)
Irrigated cotton rice fallows experiment.	864 8 0
Night soil compost experiment.	176 12 0
Farm cane.	742 17 0
Government Entomologist's experiment.	190 1 0
Yield is only from 40 cents.	70 0 0
The seedling from paddy nursery were utilised for planting the other areas, and charged for the respective area. Here they are accounted as loss to facilitate accounts.	235 0 0
Government Agricultural Chemist's Sesbania experiment—Second crop.	199 14 0
Government Agricultural Chemist's Sesbania experiment—First crop.	169 4 0
Government Agricultural Chemist's green manure experiments.	95 5 0
Farm bulk.	261 14 0
Do.	75 7 0
Meteorological experiments.	147 10 0
Second crop.	64 0 0
Government Agricultural Chemist's Pilipe-sara experiment.	101 8 0
Government Agricultural Chemist's green Manure experiment.	133 12 0
Farm bulk.	283 12 0
Do.	292 6 0
Do.	144 0 0
Do.	240 14 0
Do.	30 13 0
Do.	104 5 0
Do.	398 10 0
Do.	254 12 0
Do.	303 15 8
Do.	2 7 0
Do.	51 13 0
Night soil compost experiment.	178 0 0
Farm bulk.	11 14 0
Do.	120 6 0
Do.	19 8 0

APPENDIX IV.

PROFIT AND LOSS ACCOUNTS OF BULK CROPS—WET LANDS, 1951-52.

Serial number and name of crop.	Name of block.	Area in acres.	Cost of cultivation.	Value of produce realized.	Net profit or loss.	Profit or loss per acre.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
			RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
1 Cotton (rice fallows)	A	0.52	251 15 0	..	..	..
2 Do.	R	0.08	12 2 0	1,093 0 0	649 11 0	864 8 0
3 Sugarcane	K	0.78	412 5 0	1,080 0 0	141 6 0	176 12 0
4 Do.	M	0.80	938 10 0	2,700 0 0	1,484 15 0	742 17 0
5 Bananas	M	2.00	1,215 1 0	111 6 0	130 10 0	190 1 0
6 Do.	N	0.80	242 10 0	10 0 0	25 10 0	70 0 0
7 Paddy (nursery)	A	0.35	35 10 0	..	103 2 0	235 0 0
8 Do.	A	0.46	108 2 0	..	..	..
9 Do.	C	0.40	70 15 0	..	70 15 0	..
10 Do.	C	1.42	244 12 0	..	244 12 0	..
11 Do.	C	0.16	15 4 0	..	15 4 0	..
12 Paddy Co. 13	M	0.80	209 8 0	94 2 0	209 8 0	261 14 0
13 Paddy GEB. 24	A	0.37	66 11 0	..	27 7 0	75 7 0
14 Paddy GEB. 24	A	0.37	47 12 0	101 8 0	53 12 0	147 10 0
15 Paddy GEB. 24	A	1.00	269 13 0	273 13 0	64 0 0	64 0 0
16 Paddy Co. 14 and ASD. 5	A	1.96	381 3 0	579 8 0	198 5 0	101 8 0
17 Paddy Co. 8 and MTU. 19	R	3.61	696 7 0	1,173 14 0	477 7 0	133 12 0
18 Co. 25 and Co. 16	C	0.84	179 7 0	422 0 0	242 9 0	283 12 0
19 Co. 2 Co. 25 ASD. 5	C	3.12	514 0 0	1,430 4 0	916 4 0	292 6 0
20 Co. 13 and Co. 18	C	1.60	399 9 0	639 8 0	239 15 0	144 0 0
21 GEB. 24	D	0.30	156 13 0	81 1 0	75 12 0	240 14 0
22 GEB. 24	D	1.60	383 9 0	432 12 0	49 3 0	30 13 0
23 GEB. 24 and Co. 20	D	0.25	166 1 0	257 14 0	91 13 0	104 5 0
24 Co. 19 and Co. 26	D	2.46	645 8 0	1,625 8 0	980 0 0	398 10 0
25 Co. 25	E	4.95	1,035 2 0	2,285 12 0	1,250 10 0	254 12 0
26 Co. 2 and Co. 6	F	0.80	185 2 0	428 2 0	243 0 0	303 15 8
27 Co. 25, Co. 26 and ASD. 5	G	1.00	242 5 0	239 14 0	2 7 0	2 7 0
28 Co. 14	H	1.00	396 15 0	345 2 0	51 13 0	51 13 0
29 Co. 11, 2 and 25	K	3.50	615 6 0	1,236 10 0	621 4 0	178 0 0
30 Co. 2 and GEB. 24	L	0.65	174 9 0	1,096 14 0	397 0 0	11 14 0
31 Co. 2 and GEB. 24	M	3.30	699 12 0	1,096 14 0	397 0 0	120 6 0
32 Co. 2, 25 and ASD. 5	N	3.78	157 12 0	1,142 6 0	15 6 0	19 8 0
Total		42.70	11,110 2 0	18,024 8 0	7,178 7 0	..

APPENDIX V.

PROFIT AND LOSS ACCOUNT OF BULK CROPS—WESTERN BLOCK, 1951-52.

Field No.	Area in acres.	Crops grown.	Actual cost of cultivation.	Actual return for crop.	Net gain or loss (*indicates loss.)	Profit per acre.	Loss per acre.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
Tankbed area.	20.00	Cholam and grams.	B. 1,195 15 0	3,045 12 0	1,849 13 0	92 8 0	
22	3.00	Cholam Co. 1	79 14 0	185 7 0	105 9 0	35 3 0	
23	1.28	Cumbu Co. 1	36 9 0	52 0 6	15 7 6	12 7 0	
28	2.86	Cumbu Co. 1	57 13 0	44 13 6	*12 15 6		4 10 0
39	1.71	Ragi Co. 2	307 13 0	498 5 6	188 8 6	110 9 0	
40-W and E.	2.44	Ragi Co. 1	447 5 0	365 10 0	*81 11 0		33 7 0
39	1.71	Sunn hemp	65 3 0				
40-E	1.44	Sunn hemp	55 3 0				
40-W	1.00	Sunn hemp	40 12 0				
42	1.60	Cotton Co. 2	262 3 0	464 0 0	201 13 0	124 10 0	
43-A	1.90	Cotton Co. 2	404 9 0	413 1 9	8 8 9	5 11 0	
44 (G.E.)	1.00	Brinjal and bendal.	162 8 0	200 15 0	38 7 0	38 7 0	
43-b	1.50	Cholam Co. 14 and Co. 15.	280 4 3	491 9 6	211 5 3	93 14 0	
43-b	1.25	Maize fodder	145 7 0	219 6 0	73 15 0	58 9 0	
44-N	0.12	Ragi Co. 1	44 7 6				Nursery
44-S	1.50	Ragi Co. 1	279 15 6	177 8 6	*102 7 0		67 6 6
56	2.76	Cotton	311 15 0	214 3 0	*97 12 0		33 14 0
57-B	0.15	Ragi Co. 2	18 1 6				Nursery
58	2.13	Cholam	222 10 0	176 9 0	*46 1 0		21 10 0
59-A	1.50	Cholam Co. 11 and Cumbu 411.	240 12 0	374 8 6	133 12 6	89 7 0	
59-A	1.56	Cholam 7589 and A.S. 8159.	207 12 6	554 10 0	346 13 6	222 9 9	
59-B	1.96	Cholam Co 11, Cumbu 350 and Maize.	255 14 0	355 15 0	100 1 0	105 14 0	
59-B	1.96	Cholam strains	271 12 0	588 7 0	316 11 0	161 7 0	
59-C	0.80	Maize	88 11 0	207 8 0	118 13 0	193 11 0	
59-C	0.60	Cholam 7905	79 10 0	295 10 0	216 0 0	353 6 0	
60	0.60	Maize	101 12 8	175 3 2	73 6 6	114 6 0	
60	0.60	Lucerne	25 10 0	44 8 6	18 14 6	29 6 0	
60-A	1.33	Ragi Co. 2	300 1 6	442 11 6	142 10 0	120 15 0	
60-B	1.50	Wheat	235 8 0	10 5 3	*225 2 9		147 7 0
60-B	1.50	Ragi Co. 2	330 2 0	489 6 0	159 4 0	106 3 0	
63.06		Total	6,556 1 5	10,086 2 2	3,753 11 9		

	RS. A. P.
Total Profits	4,319 13 0
Total Losses	568 1 3
Net Profit	3,753 11 9

APPENDIX VI.

STATEMENT SHOWING THE OUTPUT AND DISPOSAL OF DAIRY PRODUCE.

Opening balance.	Receipts.	Total.	Cash sale.	Credits.	Separation.	Fed to stock.	Demonstration.	Rejected and cotsorum.	Total issued.	Difference.	Balance.
(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.
43,271 8	43,271 8	43,271 8	403 8	35,809 12	6,816 12	59 12	47 0	273 0	43,504 12	+ 234 4	1 0
Whole Milk											
Opening balance.	Receipts.	Total.	Fed to poultry.	Credits.	Cash sales.	Starter.	Converted into curd.	Total issues.	Balance.		
(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)		
RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.		
6,026 12	6,026 12	6,026 12	267 0	1,169 0	1,841 0	193 0	721 0	6,026 12	..		
Skim milk											
Opening balance.	Receipts.	Total.	Issued for butter making.	Cash sales.	Converted into ghee.	Issued for milking.	Balance.				
(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)				
RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.				
1 15	675 1	677 0	642 3	110 12	72 0	5 3	677 0	351 10	..		
Cream											
Opening balance.	Receipts.	Total.	Cash sales.	Credit sales.	Converted into ghee.	Issued for milking.	Balance.				
(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)				
RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.				
0 11	350 15	351 10	110 12	163 10	72 0	5 3	351 10	..			
Butter											
Opening balance.	Receipts.	Total.	Cash sales.	Credit sales.	Converted into ghee.	Issued for milking.	Balance.				
(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)				
RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.				
0 11	350 15	351 10	110 12	163 10	72 0	5 3	351 10	..			
Ghee											
Opening balance.	Receipts.	Total.	Cash sales.	Credit sales.	Converted into ghee.	Issued for milking.	Balance.				
(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)				
RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.				
0 11	350 15	351 10	110 12	163 10	72 0	5 3	351 10	..			

ANNUAL REPORT OF THE MILLET BREEDING STATION, COIMBATORE, REGIONAL MILLET STATIONS, CUMBU SCHEME AND STRIGA SCHEME FOR THE YEAR 1951-52 (FASLI 1361).

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APPENDIX V—Steps taken to step up the revenue of the Stations (Millet Breeding Station and Regional Millet Stations).

SECTION I—MILLET BREEDING STATION, COIMBATORE.

This is the twenty-sixth Annual Report of the work done at the Station. A note giving the particulars of the Millet Breeding Station is given in Appendix I.

2. A. Season and rainfall.—A statement of the rainfall received during the year, giving weekly totals and the number of rainy days, with similar figures for the previous year, and those of the previous ten years and the past 28 years since the inception of the station is given in Table I.

TABLE I.—Statement of rainfall—Fasli 1361 (1951-52).

Month.	Week.	1951-52.		1950-51.		Average for the past ten years.		Average for the past twenty-six years (since the inception of the station).	
		Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.
		South-west monsoon.							
June ..	7-13	0.35	2	..	..	0.79	0.9	0.43	1.14
	14-20	..	..	..	..	0.11	0.5	0.28	1.21
	21-27	..	..	0.29	1	0.20	0.7	0.20	1.07
June-July ..	28-4	..	..	..	..	0.28	1.4	0.30	1.82
	5-11	0.12	1	0.29	1	0.37	1.6	0.31	1.71
	12-18	0.04	..	0.11	1	0.47	1.4	0.57	1.57
	19-25	1.33	4	0.83	3	0.34	1.5	0.46	1.64

TABLE OF YIELDS OF THE COMPOST EXPERIMENTS—WET LANDS—K. BLOCK, 1951-52.

APPENDIX VII.

(Table I.)

	I Series—Crop Co. 14 paddy			II Series—Crop Co. 14 paddy			III Series—Crop Co. 419 sugarcane.				
	Nightsoil compost. (A)		Control (no-mature). (C)	Farmyard manure. (B)		Nightsoil compost. (A)	Control (no-mature). (C)	Nightsoil Farmyard compost. manure. (A) (B)		Control (no-mature). (C)	
	Grain. (2)	Straw. (3)		Grain. (4)	Straw. (5)			Tons-lb. (14)	Tons-lb. (15)		
(1)	2,247	5,820	110	117	2,017	5,027	101	117	43-160	42-693	39-253
Yield per acre in lb.	110	98	100	100	98	101	100	100	110	103	100
Percentage over con-											
trol.											

APPENDIX VII.

(Table 1.)

TABLE OF YIELDS OF THE COMPOST EXPERIMENTS—WET LANDS—K. BLOCK, 1951-52.

	I Series—Crop Co. 14 paddy			II Series—Crop Co. 14 paddy			III Series—Crop Co. 419 sugarcane.			
	Nightsoil compost. (A)		Control (no-mature). (C)	Farmyard manure. (B)		Nightsoil compost. (A)	Control (no-mature). (C)	Nightsoil Farmyard compost. manure. (A) (B)		Control (no-mature). (C)
	Grain. (2)	Straw. (3)		Grain. (4)	Straw. (5)			Tons-lb. (14)	Tons-lb. (15)	
(1)	50	4,625	2,619	166	268	1,303	114	182	4,857	18
Eggs (Nos.)										

Month.	Week.	1951-52.		1950-51.		Average for the past ten fast years.		Average for the past twenty-six years (since the inception of the station).	
		Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.
South-west monsoon—cont.									
July-August ..	26—1	..	..	1.11	3	0.30	0.7	0.24	1.18
	2—8	..	..	0.40	1	0.39	0.9	0.39	1.14
	9—15	0.06	..	..	..	0.27	1.3	0.28	1.21
	16—22	..	..	2.22	4	0.46	1.4	0.41	1.54
	23—29	0.10	1	..	..	0.35	1.3	0.22	1.00
August-September ..	30—5	..	..	..	..	0.10	0.3	0.19	0.71
	6—12	..	..	0.12	1	0.12	0.7	0.26	1.11
	13—19	1.50	4	..	..	0.31	0.5	0.32	0.89
	20—26	1.08	3	0.96	1	0.43	1.2	0.65	1.45
Total ..		4.58	15	6.33	16	5.29	16.3	5.51	20.40
North-east monsoon.									
September-October ..	27—3	0.22	2	2.90	3	1.01	1.8	0.82	1.86
	4—10	2.23	2	0.12	1	0.83	2.3	0.89	2.11
	11—17	0.56	1	1.19	4	1.95	3.3	1.43	2.96
	18—24	1.43	2	1.23	2	1.63	3.0	1.43	2.89
	25—31	..	..	..	..	1.44	1.9	1.87	2.75
November ..	1—7	2.33	3	..	..	1.33	1.9	1.95	3.14
	8—14	1.84	4	1.59	3	1.68	2.9	1.48	2.86
	15—21	0.74	2	1.39	3	1.07	2.1	0.87	1.75
	22—28	0.05	..	..	..	0.65	1.1	0.42	0.93
November-December.	29—5	0.76	1	..	..	0.56	1.1	0.59	1.32
	6—12	..	..	..	..	0.46	1.0	0.62	1.14
	13—19	..	..	..	..	0.47	1.0	0.24	0.71
	20—26	..	..	..	..	0.17	0.5	0.12	0.46
	27—3	0.08	..	..	..	0.06	0.1	0.09	0.43
	4—10	..	..	..	..	0.33	0.6	0.20	0.50
	11—17	..	..	..	..	..	..	0.07	0.14
	18—24	..	..	..	..	0.15	0.3	0.05	0.11
25—31	0.05	..	..	..	0.02	0.2	0.15	0.36	
Total ..		10.34	17	8.42	16	13.86	25.1	13.29	26.42
Hot weather period.									
February ..	1—7	..	..	..	..	..	..	0.04	0.29
	8—14	..	..	..	..	0.06	0.2	0.10	0.21
	15—21	..	..	..	..	0.09	0.1	0.04	0.07
	22—29	1.23	3	..	..	0.11	0.3	0.13	0.21
March ..	1—7	..	..	..	..	0.16	0.3	0.09	0.14
	8—14	..	..	..	..	0.04	0.1	0.08	0.21
	15—21	0.23	1	..	..	0.10	0.2	0.23	0.46
	22—28	..	..	0.07	..	0.08	0.3	0.12	0.40
March-April ..	29—4	..	..	0.83	2	0.24	0.7	0.40	0.75
	5—11	..	..	0.45	1	0.53	1.6	0.47	1.59
	12—18	..	..	1.50	2	0.66	1.2	0.64	1.25
	19—25	..	..	..	..	0.63	1.2	0.47	1.01
May ..	26—2	..	..	0.09	..	0.63	0.9	0.58	1.14
	3—9	..	..	0.03	..	0.27	1.1	0.59	1.61
	10—16	..	..	0.16	1	0.36	1.1	0.55	1.32
	17—23	..	..	0.25	1	0.48	1.1	0.67	1.50
	24—30	..	..	0.75	2	0.43	1.2	0.40	1.25
May-June ..	31—6	..	..	0.39	1	0.17	0.8	0.35	1.00
Total ..		1.46	4	4.52	10	5.04	12.4	5.93	14.31
Grand total ..		16.38	36	19.27	42	24.19	53.8	24.78	61.13

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 53.8 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 periods. The cumulative effect of the continued deficient rainfall for the past five years has told upon the water-supply in the wells of the station. The west well which used to have about 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 inch of rain, and the sowing was 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 their 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. As the hot weather rains were much in deficit of the normal, the area under 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 due to poor supply of water in the wells.

3. *B. Cholam (Sorghum species)*.—Sorghum (Cholam 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 station. A total number of 858 cultures were grown and studied during the year. As already stated, the season was a failure for the rainfed cholam 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. 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.

4. All the Sorghum strains, both rainfed and irrigated so far evolved at the station continue to spread in tracts for which they have been evolved. As usual, the demand for cholam seeds was heavy. Since the area available for the multiplication of nucleus seeds is very limited, only a part of the demand for seed could be met. Thirty-seven thousand two hundred and thirty-five pound of seeds of cholam strains and promising high yielding selections were supplied to farmers through departmental officers and also by direct sale at the 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 localised in their behaviour and distribution. Therefore the 16 strains so far released from the station, 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 station, is given under each item.

5. *Rainfed Cholams—Periamanjol cholam*—(a) *Evolution of high-yielding strains having juicy stalks and reddish purple straw*.—*Periamanjol cholam* is the best dry land variety of cholam grown in the Coimbatore district. Cholam Co. 1 is a strain of *Periamanjol cholam*. It matures in 135 to 140 days and has yellow grain and blackish purple straw. In *Periamanjol cholam*, 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 *Periamanjol cholam* with reddish purple straw was taken up. Since the selections that came out of this process were pithy, juiciness was introduced into *Periamanjol cholam* by hybridizing 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 *Periamanjol cholam* having juicy stalk and reddish purple straw.

(b) *Improvement of grain size in Periamanjol cholam.*—With a view to improve the grain size of *Periamanjol cholam*, 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.

(c) *Investigations on the effect of early drought on the development of Periamanjol cholam 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 *Periamanjol cholam* 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 indicated 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.

6. *Talaivirichan cholam*—(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 in Madras. The grain of *Talaivirichan cholam* 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 cholam 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 in Madras

as already mentioned. 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 52 main 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 contents. 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 lb. of stalks.
	PER CENT.	LB.
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 presented below:—

Particulars.	Co. 3	Co. 2	A.S. 7657
Moisture	..	..	..
Ash	7.88	7.39	10.47
Crude protein	2.93	4.12	6.56
Ether extractive	2.37	2.74	3.30
Crude fibre	30.83	22.89	24.22
Carbohydrates by difference	55.99	62.86	55.45
Total	100.00	100.00	100.00
Lime (Ca)	0.16	0.28	0.10
Phosphoric acid	0.28	0.66	0.62
(P ₂ O ₅)			
Nutritive ratio	20.96	16.78	9.61

NOTE.—Oven dry basis.

Remarks of the Government Agricultural Chemist.—From the point of view of superiority of cholam straw for feeding, selection A.S. 7657 is the best of the lot, followed by Co. 2 and Co. 3 in the descending order of merit.

7. *Irungu cholam*—*Improvement of grain size, grain colour and yield of grain and straw in Irungu cholam.*—This variety is cultivated largely 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

12. *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 Cholam 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. The differences in grain yield were not significant. In straw yield, Co. 11 and 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. The results of the trial are given in Table III.

TABLE III.—*Cholam yield trials—Summer, 1951.*

Chinnamanjal cholam.

Particulars.	Selections.						Standard error.	Whether differences are significant or not. $P=0.05$.	Critical difference.
	Co. 5 Standard.	Co. 11	A.S. 8338/4	A.S. 8338/7	A.S. 8338/8	A.S. 8339/8			
Grain—									
Yield in lb. per acre.	1,729	1,275	1,959	1,875	1,937	1,521	152.1	No.	..
Yield as a percentage of the standard.	100.0	79.6	112.9	106.0	111.7	87.7	8.8	Do.	..
Straw—									
Yield in lb. per acre.	5,875	8,354	6,396	9,033	8,726	8,854	351.7	Yes.	987.0
Yield as a percentage of the standard.	100.0	142.4	108.8	153.9	148.8	150.4	5.9	Do.	16.8
Money value of grain and straw as a percentage of the standard.	100.0	105.2	115.3	125.6	125.6	110.3	7.1	No.	..

Conclusion—

Straw—A.S. 8338/7, A.S. 8339/8, A.S. 8338/8, Co. 11, A.S. 8338/4, Co. 5.

NOTE.—Grain valued at 1½ annas per lb. and dry straw valued at 80 lb. per rupee.

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.

13. *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 irrigation facilities have so far been released from the Station. But to cater to the specific needs of certain tracts, work is being continued at present. Further 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 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, Satyaman-galam and Avanashi taluks, sown in 2 row plots 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, A.S. 8401, A.S. 8404, A.S. 8403 and A.S. 8402 were found to give increased yields of 100.0 per cent, 92.3 per cent, 83.1 per cent and 73.8 per cent grain over the standard Co. 7, the increase being significant. But these selections have grains with slight red wash over them, and also their duration is shorter by 10 to 15 days. As they were 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 for 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 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 the 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, Mathurai 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 ten 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 86

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 having the same duration as Co. 12 (86–90 days) 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. However both the selections were inferior to K. 2 the other standard. 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.

14. *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 Cholan 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 Koilpatti 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 Mathurai, 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 Aruppukottai. 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 Dharapuram. 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, Mathurai 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 Cholan strains, Co. 9 (*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.

15. *Fundamental work*—(i) *Studies in the genetics of Sorghum.*—Linkage relationship, (a) axil and sheath; and (b) 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 F₁s in 1953 summer season.

(ii) *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 problems 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 are being statistically analysed as a preliminary step. Work on the baking qualities and the gluten content of the different varieties is being taken up.

16. *C. Ragi (Eleusine coracana, Gaertn.)*—Ragi is the next important millet in acreage, occupying an area of 1.5 million acres in this State. Owing to uncertain monsoon, work at the Millet Breeding station was limited to irrigated types. Two crops namely, the summer and the main season ones were grown and 333 cultures were raised in 2.43 acres and studied.

17. *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 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.

18. *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 (E.C. 4561, 4595, 4601, AKP.1 and AKP.2) were compared with Ragi Co. 2 to isolate a selection of Ragi better than Co. 2. The result of the trial was analysed and presented in Table IV.

TABLE IV.—Ragi—Yield trial—Main 1951.

Field No.—3-A.	Short duration series.							Whether differences are significant or not (P = 0.05).	Critical difference.
	Co. 2.	E.C. 4561.	E.C. 4595.	E.C. 4601.	AKP. 1.	AKP. 2.	Standard error.		
Previous crop—Green manure-cowpea.									
Manure—Ten tons of farm yard manure per acre.									
Date of sowing—11th May 1951.									
Date of harvest—17th, 24th, 28th August 1951 and 4th September 1951.									
Particulars.	Co. 2.	E.C. 4561.	E.C. 4595.	E.C. 4601.	AKP. 1.	AKP. 2.	Standard error.		
Grain—									
Yield in lb. per acre.	2,357	2,332	1,535	2,722	2,099	1,653	203	Yes.	613.0
Yield as a percentage of the standard.	100.0	98.5	65.1	115.5	89.0	70.1	8.6	Do.	25.9

Particulars.	Selections.						Standard error.	Whether differences are significant or not (P = 0.05).	Critical difference.
	Co. 2. Standard.	E.C. 4561.	E.C. 4595.	E.C. 4601.	AKP. 1.	AKP. 2.			
Straw—									
Yield in lb. per acre.	10,972	11,250	7,222	12,138	4,305	4,055	842	Yes.	2,537.0
Yield as a percentage of the standard.	100.0	102.5	66.1	110.6	39.2	36.9	7.6	Do.	23.0
Money value of grain and straw as percentage of the standard.	100.0	93.7	65.2	113.2	68.7	56.7	7.7	Yes.	23.3
Duration in days.	117	110	106	106	100	100	..	..	..
Conclusion—	Grain—E.C. 4601, Co. 2, E.C. 4561, A.K.P. 1, A.K.P. 2, E.C. 4595.								
	Straw—E.C. 4601, E.C. 4561, Co. 2, E.C. 4595, A.K.P. 1, A.K.P. 2.								
	Money value—E.C. 4601, Co. 2, E.C. 4561, A.K.P. 1, E.C. 4595, A.K.P. 2.								
	NOTE.—Grain valued at 19.5 pies per lb. Straw valued at 2.8 pies per lb.								

Year.	Results of previous years' trials.								Critical difference.
	Co. 2.	E.C. 3927.	E.C. 4561.	E.C. 4577.	E.C. 4578.	E.C. 4579.	E.C. 4580.		
1944	..	1,520	1,458	..	..	..	..	..	774.0
1945	..	1,335	1,343	..	..	..	..	..	..
1946	..	2,364	2,245	2,217	..	..	..	..	52.5
1947	..	1,354	1,200	1,300	..	..	..	..	234.0
1948	..	1,354	1,315	1,528	1,092	1,026	..	..	124.0
1949	..	949	848	1,000	..	1,058	1,481	..	456.0
1950	..	..	..	..	..	..	..	..	Crop failed.

E.C. 4601 is earlier by 11 days and gave an increased yield of 15.6 per cent grain and 10.6 per cent straw over Co. 2 though the difference was not statistically significant. The shorter duration by 11 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. In the same yield trial E.C. 4310, a promising white grain selection was also included to avoid a separate yield trial. Three *Karumsuruttai* selections (E.C. 4573, 4576 and 4190) and E.C. 4310 were compared with Ragi Co. 1. The results were analysed and are presented in table V.

TABLE V.—Ragi—Yield trial—Main 1951.

Karumsuruttai Series.

Field No.—3.
Previous crop—Green manure-cowpea.
Manure—Ten tons of farm yard manure per acre.
Date of sowing—8th May 1951.
Date of harvest—6th, 8th and 12th September 1951.

Variants—Five.
Replications—Five.
Layout—Randomized blocks.
Size of plots—
Gross—1.88 cents.
Net—0.90 cent.

Particulars.	Selections.					Standard error.	Whether differences are significant or not (P = 0.05).	Critical difference.
	Co. 1 Standard.	E.C. 4573.	E.C. 4576.	E.C. 4190.	E.C. 4310.			
Grain—								
Yield in lb. per acre.	1,974	3,127	3,055	2,622	1,687	141	Yes.	426.0
Yield as a percentage of the standard.	100.0	158.4	154.6	132.8	94.0	7.4	Do.	21.4
Straw—								
Yield in lb. per acre.	18,955	15,288	16,222	14,377	18,222	1,431	Do.	4,277.0
Yield as a percentage of the standard.	100.0	80.6	85.5	75.3	96.1	7.0	Do.	20.3

Particulars.	Selections.					Standard error.	Whether differences are significant or not (P = 0.05).	Critical difference.
	Co. 1 Standard.	E.C. 4573.	E.C. 4576.	E.C. 4190.	E.C. 4310.			
Money value of grain and straw as a percentage of the standard.	100.0	116.0	111.6	99.7	91.6	6.1	Yes.	19.3
Duration in days.	127	121	121	121	123	..	..	..
Conclusion—	Grain—E.C. 4573, E.C. 4576, E.C. 4190, Co. 1, E.C. 4310.							
	Straw—Co. 1, E.C. 4310, E.C. 4576, E.C. 4573, E.C. 4190.							
	Money value—E.C. 4573, E.C. 4576, Co. 1, E.C. 4190, E.C. 4310.							
	NOTE.—Grain valued at 19.5 pies per lb. Straw valued at 2.8 pies per lb.							

Year.	Results of previous years' trials.					Critical difference.
	E.C. 4190.	E.C. 4437.	E.C. 4534.	E.C. 4573.	E.C. 4576.	
1945	..	1,213	1,078	1,139	1,126	..
1946	..	2,450	2,345	1,918	1,960	2,124
1947	..	1,311	1,400	1,428	1,444	1,456
1948	..	1,169	1,199	1,234	1,241	1,261
1949	..	1,025	1,418	1,241	1,493	1,468
1950	..	..	..	..	..	321.5
	Crop failed.					

All the three *Karumsuruttai* selections were significantly superior to Co. 1, yielding 58.4 per cent, 54.6 per cent and 32.8 per cent more grain. E.C. 4310 yielded as much as Co. 1. E.C. 4573 and E.C. 4310 are advanced for district trials 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 were advanced for further tests. One 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.

19. *Disease resistance studies.*—This 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 of the crop. All the cultures that were under study were affected to a greater or lesser extent due to the artificial inoculation which was done by the Government Mycologist. Seven selections that were comparatively resistant in previous years were put to critical yield and infection tests. The results were separately analysed for yield and infection and the correlation between disease infection and yield was also worked out. The data are presented in Table VI.

TABLE VI.—Ragi—Disease Resistance Trial—Main 1951.

To isolate strains resistant to *Piricularia* infection.

Field No.—6 B.
Previous crop—Tenal.
Manure—Ten tons of farm yard manure per acre.
Date of sowing—18th August 1951.
Date of harvest—25th November 1951 to 10th December 1951.

Variants—Eight.
Replications—Four.
Layout—Randomized blocks.
Size of plot—Gross 20 x 20 links with one line for each variant.

Particulars.	Selections.								Standard error.	Whether differences are significant or not (P = 0.05).	Critical difference.
	Co. 1 stan- dard.	E.C. 1008	AKP. 3	E.C. 151	K. 1	E.C. 4600	E.C. 4591	E.C. 24			
Grain—											
Yield in Oz. per line.	5.5	2.0	5.5	4.0	6.0	5.0	5.3	5.5	0.58	Yes.	1.6
Yield as a percentage of the standard.	100.0	36.4	100.0	72.7	109.1	90.9	96.4	100.0	9.6	do.	28.1
Percentage of <i>Piricularia</i> infection.	25.4	0.5	6.4	1.6	17.4	35.3	4.7	13.7	6.5	do.	19.0

Particulars.	Selections.								Standard error.	Whether differences are significant or not (P = 0.05).	Critical difference.
	Co. 1 stand- dard.	E.C. 1008	AKP. 3	E.C. 151	K. 1	E.C. 4600	E.C. 4591	E.C. 24.			
Infection as a percentage of the standard	100.0	2.0	25.2	6.3	63.5	131.1	18.5	53.9	25.6	Yes.	74.8
Conclusion—											
Grain yield	K1	AKP. 3,	Co. 1,	E.C. 24,	E.C. 4591,	E.C. 4600.	E.C. 151,	E.C. 1006.			
Infection—	E.C. 4600,	Co. 1,	K1,	E.C. 24,	AKP. 3,	E.C. 4591,	E.C. 151,	E.C. 1008.			
Correlation Coefficient for yield and infection.	} + 0.129 Not significant.										
Incidence of infection for the past two years.											
	Selection.			Infection in 1949.		Infection in 1950.					
				PER CENT.		PER CENT.					
E.C. 24	..	..	..	..	2.2	..	0.54				
E.C. 1008	..	..	..	..	..	..	3.88				
E.C. 151	..	..	..	..	..	..	3.03				
E.C. 4591	..	..	..	..	..	..	1.61				
E.C. 4600	..	..	..	..	..	..	1.04				
AKP. 3	..	..	..	..	..	..	0.68				
K. 1	..	..	..	..	..	..	2.82				
Co. 1	..	..	..	..	20	..	37.0				

The correlation, though positive, was not significant. The results indicate that generally high yielding types show high infection. High yielding types AKP. 3, K1 and Co. 1 show a higher percentage of infection than E.C. 1008 and E.C. 151 which are very poor yielders. The resistance of the latter will have to be built up into the former which may result in greater yield in the former, by hybridization, which will be taken up in the coming season.

20. *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.

21. *Trial of strains in the districts.*—The trial of the strains in the district 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 the local varieties for ripening. Local varieties were collected for isolating types suited to the tract.

22. 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.

23. A research note reporting the occurrence of 'Reniform' grain in Ragi was prepared and sent up for publication in Madras Agricultural Journal.

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

24. *D. Tenai (Setaria italica, Beauv).*—Tenai (Korra) is one of the four major millets dealt with at the station. It comes fourth in the order of importance and occupies an area of 1.5 million acres in the Madras State. 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 were 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.

25. *Improved strains.*—Three strains in Tenai have been evolved at the station, of which Tenai Co. 1 and Co. 3 are dry land 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 station 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 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 dry land 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.

26. *Evolution of short duration high yielding strains*—(i) *Short duration less than 85 days.*—To evolve a short duration and high yielding tenai type 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 comparative 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. The results are presented in Table VII.

TABLE VII.—Tenai—Yield trial—Main, 1951.

Short duration. Series I.

Field No.—12.		Variants—Six.							
Previous crop—Cumbu.		Replications—Five.							
Manure—Ten cartloads of farm yard manure per acre.		Layout—Randomized blocks.							
Date of sowing—14th September 1951.		Size of plot—Gross 0.84 cent.							
Date of harvest—26th November 1951 to 4th December 1951.		Nett 0.80 cent.							
Particulars.	Selections.						Standard error.	Whether differences are significant or not (P=0.05).	Critical difference.
	S.I. 3497 standard.	S.I. 4894.	S.I. 4906.	S.I. 4909.	S.I. 4805.	S.I. 4919.			
Grain—									
Yield in lb. per acre.	616	722	675	614	543	525	34.3	Yes.	101.6
Yield as a percentage of the standard.	100.0	117.3	109.6	99.7	89.1	85.3	5.57	do.	16.5
Straw—									
Yield in lb. per acre.	1,593	2,323	1,770	1,848	1,863	2,483	123.0	do.	363.2
Yield as a percentage of the standard.	100.0	145.8	111.1	116.0	104.4	155.9	7.72	do.	22.8
Money value of grain and straw as a percentage of the standard.	100.0	123.6	110.6	103.6	92.7	99.8	5.78	do.	17.0
Duration in days	74	72	72	71	73	81	..	..	..
Conclusion—									
Grain—S.I. 4894, S.I. 4906, S.I. 3497, S.I. 4909, S.I. 4805, S.I. 4919.									
Straw—S.I. 4919, S.I. 4894, S.I. 4909, S.I. 4906, S.I. 4805, S.I. 3497.									
Money value—S.I. 4894, S.I. 4906, S.I. 4909, S.I. 3497, S.I. 4919, S.I. 4805.									
NOTE.—Grain valued at 21 pias per lb.									
Straw valued at 2 pias per lb.									

Results of the trial during 1950-51.

Particulars.	Selections.						Standard error.	Whether differences are significant or not (P = 0.05).	Critical difference.
	S.I. 3497 standard.	S.I. 4894	S.I. 4906	S.I. 4909	S.I. 4805	S.I. 4919			
Grain—									
Yield in lb. per acre.	287.5	358.2	480.2	297.5	491.0	529.3	37.8	Yes.	110.4
Straw—									
Yield in lb. per acre.	1,053	1,082	1,503	681	774	1,154	84.2	do.	245.4
Money value of grain and straw as a percentage of the standard.	100.0	120.0	161.8	95.2	160.2	168.2	15.3	do.	44.6

Out of the five selections compared, 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. The results are presented in Table VIII.

TABLE VIII.—Tenai—Yield trials—Main, 1951.

Tiruchirappalli irrigated varieties (Series II).

Particulars.	Selections.						Standard error.	Whether the differences are significant or not. (P = 0.05).	Critical difference
	Local Stand-ard.	S.I. 4946.	S.I. 4945.	S.I. 4957.	S.I. 4938.	S.I. 4939.			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Grain—									
Yield in lb. per acre.	317	519	442	395	117	111	15.7	Yes	46.3
Yield as a percentage of the standard.	100.0	163.5	139.4	124.6	36.9	35.0	4.96	..	14.6
Straw—									
Yield in lb. per acre.	3,598	3,188	1,870	3,295	2,870	2,775	117.3	..	345.4
Yield as a percentage of the standard.	100.0	88.6	52.0	91.6	79.8	77.1	3.26	..	9.6
Money value of grain and straw as a percentage of the standard.	100.0	124.8	93.9	107.5	59.2	56.8	3.54	..	10.4
Duration in days..	95	75	78	75	91	91	..	..	..
Conclusion—									
Grain—	S.I. 4946.	S.I. 4945.	S.I. 4957.	Local.	S.I. 4938.	S.I. 4939.			
Straw—	Local S.I. 4957.	S.I. 4946.	S.I. 4938.	S.I. 4939.	S.I. 4945.				
Money value—S.I. 4946.	S.I. 4957.	Local S.I. 4945.	S.I. 4938.	S.I. 4939.					

NOTE—Grain valued at 21 ples per lb.
Straw valued at 2 ples per lb.

Results of trials during 1950-51.

Particulars.	Selections.						Standard error.	Whether the differences are significant or not. (P = 0.05).	Critical difference.
	Local Stand-ard.	S.I. 4938.	S.I. 4939.	S.I. 4945.	S.I. 4946.	S.I. 4957.			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Grain—									
Yield in lb. per acre.	197.9	105.5	83.7	232.4	412.5	229.6	12.3	Yes.	35.3
Straw—									
Yield in lb. per acre.	2,734	1,613	1,531	1,443	2,266	2,689	74.5	Do.	216.0
Money value of grain and straw as a percentage of the standard.	100.0	56.2	49.2	84.7	144.9	107.1	8.7	Do.	10.8

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 is 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 differences in yield for both grain and straw are not significant, but two selections have given higher yield of grain than the control.

(iv) *Evolution of dryland strains for Cuddapah district.*—Four Cuddapah selections were compared in a 4 × 6 randomized block in a preliminary yield trial with the general mean as control. One selection has given 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 (rainfed).*—Dry-land 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 districts (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.

27. *Rust resistance studies.*—Rust (*Uromyces Setariae italicae*) is a disease which attacks the Tenai crop. It appears sometime 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 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 culture and S.I. 3756, the resistant selection 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 amount of infection of 30 per cent as S.I. 3756 the rust resistant culture. 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 selection and S.I. 3560, the susceptible culture next year. The work is being done in collaboration with the Government Mycologist both for field tests and for laboratory tests.

28. *Miscellaneous studies*—(i) *Studies on tillering.*—With a view to induce tillering into Co. 2 the irrigated non-tillering strain, a natural cross from Co. 2 bulk crop having a number of tillers was taken and studied. Ten heavy tillering selections (6-8 tillers) from it were chosen and were sown in 1951 main season under rainfed conditions along with Co. 2 (one tiller) 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 Tiruchirappalli 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 Addis Ababa, East Abyssinia, 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.

29. *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 Uttamapalayam taluks.

30. *E. Minor Millets—(a) Evolution of high yielding strains.*—There are four millets which are of minor importance and hence called minor millets. All 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 a dryland crop 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* were 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 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 (130 days), 9 lb. of P.M. 4 the short duration economic *Samai* selection (85 days), 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 differences were not significant and hence the trial was repeated in main 1951 season in a comparative trial. The differences 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 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. 269, 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 are presented in Table IX.

TABLE IX.—*Panivaragu*—Yield trial—Main, 1951.

Field No.—3.
Previous crop—Irrigated ragi.
Manure—Ten cartloads of farm yard manure per acre.
Date of sowing—27th November 1951.
Date of harvest—5th to 15th March 1952.

Variants—Five.
Replications—Six.
Layout—Randomized blocks.
Size of the plot—Gross 1.30 cent:
Net 0.80 cent.

Particulars.	Selections.					Standard error.	Whether the differences are significant or not. (P=0.05).	Critical difference.
	P.V. 14. Standard.	P.V. 324.	P.V. 325.	P.V. 332.	P.V. 327			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Grain—								
Yield in lb. per acre.	628	755	695	660	492	25.75	Yes	76.0
Yield as a percentage of the standard.	100.0	120.3	110.8	105.2	78.4	4.1	..	12.1
Straw—								
Yield in lb. per acre.	2,729	2,469	2,979	3,104	3,354	226.5	No	..
Yield as a percentage of the standard.	100.0	90.5	109.1	113.7	122.8	8.03	..	..
Money value of grain and straw as a percentage of the standard.	100.0	111.8	110.5	107.3	91.6	4.41	Yes	13.6
Duration in days..	98	90	90	90	90	..	..	..
Conclusions—								
Grain—	P.V. 324, P.V. 325, P.V. 332, P.V. 14, P.V. 327.							
Money value—	P.V. 334, P.V. 325, P.V. 332, P.V. 14, P.V. 327.							
NOTE—Grain valued at 21 ples per lb. Straw valued at 2 ples per lb.								

The differences in 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.*—Seed of P.V. 14 was given out for trials in the districts of Ramanathapuram, Madurai and Tirunelveli. The results are awaited.

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

(ii) *Fruit trees.*—Among the fruit plants planted in 1948 at the Millet Breeding Station, 13 guava, 4 anona, 14 sapota and 3 pomegranates have come up well. Two plants in each of the three varieties of Malta lemon (Lemon Lisbon, Lemon Villufraunce, Lemon Malta) were planted during the year out of which four have established well. Anona, custard apple 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 under cholam, cumbu and ragi crops. Eighty-four pounds of seeds of *Sesbania speciosa* and three pounds of seed of *Gliricidia maculata* were collected.

Seeds of *Indigofera teysmanni* 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 cents each. It was found that *Blou Buffel* is more quick growing 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 were obtained during the course of three cuttings from February 1952.

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

SECTION II—REGIONAL MILLET STATIONS.

33. *A. Introduction.*—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. Ms. No. 1565, Development, dated 24th March 1949. Accordingly four Regional Millet Stations were opened, one at Ariyalur in the Tiruchirappalli district, the second at Tiruppattur 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 Officer.	Agricultural upper subordinates.	Fieldmen.	Clerks.	Peons.
Ariyalur		1	2	..	1*
Tiruppattur		2	2	1	1
Ongole		1	2	..	1†
Narasapatnam		3	3	1	1‡
Headquarters	1	..	..	1	1§

* Includes one Assistant and one Fieldman working at Palur transferred to the station.

† Includes one Assistant and one Fieldman working at Lam.

‡ One Assistant and one Fieldman transferred from Anakapalle.

§ 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.

34. *B. Regional Millet Station, Ariyalur.*—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 5-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 the 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.

35. *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 for Cumbu and dry Ragi crops.

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

(a) *Makkattai cholam.*—Of the varieties of Cholam cultivated in this tract, *Makkattai 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 trial conducted on the station during the last year revealed that A.S. 7537 a selection of *Vellaimakkattai cholam* was 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 *Manjamakkattai cholam*. Strain Co. 1, A.S. 8001 and A.S. 7537 were tried in yield trial plots against local bulks of both *Vellaimakkattai* and *Manjamakkattai cholam*. The results are presented in Table X.

TABLE X.—*Cholam—Yield trials—Main, 1951—Makkattai cholam.*

Field No.—E.	Variants—Five.
Previous crop—Late season cumbu.	Replications—Six.
Manure—Ten cart-loads of compost per acre.	Layout—Randomized blocks.
Date of sowing—13th August 1951.	Size of plot—Gross 1.0 cent.
Date of harvest—3rd January 1952.	Net 0.6 cent.

Particulars.	Selections.					Standard error.	Whether the differences are significant or not. (P=0.05).	Critical difference.
	Co. 1 (strain).	A.S. 8001.	A.S. 7537.	Local Vellai-makkattai cholam.	Local Manja makkattai cholam standard.			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Grain—Yield in lb. per acre.	1,687	1,953	2,113	1,737	1,613	90.0	Yes.	265.2
Yield as a percentage of the standard.	116.8	120.8	124.7	107.5	100.0	5.58	..	16.4
Straw—Yield in lb. per acre.	6,000	5,400	6,232	6,350	5,680	351.6	No.	..
Yield as a percentage of the standard.	106.1	95.7	110.4	112.5	100.0	6.2	..	..
Conclusion—								
Grain—A.S. 7537, A.S. 8001, Co. 1.	Local Vellai makkattai, Local Manja makkattai.							

Particulars.	Year.	Results of previous years' trial.					Critical difference.
		Strain Co. 1.	A.S. 8001.	A.S. 7537.	Local Vellai-makkattai.	Local Manja-makkattai.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Grain yield in lb. per acre.	1949-50 1950-51	1,083	..	1,141 1,100	1,016 917	434	171.8

It was found that A.S. 7537 was superior to both the local bulks giving 16.7 per cent higher yield of grain over local *Vellaimakkattai cholam* and 24.7 per cent over *Manjamakkattai*. A.S. 8001 and Co. 1 gave 20.8 per cent and 16.8 per cent higher yields respectively over the local *Manjamakkattai cholam*. All the increases were statistically significant. Ten selections in each of *Manjamakkattai* and *Vellaimakkattai cholam* were tested in preliminary yield trials. Two selections of *Manjamakkattai 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 *Vellaimakkattai* were found to be superior to the local variety. Out of a total number of 68 fresh collections and 38 single plants of *Manjamakkattai cholam* studied during the year, 198 single plants and 16 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 selections 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 8 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 superior to the local in the yield of grain. The trial was repeated this year. The results are presented in Table XI.

TABLE XI.—*Cholam*—Yield trials—Main, 1951—*Irungu cholam*.

Field No.—G.	Replications—Eight.
Previous crop—Varagu.	Layout—Randomized blocks.
Manure—Ten cart-loads of compost per acre.	Size of plot—Gross: 1'0 cent.
Date of sowing—14th August 1951.	Net 0.6 cent.
Date of harvest—20th and 26th December 1951.	

Particulars.	Selections.			Standard error.	Whether the differences are significant or not. (P=0.05.)	Critical difference.
	A.S. 7081.	A.S. 660.	Local <i>Irungu</i> standard.			
Grain—Yield in lb. per acre	837	833	717	36.6	Yes.	110.2
Yield as a percentage of the standard.	120.1	114.4	100.0	5.1	..	15.
Straw—Yield in lb. per acre	3,723	4,867	5,060	173.3	..	522.6
Yield as a percentage of the standard.	73.7	96.1	100.0	3.4	..	10.6
Conclusion—						
Grain—	A.S. 7,081	A.S. 660	Local <i>Irungu</i> .			
Straw—	Local <i>Irungu</i> .	A.S. 660	A.S. 7,081			

Particulars.	Year.	Results of previous year's trial.			Critical difference.
		A.S. 7081	A.S. 661	Local <i>Irungu</i> .	
Grain yield per acre in lb. ..	1950-51.	1,217	1,350	983	185.8

A.S. 7081 was found to be significantly superior to local *Irungu cholam* giving 20.1 per cent higher yield of grain; A.S. 660, being on a par with 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 86 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 work.

37. *Cumbu (Pennisetum typhoides)*.—*Cumbu* is grown under rainfed 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 north-east monsoon and 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. The results are presented in Table XII.

TABLE XII.—*Cumbu*—Yield trials—Main, 1951—*Arisi Cumbu*.

Field No.—C.	Replications—Six.
Previous crop—Cholam.	Layout—Randomized blocks.
Manure—Five cart-loads of compost per acre.	Size of plot—Gross
Date of sowing—4th July 1951.	1'0 cent. Nett
Date of harvest—28th September 1951.	0.6 cent.

Particulars.	Selections.					Standard error.	Whether the differences are significant or not. (P=0.05.)	Critical difference.
	P.T. 832.	P.T. 835.	AKP. 2.	A.C. 23.	A.C. 50.	Local <i>Arisi cumbu</i> standard.		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Grain—Yield in lb. per acre ..	436	430	364	450	592	492	27.9	Yes.
Yield as a percentage of the standard.	109.2	108.0	91.8	112.7	147.5	100.0	6.8	..

Particulars.	Selections.						Standard error.	Whether the differences are significant or not (P=0.05).	Critical difference.
	P.T. 833.	P.T. 835.	AKP. 2.	A.C. 23.	A.C. 50.	Local standard.			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Straw—									
Yield in lb. per acre ...	535	547	468	477	445	501	23.3	No.	..
Yield as a percentage of the standard.	107.9	109.2	93.4	95.2	88.9	100.0	5.7	..	..
Conclusion—									
Grain—A.C. 50, A.C. 23, P.T. 833, P.T. 835, Local, AKP. 2.									

Particulars.	Year.	Results of previous year's trial.						Local.	Critical difference.
		P.T. 833	P.T. 835	AKP. 2.	A.C. 23	A.C. 50	Local.		
Grain yield per acre in lb. ..	1950-51.	272	237	205	..	..	200	39.0	

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 79 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.

38. *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.

39. *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 the local Varagu in yield trial plots. The results are given in Table XIII.

TABLE XIII.—*Varagu*—Yield trials—Main, 1951.

Field No.—D. Previous crop—Cholam. Manure—Five cart-loads of cattle manure per acre. Date of sowing—30th August 1951. Date of harvest—8th and 14th January 1952.	Selections.						Standard error.	Whether differences are significant or not (P=0.05).	Critical difference.
	P.S. 1.	A. 117.	A. 142.	A. 416.	Local Standard.	Local.			
Grain—									
Yield in lb. per acre ...	2,625	2,063	2,196	1,745	2,086	94.3	4.5	Yes.	278.2
Yield as a percentage of the standard.	125.6	98.8	105.3	83.6	100.0			..	13.4
Straw—									
Yield in lb. per acre ...	5,113	3,925	4,325	4,944	4,758	210.0	4.4	..	619.5
Yield as a percentage of the standard.	107.6	82.6	91.0	104.7	100.0			..	12.9
Conclusion—									
Grain—P.S. 1, A. 142, Local, A. 117, A. 416.									
Straw—P.S. 1, A. 416, Local, A. 142, A. 117.									
Results of previous year's trial.									
Grain yield per acre in lb.	Year.	P.S. 1.	A. 117.	A. 142.	A. 416.	Local.	Critical difference.		
	1950-51.	1,750	1,150	1,350	1,317	1,300	316.7		

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.

40. *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-spaces in varagu crop and 98 lb. of seed were obtained.

41. *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.

42. *C. Regional Millet Station, Tiruppattur*.—The Regional Millet Station, Tiruppattur, is situated about a mile away from Tiruppattur town on the Tirupattur-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.

43. *Season and rainfall*.—A total rainfall of 26.42 inches was received in 37 rainy days as against the previous year's 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 crops 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.

44. *Breeding work*—(1) *Cholam (Sorghum sp.)*.—The important variety of Cholam cultivated in the tract is *Talaivirichan cholam* which is grown under rain-fed 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. The results are presented in Table XIV.

TABLE XIV.—*Cholam*—Yield trials—Main, 1951.

Talaivirichan Cholam.									
Field No.—III. Previous crop—Cumbu. Manure—Ten cart-loads of Farmyard manure per acre. Date of sowing—8th July 1951. Date of harvest—22nd December 1951.	Selections.						Standard error.	Whether differences are significant or not (P=0.05).	Critical difference.
	A.S. 8,006.	A.S. 8,080.	A.S. 8,008.	A.S. 8,083.	Co. 3.	Local Standard.			
Particulars.	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Grain—									
Yield in lb. per acre.	1,579	1,281	1,252	1,203	1,118	889	66.9	Yes.	201.2
Yield as a percentage of the standard.	177.6	144.1	140.8	135.3	125.8	100.0	7.5	..	22.6

Particulars.	Selections.						Standard error.	Whether differences are significant or not (P = 0.05).	Critical difference.
	A.S. 8,006.	A.S. 8,080.	A.S. 8,008.	A.S. 8,083.	Co. 3.	Local Standard.			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Straw—									
Yield in lb. per acre.	7,408	5,858	4,623	5,351	4,941	3,633	318.1	Yes.	956.8
Yield as a percentage of the standard.	195.6	152.3	120.6	139.6	128.9	100.0	8.3	..	24.9
Conclusion—									
Grain—A.S. 8,006.	A.S. 8,080.	A.S. 8,008.	A.S. 8,083.	Co. 3.	Local.				
Straw—A.S. 8,006.	A.S. 8,080.	A.S. 8,083.	Co. 3.	A.S. 8,008.	Local.				

Results of previous year's trials.
Grain yield per acre in lb.

Year	A.S. 8080	Co. 3.	A.S. 8083	A.S. 8008	A.S. 8006	Local.	Critical difference.
1950 Main ..	487.5	466.3	456.3	452.5	410.0	357.5	..

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, 16 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 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.

Periamanjol cholam.—Five economic selections of *Periamanjol 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 in yield trials. The results are presented in Table XV.

TABLE XV.—*Cholam*—Yield trials—Main, 1951—*Periamanjol Cholam*.

Particulars.	Variants.						Standard error.	Whether differences are significant or not (P = 0.05).	Critical difference.
	Co. 1.	A.S. 8112.	A.S. 8002.	A.S. 8001.	T.V. local standard.	A.S. 60.			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Grain—									
Yield in lb. per acre.	1,026	1,024	956	950	882	762	65.1	No.	..
Yield as a percentage of the standard.	116.3	116.1	108.4	107.7	100.0	86.4	7.7	No.	..
Straw—									
Yield in lb. per acre.	6,750	6,394	6,338	7,375	4,588	5,550	485.6	Yes.	1,459.1
Yield as a percentage of the standard.	147.1	139.4	138.1	160.7	100.0	121.0	10.6	Yes.	31.3
Conclusion—									
Straw yield—A.S. 8001, Co. 1, A.S. 8112, A.S. 8002, A.S. 60, Local.									

Results of previous year's trials—Grain yield per acre in lb.

Year.	Variants.				
	A.S. 8002.	Local T.V.	Co. 1.	A.S. 60.	A.S. 8001.
(1)	(2)	(3)	(4)	(5)	(6)
1950—Main	559	498	468	441	400

The *Periamanjol cholam* cultures compared favourably with the local *Talaivirichan cholam* in duration, height and grain setting. A.S. 8112 (juicy stalked *Periamanjol 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 *Periamanjol 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, *Periamanjol cholam* straw was found to be far superior to the *Talaivirichan cholam* straw. The trials will be repeated during the coming season.

45. (2) *Cumbu* (*Pennisetum typhoides*).—Next to cholam cumbu is the most important millet of 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, M.S. 5775/1, B.T. 512, 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.

46. (3) *Ragi* (*Eleusine coracana*).—This crop is raised both as an irrigated crop and as a dry land crop. As a dry land 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.

47. (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.

48. (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.

49. (4) *Miscellaneous crops*—(i) *Maize*.—Maize was grown for fodder purposes and a total quality 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.

50. *D. Regional Millet Station, Ongole*.—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 the 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*, *Variga* and maize varieties are also tested. The improvements achieved are applicable to the whole of *Pyrus jonna* and *Variga* area of this district.

51. *Season and rainfall*.—The rainfall 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 only less than normal yields.

52. *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. The results are presented in Table XVI.

TABLE XVI.—*Jonna*—Yield trials—Main, 1951—*Pyrus Jonna* Group I.

Particulars.	Selections.						Standard error.	Whether differences are significant or not. P=0.05.	Critical difference.
	Local standard.	G. 2.	J. 11.	J. 12.	J. 16.	J. 17.			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Grain—									
Yield in lb. per acre.	1,791	1,713	1,860	1,526	1,476	1,683	94.59	Yes.	194.7
Yield as a percentage of the standard.	100.0	95.6	103.8	85.2	82.4	94.0	53.1	"	10.9
Straw—									
Yield in lb. per acre.	4,468	4,488	4,902	4,606	5,354	5,108	181.11	"	378.1
Yield as a percentage of the standard.	100.0	100.4	109.7	103.1	119.8	114.3	4.1	"	8.3
Conclusion—									
Grain—J. 11, Local, G. 2, J. 17, J. 12, J. 16.									
Straw—J. 16, J. 17, J. 11, J. 12, G. 2, Local.									

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 for 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 of 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 grain yields of 21 per cent, 13 per cent and 17 per cent over the local *Jonna* respectively. The differences for 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.

53. (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 five local selections gave higher yields than the control V. 27 giving significantly higher yield of 23 per cent grain, while 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.

54. (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.

55. *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 3½ 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.

56. *E. Regional Millet Station, Narasapatnam*.—The Regional Millet Station, Narasapatnam, is situated in the Golugonda 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.

57. *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 seedlings with the result that planting was delayed. Again heavy rains at the flowering time of Cumbu resulted in poor yields.

58. *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 *pyru* 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 A.K.P. 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 A.K.P. 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 A.K.P. 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 A.K.P. 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, 9 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) *Pyru 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 ten single plants were selected.

59. (2) *Ganti* (*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.

60. (3) *Jonna* (*Sorghum* species)—(a) *White grain group*.—Five *Talaivirichan jonna* selections of Coimbatore were tried in yield trials with local as control for a second time. The results are presented in Table XVII.

TABLE XVII.—*Jonna* yield trials—Main, 1951—*Tella Jonna*—*Talaivirichan Cholan*.

Field No.—39. Previous crop—Dry ragi nursery. Manure—Nil. Date of sowing—27th and 28th September 1951. Date of harvest—19th January 1952. Variants—Six.	Replications—Four. Layout—Randomized blocks. Size of plot— Gross—110 × 9 links or 0.99 cent. Nett—100 × 8 links or 0.89 cent.					
	Variants.					
	A.S. 475.	A.S. 8085.	Local standard.	A.S. 8008.	Co. 3.	C. 20
	(2)	(3)	(4)	(5)	(6)	(7)
Grain—						
Yield in lb. per acre ..	1,074	970	969	886	772	667
Yield as a percentage of the standard.	111	101	100	91	79	69
Straw—						
Yield in lb. per acre ..	2,167	2,667	3,000	2,334	2,667	2,500
Yield as a percentage of the standard.	72	89	100	78	89	83

Particulars.	General mean.	Standard error.	Whether differences are significant or not. P=0.05.	Critical difference.
	(8)	(9)	(10)	(11)
Grain—				
Yield in lb. per acre ..	896	77.1	Yes.	218.0
Yield in lb. as a percentage of the standard.	92	8.0	Yes.	24.0
Straw—				
Yield in lb. per acre ..	2,500	232	No.	..
Yield in lb. as a percentage of the standard.	83	7.7	No.	..
Conclusion—	Grain—A.S. 475, A.S. 8085, Local, A.S. 8008, Co. 3, Co. 2.			

(Results of previous year's trials.) (Grain yield per acre in lb.)

Year.	Co. 2.	Co. 3.	A.S. 475.	A.S. 8008.	A.S. 8085.	Local.	Critical differ- ence.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1950—Main ..	138	141	74	436	234	83	178.0

The differences in yield were significant. A.S. 475 has given 11 per cent increased yield of grain over the local though this increase is not significant. 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 the 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.

61. *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 green gram culture No. 127 and 83 lb. of seed was obtained.

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

(v) *Horse gram*.—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.R.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 seeds were obtained. Seedlings of *Gliricidia maculata* planted along the boundary of the farm are coming up well.

62. *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. Cattle manure at ten cart loads per acre gave an increased yield of 24.2 per cent over no manure with an increased money value of Rs. 13-14-0 while ammonium sulphate at 360 pounds per acre yielded 50 per cent over no manure, the increase in money value being Rs. 38-14-0.

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

SECTION III.—SCHEME FOR THE EVOLUTION AND DISTRIBUTION OF HYBRID CUMBU SEEDS (INDIAN COUNCIL OF AGRICULTURAL RESEARCH SCHEME).

63. *A. 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 station, 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 normally facilitates hybridisation 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 technical programme of work was approved by the Indian Council of Agricultural Research 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.)

64. *B. Research work at the Millet Breeding Station*.—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 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.

65. (1) *Collection and study of fresh samples of seed*.—Eighty-five new samples of Cumbu were collected, 25 from Coimbatore, 35 from Nellore, 2 from Chittoor, 7 from Vishakhapatnam, 9 from East Godavari and 7 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.

66. (2) *Inbreeding of superior selections from new samples and also those which have been previously isolated*.—Thirty-six inbreds of short duration (70-80 days) and 64 of medium duration (80-90 days) 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 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 the open pollinated varieties. 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. 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 hybridisation 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.

67. (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.

68. (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.

69. (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 the parent inbreds concerned, 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.

70. (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 inbred 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 show that only one hybrid was superior to the standard and both parents while eight were superior to both parents but not to the standard. Among the remaining hybrids, six were superior to and the rest were equal to the parents.

B. Interim tests.—Twenty hybrids (11 of short duration and nine 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 the 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 seed 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.*—In 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 summary of results is given in Table XVIII.

TABLE XVIII.—Cumbu—Yield trials—Summer, 1951—Hybrids of Short Duration, Group I.

Field No.—4-a.
Previous crop—Ragi and green manure—Sunn hemp.
Manure—Green manure—Sunn hemp.
Date of sowing—19th April 1951.
Date of harvest—15th July 1951.
Variants—Six.

Replications—Five.
Layout—Randomized blocks.
Size of plot—
Gross—13 x 50 links or 0.65 cent.
Net—0.40 cent.

TABLE XVIII.—Cumbu—Yield trials—Summer 1951—Hybrids of short duration, Group I—cont.

Particulars.	Variants.						Standard error.	Whether the differences are significant or not. $P = 0.05$.	Critical difference.
	Co. 3 standard.	H. 865.	H. 866.	P.T. 833/3.	P.T. 829/3.	P.T. 634/4.			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Grain—Yield in lb. per acre.	1,906	2,281	2,261	1,863	1,813	1,430	124	Yes.	374.0
Yield as a percentage of the standard.	100.0	119.7	119.7	97.7	95.1	75.0	6.5	Yes.	19.6
Straw—Yield in lb. per acre.	5,019	5,219	4,231	4,666	4,013	4,013	239	Yes.	720.0
Yield as a percentage of the standard.	100.0	102.0	84.3	92.8	79.9	79.9	4.8	Yes.	14.3
Money value of grain and straw as a percentage of the standard.	100.0	118.0	119.7	97.3	93.5	75.6	6.9	Yes.	21.0
Duration in days ..	83	78	73	78	75	79	..	..	..

Conclusion—

Grain—H. 866, H. 865, Co. 3, P.T. 833/3, P.T. 829/3, P.T. 834/4.

Straw—H. 865, Co. 3, P.T. 833/3, H. 866, P.T. 829/3, P.T. 834/4.

Money value—H. 865, H. 866, Co. 3, P.T. 833/3, P.T. 829/3, P.T. 834/4.

Index to crosses—

H. 866 (P.T. 833/5 Kullam Cumbu, Madurai x P.T. 829/3 Arisi Cumbu, Coimbatore).
H. 865 (P.T. 834/4 Bajri, 23-15 Bombay x P.T. 833/3 Kullam Cumbu, Madurai).

NOTE.—(1) The produce has been valued at grain 1½ annas per lb. and straw 180 lb. per rupee.
(2) The allowance for border at the end of rows in plots has not been made. The gross and nett lengths of plots are the same. This has been effected in the trials of succeeding seasons, after the receipt of instructions from the Statistician of the Indian Council of Agricultural Research.

The yield data show that in weight of grain, both the hybrids were superior to the standard and parents tested. The hybrids have given appreciably high yield (2,281 lb. per acre) with an increase of 19.7 per cent over the standard in grain weight. 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 standard and one inferior to it statistically.

In group II, three hybrids were tested with four parents and standard Co. 3. The results are presented in the Table XIX.

TABLE XIX.—Cumbu—Yield trials—Summer 1951—Hybrids of short duration—Group II.

Field No. 4 A.
Previous crop—Ragi and green manure—Sunn hemp.
Manure—Green manure—Sunn hemp.
Date of sowing—20th April 1951.
Date of harvest—16th July 1951.
Variants—Eight.

Replications—Six.
Layout—Randomized blocks.
Size of plot—
Gross—13 x 50 links or 0.65 cent.
Net—8 x 50 links or 0.40 cent.

Particulars.	Variants.							Standard error.	Whether the differences are significant or not. $P = 0.05$.	Critical difference.
	Co. 3 Standard.	H. 874	H. 857	H. 875	P.T. 835/7	P.T. 830/3	P.T. 826/4	P.T. 820/6		
Grain—Yield in lb. per acre.	1,977	2,099	2,066	1,827	1,677	1,671	1,665	1,686	67.7	Yes.
Yield as a percentage of the standard.	100.0	106.2	104.5	92.4	84.8	84.6	84.2	80.2	3.2	Yes.
Straw—Yield in lb. per acre.	4,545	5,425	4,563	3,858	3,725	4,508	4,495	3,480	304.8	Yes.
Yield as a percentage of the standard.	100.0	119.3	100.4	84.0	82.0	99.2	95.9	76.6	6.7	Yes.

TABLE XIX.—*Cumbu—Yield trials—Summer 1951—Hybrids of short duration—Group II—cont.*

Particulars.	Variants.								Standard error.	Whether the differences are significant or not, (P = 0.05)	Critical difference.
	Co. 3. Standard.	H. 874	H. 887	P. 875	P.T. 835/7	P.T. 830/3	P.T. 826/4	P.T. 820/6			
Money value of grain and straw as a percentage of the standard.	100.0	106.6	104.2	91.6	84.6	86.1	86.7	79.7	4.8	Yes.	12.2
Duration in days.	83	80	80	82	84	80	80	79	..	..	..
Conclusion—											
Grain—H. 874	H. 857	Co. 3	H. 875	P.T. 835/7	P.T. 836/3	P.T. 826/4	P.T. 820/6.				
Straw—H. 874	H. 857	Co. 3	P.T. 830/3	P.T. 826/4	H. 875	P.T. 835/7	P.T. 829/6.				
Money value—H. 874	H. 857	Co. 3	H. 875	P.T. 826/4	P.T. 830/3	P.T. 836/7	P.T. 820/6				
Index to crosses—											
H. 857 (P.T. 830/3 <i>Aravadam cumbu</i> , Coimbatore × P.T. 835/1 <i>Bajri</i> , Niphad, Bombay.)											
H. 874 (P.T. 825/6 <i>Bajri</i> , Niphad, Bombay × P.T. 826/4 <i>Kattu Cumbu</i> , Salem.)											
H. 875 (P.T. 835/7 <i>Bajri</i> , Niphad, Bombay × P.T. 820/6 <i>Amari Sajje</i> , Chittoor.)											

NOTE.—(1) The produce has been valued at grain 1½ annas per lb. and straw at 160 lb. per rupee.

(2) The allowances for border at the ends of rows in plots has not been made. The gross and net lengths of plots are the same. This has been effected in the trials of succeeding seasons, after the receipt of instructions from the Statistician to the Indian Council of Agricultural Research.

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. The summary of results is given in Table XX.

TABLE XX.—*Cumbu—Yield trials—Main 1951—Hybrids of short duration—Group II.*

Field No.—1.	Replications—Six.
Previous crop—Cholam.	Layout—Randomized blocks.
Manure—Farmyard manure at 3 tons per acre.	Size of plot—
Date of sowing—14th September 1951.	Gross—12 × 50 links or 0.60 cent.
Date of harvest—12th December 1951.	Net—8 × 48 links or 0.364 cent.
Variants—Four.	

Particulars.	Variants.				Standard error.	Whether the differences are significant or not. P = 0.05.	Critical difference.
	Co. 3 Stand- ard.	H. 854	H. 850	H. 853			
Grain—							
Yield in lb. per acre ..	583	647	549	538	21.3	Yes.	62.5.
Yield as a percentage of standard.	100.0	111.2	94.2	91.9	3.6	Yes.	10.7
Straw—							
Yield in lb. per acre ..	1,661	1,750	1,365	1,607	91.5	Yes.	276.0
Yield as a percentage of standard.	100.0	105.3	82.1	108.8	5.5	Yes.	16.6
Money value of grain and straw as a percentage of the standard.	100.0	105.7	86.5	90.1	3.7	Yes.	11.1
Duration in days ..	78	77	75	75	..	..	..
Conclusion—							
Grain—H. 854	Co. 3	H. 850	H. 853.				
Straw—H. 853	H. 854	Co. 3	H. 850.				
Money value—H. 854	Co. 3	H. 853	H. 850.				

NOTE.—The produce has been valued at grain 1½ As. per lb. and straw 160 lb. per rupee.

Hybrid 854 (P.T. 834/2 *Bajri* Bombay × P.T. 827/2 *Kottapudi 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. The results are presented in Table XXI.

TABLE XXI.—*Cumbu—Yield trials—Main, 1951—Hybrids of short duration Group I.*

Field No. 1.	Replications—Six.							
Previous crop—Cholam.	Layout—Randomized blocks.							
Manure—Farm yard manure at 3 tons per acre.	Size of plot—							
Date of sowing—14th September 1951.	Gross—12 × 50 links or 0.6 cent.							
Date of harvest—10th December 1951.	Net—8 × 48 links or 0.384 cent.							
Variants—Five.								
Particulars.	Variants.					Standard error.	Whether the differences are significant or not P = 0.05.	Critical difference.
	Co. 3 Standard.	H. 857	H. 874	H. 863	H. 865			
Grain—								
Yield in lb. per acre.	659	726	646	609	509	27	Yes.	80.0
Yield as a percentage of standard.	100.0	108.5	96.6	91.0	76.1	4.1	Yes.	12.0
Straw—								
Yield in lb. per acre.	1,414	1,693	1,245	1,161	1,083	74	Yes.	218.0
Yield as a percentage of standard.	100.0	119.7	88.0	82.1	76.6	5.2	Yes.	13.4
Money value of grain and straw as a percentage of the standard.	100.0	110.8	95.8	90.9	72.6	6.2	Yes.	18.3
Duration in days.	78	77	75	77	73	..	..	..
Conclusion—								
Grain—H. 857	Co. 3	H. 874	H. 863	H. 865.				
Straw—H. 857	Co. 3	H. 874	H. 863	H. 865.				
Money value—H. 857	Co. 3	H. 874	H. 863	H. 865.				

NOTE.—The produce has been valued at—Grain at 1½ annas per lb. and straw at 160 lb. per rupee.

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 condition. 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 of the hybrids of medium duration and standard Co. 1. The summary of results is given in Table XXII.

TABLE XXII.—Cumbu—Yield trials—Main, 1951—Hybrids of Medium duration.

Field No.—1.	Variants.—Six.						Whether differences are significant or not P=0.05.	Critical difference.
Previous crop—Cholam.	Replications—Six.							
Manure—Farm yard manure at 3 tons per acre.	Layout—Randomized blocks.							
Date of sowing—15th September 1951.	Size of plot—							
Date of harvest—16th December 1951.	Gross—12 × 50 links 0.60 cent. Net—8 × 48 links 0.384 cent.							
Particulars.	Variants.						Stan- dard error.	
	Co. 1. standard.	H. 837.	H. 843.	H. 846.	H. 835.	H. 840.		
Grain—								
Yield in lb. per acre.	451	766	656	641	641	599	29	Yes. 86.0
Yield as a per- centage of the standard.	100.0	169.0	145.7	145.7	142.2	132.9	6.4	Yes. 19.1
Straw—								
Yield in lb. per acre.	1,539	2,279	1,562	1,453	1,669	1,656	79.2	Yes. 231.6
Yield as a per- centage of the standard.	100.0	148.1	100.8	94.4	103.5	107.6	6.11	Yes. 15.1
Money value of grain and straw as a percentage of the standard.	100.0	170.8	139.1	135.1	137.3	129.4	7.5	Yes. 21.7
Conclusion—								
Grain—H. 837,	<u>H. 843,</u>	<u>H. 846,</u>	<u>H. 835,</u>	<u>H. 840,</u>	Co. 1,			
Straw—H. 837,	<u>H. 835,</u>	<u>H. 840,</u>	<u>H. 843,</u>	Co. 1,		<u>H. 846,</u>		
Money value—H. 837,	<u>H. 843,</u>	<u>H. 835,</u>	<u>H. 846,</u>	<u>H. 840,</u>		Co. 1,		
NOTE.—The produce has been valued at grain at 1 anna per lb. and straw at 160 lb. per rupee.								

Index to selections.

P.T. 860 Local sajja, Hospet, Bellary.
 P.T. 856 Local sajja, Hospet, Bellary.
 P.T. 857 Local sajja, Hospet, Bellary.
 P.T. 859 Local sajja, Hospet, Bellary.
 P.T. 854 Local sajja, Kalyandurg, Anantapur.
 P.T. 858 Local sajja, Chittimathur, Hindupur, Anantapur.
 P.T. 869 Local sajja, Madanapalle, Chittoor.
 P.T. 882 Local sajja, Rapur, Nellore.

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 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.

71. (7) *Testing of hybrids in the fields of the cultivators in the districts.*—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 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 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 case of X. 1 and 47 per cent in respect of X. 2. In the taluks 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 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. 159, P.T. 853 and T.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 both 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 district officers for conducting further trials.

72. (8) *Multiplication of parents, hybrids and other strains.*—A quantity of 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 indent 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 form.	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
P.T. 348	350	..	350
P.T. 350	175	..	175
P.T. 411	328	..	328
P.T. 422	3,360	..	3,360
P.T. 833	274	119	393
P.T. 836	2,357	48	2,405
Miscellaneous	224	..	224
Total	35,071	630	35,701

The total quantity of seed 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.

SECTION IV.—SCHEME FOR THE CONTROL OF STRIGA ON SORGHUM IN THE MADRAS STATE (INDIAN COUNCIL OF AGRICULTURAL RESEARCH SCHEME).

73. *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).

74. (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 under ground as a complete parasite on sorghum roots. The damage done to the crop is greater when it is still under ground 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 Coimbatore summer 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.

75. (b) *Control of striga by the evolution of resistant strains*.—Selections collected from ryots holdings, as apparently resistant to striga in heavily infested 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 studies. 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-2 of crosses with Co. 1, Co. 2 and Co. 3 with A.S. 4003 were sown for testing for 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 F-1s.

AGRICULTURAL COLLEGE RESEARCH INSTITUTE,
LAWLEY ROAD POST,
24th August 1951.

P. KRISHNA RAO,
Millet Specialist.

APPENDIX I.

MILLET BREEDING STATION, COIMBATORE.

The opening of the Millet section was sanctioned in G.O. No. 612, dated 1st May 1923. Lands to the extent of 57.52 acres were acquired contiguous to the Cotton Breeding Station at Coimbatore in 1923. Field laboratories, farm office and store, cattle and implement sheds, irrigation channels and a few quarters for the staff were built at the station. These and roads and bunds occupy about 6.61 acres. The total cultivated area is 50.91 acres. The Millet Section was started with the object of improving the millets of this State by selection, introduction and hybridization. The primary aim was to evolve strains of millets which give higher yield of grain and straw than the local types. Better quality of grain and straw, resistance to pests, diseases and parasites, etc., were also aimed at in the selection and breeding work. The following eight millets were taken up for work at the station,

Common name.	Botanical name.	Tamil.	Telugu.	Hindustani.
1 Sorghum	<i>Sorghum</i> species.	Cholam	Jonna	Jowar.
2 Pearl millet	<i>Pennisetum typhoides</i> , S. and H.	Cumbu	Sajja	Bajra.
3 Finger millet	<i>Eleusine coracana</i> , Gaertn.	Ragi	Ragulu	Ragi.
4 Fox-tail millet	<i>Setaria italica</i> , Beauv.	Tenai	Korralu	Kangoone.
5 Kodo millet	<i>Paspalum scrobiculatum</i> , L.	Varagu	Arikalu	Kodra.
6 Little millet	<i>Panicum miliare</i> Lam.	Samai	Samalu	Shavan.
7 Common millet	<i>Panicum miliaceum</i> , L.	Panivaragu.	Varigalu	Barri.
8 Barnyard millet	<i>Echinochloa frumentacea</i> , Link.	Kudiraivali.	Oodalu	Sanwak.

Fundamental research for the understanding of these crops as individuals, and as populations was carried on at the station. Selection and cross breeding are in progress. With the help of the knowledge gained here, work on the improvement of local varieties of economic importance is being carried out by Assistants trained in Millet Breeding and posted at the Agricultural Research Stations at Hagari, Nandyal, Guntur, Anakapalle, Palur, Koilpatti and Siruguppa. Assistants trained at Millet Breeding Stations, are also in charge of the Regional Millet Stations opened at Ariyalur, Tirupattur, Ongole and Narasapattanam.

APPENDIX II.

STATEMENT OF RECEIPTS, TRANSFER AND SALES OF SEEDS DURING FASLI 1361 (1ST JULY 1951 TO 30TH JUNE 1952).

Serial number and name of seed.	Receipts purchased direct from ryots.	Farm produce brought into stock including produce from Central Farm.	Total receipts.	Issues.				
				Free transfers				
				To officers of the department.	Cost.			
(1)	(2)	(3)	(4)	(5)	(6)			
	LB.	LB. OZ.	LB. OZ.	LB. OZ.	RS. A. P.			
1 Cholan ..	..	48,934 15	48,934 15	26,934 6	3,656 5 5			
2 Cumbu ..	36,357	8,321 0	44,678 0	24,767 0	3,204 9 9			
3 Ragi ..	..	17,822 14	17,822 14	6,584 14	770 8 0			
4 Tenai ..	..	8,427 0	8,427 0	737 0	97 13 9			
5 Minor millets.	..	1,574 8	1,574 8	734 4	82 4 6			
6 Maize ..	..	670 0	670 0	500 0	78 2 0			
7 Vegetables ..	..	13 10	13 10	13 10	26 0 0			
8 Chillies ..	..	0 ½	0 ½	..	..			
9 Green manure.	..	479 10	479 10	231 6	68 2 9			
10 Pappaiya ..	..	0 2	0 2	0 2	0 8 0			
11 Cotton seed ..	..	3 0	..	3 0	..			

Issues—cont.

	Direct sales.		Transfer outside the State.				Total.			
	Quantity sold in		Quantity in		Quantity in		Quantity in		Quantity in	
	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	LB.	RS. A. P.	LB. OZ.	RS. A. P.	LB. OZ.	RS. A. P.	LB. OZ.	RS. A. P.	LB. OZ.	RS. A. P.
1 Cholan ..	10,174	1,320 4 9	127 1 16	1 11	37,235 7	4,892 12 1				
2 Cumbu ..	10,893	1,385 6 0	41 0 5	2 3	35,701 0	4,591 2 0				
3 Ragi ..	5,987	679 15 3	19 4 2	2 4	12,591 2	1,452 9 7				
4 Tenai ..	3,071	388 10 9	38 0 4	3 6	3,846 0	490 12 0				
5 Minor millets.	148	16 12 9	2 0 0	5 0	684 4	99 4 9				
6 Maize ..	22	3 7 0	..	..	522 0	81 9 0				
7 Vegetables ..	..	..	..	..	13 0	26 0 0				
8 Chillies ..	..	..	0 ½	..	0 ½	..				
9 Green manure.	7	1 12 0	..	..	238 6	69 14 9				
10 Pappaiya ..	..	..	..	..	0 2	0 8 0				
11 Cotton seed ..	..	..	..	..	3 0	..				

APPENDIX III.

STATEMENT OF RECEIPTS AND EXPENDITURE FOR THE YEAR ENDING 30TH JUNE 1952 (FASLI 1361).

Receipts.

		RS.	A.	P.
By sale of farm produce and miscellaneous	.. ..	4,865	5	5
Cumbu scheme	.. ..	5,103	5	3

Expenditure.

Budget head.	40. G. Agriculture.		Scheme for opening new sub-stations 40. G. Agriculture Y. Y. Y. Scheme.	Grand total.
	Main.	Hybrid cumbu scheme.		
	(2)	(3)	(4)	(5)
(1)	RS.	RS.	RS.	RS.
1. Pay of officers	5,762	3,656	2,807	12,225
2. Pay of establishment	24,109	9,877	19,336	53,322
Dearness allowance	8,666	4,214	7,251	20,131
3. Travelling allowance	1,904	2,518	1,242	5,664
Compensatory, House-rent allowance.	2,589	1,000	787	4,376
4. Apparatus and Materials and Capital Outlay—				
Apparatus and materials ..	214	759	..	973
Dead stock	1,141	92	..	1,233
5. Working expenses—				
Repairs and upkeep	1,302	..	..	1,302
Maintenance of cattle	2,049	..	..	2,049
Cooli labour	10,122	..	..	10,122
Miscellaneous cultivation expenses.	2,783	..	..	2,783
Other miscellaneous charges ..	1,012	10,023	..	11,035
Dearness allowance to menials.	2,517	..	..	2,517
6. Other contingencies	1,668	322	921	2,911
7. Petty construction and repairs ..	370	..	500	870
Other charges—				
Lease amount	..	..	5,610	5,610
Rent for buildings	..	..	1,748	1,748
Livestock and deadstock	..	..	699	699
Apparatus and materials	..	..	919	919
Working expenses	..	..	11,269	11,269
Total ..	66,208	32,461	53,089	1,51,758

APPENDIX IV.

STATEMENT SHOWING THE COST OF CULTIVATION OF BULK CROPS—MILLET BREEDING STATION, COIMBATORE AND REGIONAL MILLET STATIONS, ONGOLE, AND TIRUPPATTUR (NORTH ARCOT DISTRICT).

Stations.	Millet Breeding Station, Coimbatore.		Regional Millet Stations.	
	Cumbu (Co. 2)	Tenal (Co. 1 and Co. 3)	Ongole. Jonna (G1 and G2)	Tirupattur (N. Arcot). Cholam (Co. 3)
Bulk crops.				
Area raised.	5.10 acres.	7.28 acres.	4.83 acres.	2.80 acres.
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
Cost of cultivation per acre—				
1 Preparatory cultivation	15 12 5	11 12 4	32 4 10	5 3 11
2 Manures and Manuring	..	..	49 7 6	13 13 5
3 Seeds and sowing	4 5 7	4 3 2	6 1 8	5 8 2
4 After cultivation	14 4 2	8 7 5	1 8 11	2 9 3
5 Harvesting, threshing and cleaning.	15 11 8	8 15 1	31 15 9	9 11 0
6 Supervision charge of one Fieldman.	5 8 0	3 14 0	5 8 0	8 5 4
Total ..	55 9 10	37 4 0	126 14 8	45 3 1
Produce—				
Yield per acre—				
	Yield in lb.	Value. RS. A. P.	Yield in lb.	Value. RS. A. P.
Grain ..	315	59 1 0	543	74 3 2
Straw ..	1,058	14 2 9	1,225	16 6 9
Value of produce per acre.	73 3 9	90 9 11	173 15 5	74 10 0
Less expenditure per acre.	55 9 10	37 4 0	126 14 8	45 3 1
Profit per acre ..	17 9 11	53 5 11	47 0 9	29 6 11

NOTE—(1) Produce valued at Grain (per lb.) 3 As. 2½ As. 3 As. 3 As.
Straw Rs. 30 per ton auctioned per 160 lb. per Rupee.

- (2) (a) The cholam crop Co. 1 was a failure due to want of rains in August-September 1951.
(b) The entire area of 9.95 acres was devoted to experiments at the Regional Millet Station, Ariyalur and no field was devoted to the raising of bulk crops.
(c) The crop of Ganti and Ragi at the Regional Millet Station, Narasapatnam, failed due to want of rains at the proper time.

APPENDIX V.

STEPS TAKEN TO STEP UP THE REVENUE OF THE STATION.

Millet Breeding Station, Coimbatore—

(1) *Improvement of irrigation facilities.*—There are two wells at the station which have gone dry. The source of irrigation at present is a bore-well put up near the west well in 1949. Proposals have been submitted to the Director of Agriculture, Madras, for putting up another bore-well near the east well which is now dry to enable more area being brought under irrigation.

(2) *Raising of live fence.*—Seedlings of *Gliricidia maculata* have been planted along the boundary of the farm to secure seeds. Seeds of *Sesbania speciosa* were sown along irrigation channels for seed production and 100 lb. of seed were collected. There is an existing also fence on the boundary of the farm which is reinforced by barbed wire.

(3) *Adjusting cropping programme to reduce the fallow period.*—Green manure crops of sunnhemp and cowpea were raised between two crops of millets in the area under irrigation. The green manure crop follows either cumbu or ragi or cholam and is ploughed in at the flowering stage. An yield of 10,000 to 15,000 lb. of green manure per acre is obtained. This kind of green manuring reduces the manure bill to a certain extent as the quantity of cattle manure which otherwise will have to be applied is reduced.

Regional Millet Stations.—

(1) *Improvement of irrigation facilities.*—All the four Regional Millet stations, Narasapatnam, Ongole, Ariyalur and Tirupattur, are temporary ones which are being run on leased lands since 1949. Under the circumstances, it is not possible to dig wells and improve the irrigation facilities on these stations.

(2) *Raising of live fence.*—Seedlings of *Gliricidia maculata* were planted along the boundary of the farm at Narasapatnam. Suckers of Agave were planted along the limits of the farm at Tirupattur. Seeds of *Prosopis juliflora* were also sown. Seedlings of *Sesbania speciosa* were planted in all the available spaces at Regional Millet Station, Narasapatnam, for seed multiplication.

(3) *Adjusting cropping programme to reduce fallow period.*—No area is kept fallow at the Regional Millet Station, Narasapatnam, while two crops are raised in the dry lands, three crops are raised in the area under irrigation. Pillipesara and Bengalgram were tried in the fallow period at the Regional Millet Station, Ariyalur, but the crops gave poor yield due to the failure of north-east monsoon. At the Regional Millet Station, Tirupattur, horsegram, was tried as a catch crop between two main crops.

**ANNUAL REPORT OF THE COTTON BREEDING STATION, COIMBATORE,
FOR THE YEAR ENDING 30TH JUNE 1952 (FASLI 1361).**

1. *Season.*—The season during the year under report was droughty for the fifth year in succession. The total rainfall for the year (7th June 1951 to 6th June 1952) was 17.06 inches spread over 36 rainy days, as against 24.47 inches and 25.11 inches being averages for the past 10 and 29 years, respectively, at the Cotton Breeding station. The rainfall for the year was therefore only 70 per cent of the normal with a deficit of 7.41 inches. The deficit though particularly accentuated, in total precipitation and in its distribution during the north-east monsoon and hot weather periods, the south-west monsoon also was defective. The distribution of rainfall was favourable from September to the end of November. This was helpful for the normal growth of all the Rabi (Kharif) crops in the early vegetative phase. Continuous acute droughty condition that prevailed during the next seven months, excepting for a precipitation of 1.34 inches during last week of February, adversely influenced the reproductive phase of both rainfed and irrigated cotton crops and was responsible for the below average acre yields that were obtained. The droughty season was however helpful to isolate varieties of cotton suited for adverse seasonal conditions. The weekly rainfall statement of the Cotton Breeding station is furnished in Table I.

TABLE I.—Rainfall statement for the year 1951-52.

Month.	Week.	1951-52.		1950-51.		Average for the past			
						Ten years.		29 years.	
		Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
South-west monsoon.									
June	7-13	0.45	2	..	..	0.19	0.7	0.43	1.0
	14-20	..	..	..	..	0.16	0.9	0.33	1.4
	21-27	..	..	0.38	1	0.26	0.7	0.21	0.9
June-July .. .	28-4	..	..	..	..	0.26	1.0	0.32	1.4
	5-11	0.08	..	0.34	2	0.41	1.0	0.44	1.7
	12-18	0.04	..	0.17	1	0.53	1.4	0.60	1.4
	19-25	1.59	4	0.96	3	0.50	1.3	0.49	1.4
July-August .. .	26-1	0.02	..	0.93	3	0.29	0.7	0.28	1.0
	2-8	..	..	0.33	1	0.27	0.7	0.37	1.1
	9-15	..	..	0.01	..	0.20	0.8	0.33	1.2
	16-22	..	..	2.20	4	0.47	0.9	0.40	1.2
	23-29	0.14	1	0.02	..	0.19	0.8	0.23	0.8
August-September .. .	30-5	..	..	0.04	..	0.40	0.1	0.17	0.5
	6-12	..	..	0.11	1	0.12	0.3	0.27	0.9
	13-19	1.325	4	..	..	0.38	0.8	0.30	0.8
	20-26	0.91	3	0.95	1	0.39	0.8	0.59	1.2
	Total ..	4.555	14	6.44	17	5.12	12.9	5.76	18.3
North-east monsoon.									
September-October .. .	27-3	0.24	2	3.93	4	1.10	1.6	0.88	1.8
	4-10	2.07	1	0.15	1	1.01	2.0	0.89	1.9
	11-17	0.41	1	1.30	2	1.98	2.9	1.40	2.8
	18-24	1.24	2	1.12	2	1.60	2.5	1.43	2.7
	25-31	0.05	..	..	..	1.50	1.6	1.88	2.6

Month.	Week.	Average for the past.							
		1951-52.		1950-51.		Ten years.		20 years.	
		Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
North-east monsoon—cont.									
November	1—7	2.25	3	0.03	..	1.26	1.6	1.99	3.1
	8—14	2.20	4	1.62	3	1.08	2.6	1.45	2.7
	15—21	0.98	3	1.40	1	0.96	1.6	0.86	1.6
	22—28	0.02	..	..	..	0.69	1.0	0.42	0.9
November-December	29—5	0.87	1	..	..	0.57	1.0	0.57	1.3
	6—12	..	..	..	..	0.46	0.9	0.63	1.1
	13—19	..	..	0.03	..	0.40	0.6	0.27	0.6
	20—26	..	..	..	..	0.22	0.4	0.13	0.4
December-January	27—3	0.06	..	..	..	0.07	0.1	0.09	0.3
	4—10	..	..	..	..	0.38	0.5	0.21	0.5
	11—17	..	..	..	..	0.01	..	0.07	0.1
	18—24	..	..	..	..	0.18	0.2	0.06	0.1
	25—31	..	..	..	..	0.04	0.1	0.15	0.3
Total ..		10.48	17	9.58	13	14.29	21.2	13.38	24.8
Hot weather.									
February	1—7	..	..	..	..	..	..	0.04	0.2
	8—14	..	..	..	..	0.08	0.2	0.12	0.2
	15—21	0.04	..	..	..	0.10	0.1	0.04	0.1
	22—28/29	1.34	3	..	..	0.22	0.6	0.16	0.2
March	1—7	..	..	..	..	0.14	0.3	0.05	0.1
	8—14	..	..	..	..	0.04	0.1	0.05	0.1
	15—21	0.49	1	..	..	0.15	0.2	0.30	0.4
	22—28	..	..	0.08	..	0.10	0.4	0.12	0.3
March-April	29—4	..	..	0.63	2	0.26	0.7	0.40	0.9
	5—11	0.14	1	0.46	1	0.54	1.4	0.53	1.3
	12—18	..	..	1.62	3	0.77	1.0	0.64	1.2
	19—25	..	..	..	..	0.39	0.8	0.45	0.9
April-May	26—2	..	..	0.05	..	0.58	1.0	0.58	1.2
	3—9	..	..	0.11	1	0.31	1.0	0.57	1.6
	10—16	..	..	0.16	1	0.30	0.8	0.54	1.1
	17—23	..	..	0.34	1	0.37	0.7	0.63	1.3
May-June	24—30	..	..	0.68	2	0.51	0.8	0.42	0.9
	31—6	0.01	..	0.42	1	0.20	0.6	0.33	0.9
Total ..		2.02	5	4.55	12	5.06	10.7	5.97	12.9
Grand total ..		17.06	36	20.57	42	24.47	44.8	25.11	56.0

The water-supply in the two wells at the Cotton Breeding station deteriorated further, to very unsatisfactory levels, necessitating curtailment of area under irrigated crop of Cambodia in winter and Chittarai cholam in summer. Further, no green manure crops could be sown during summer to augment the supply of organic manure. Rainfed cotton, pulses and fodder crops were sown at the proper time. But the sowing of irrigated cotton was prolonged. The yields of rainfed cotton in red and black soils were respectively 50 and 75 per cent of the normal. The yield of Cambodia cotton under irrigation was below normal, due to the combined effects of inadequate and irregular irrigation, and total absence of rainfall during the boll development phase. Black-arm attack was severe in the early sown

Cambodia cotton and unirrigated desi cotton in the red soil due to continuous wet and cloudy weather in the month of November. The yield of rainfed Periamanjai cholam sown for fodder was fairly normal except in fields infested with *Striga*. Horsegram, as a rainfed crop in red soil, in the early stages put forth rank vegetative growth, but later pod setting was poor. The grain yield of Bengalgram in black soil was below normal. Though the crop was attacked by *Laphygma species* during the second week of its growth, the immediate control measures taken, checked the spread and the extent of damage by the pest. During the summer of 1952 nearly normal yields were obtained in Chittarai cholam, in spite of the precarious water-supply in the wells.

2. *Cotton breeding.*—The items of research pertained to problems of improvement of quantity and quality, building up resistance to pests, diseases and adverse seasonal conditions. The scope of breeding was continued to be enlarged by collection of types from extra Indian sources, by hybridization involving geographical races of different species including wild cottons, by improved field and laboratory technique, by a study of laws of inheritance governing selective attributes and by the conduct of co-ordinated regional yield trials to assess the adaptability levels, to varied environments, of tested and purified selections. The problem of breeding for resistance to *jassid* and *black-arm* attack continued to engage serious attention.

3. *Unification of Cambodia area.*—Strain M.U. 1 has been declared suitable not only for growing in the summer season under irrigation but also as a rainfed and irrigated crop in the winter season in the districts of Coimbatore, Salem and Tiruchirappalli. During the year 1951-52, four new strains of Cambodia were arranged to be tested against M.U. 1 in 20 localities in the districts of Coimbatore and Tiruchirappalli, representing irrigated and rainfed conditions, early and late sown areas. Only 15 trials were declared fit for harvest and the results are furnished in Table II. It is seen that there is no significant difference between the yields, halo lengths or ginning percentages of the different strains, in each of the three different environments representing different farming conditions obtained in the Coimbatore and Tiruchirappalli districts. From the data in Table II it is seen that the yield levels vary in the different zones the late sown Avanashi tract recording the highest yields, closely followed by the early sown Coimbatore zone, while the yield level in Manaparai taluk is relatively low. In the mean halo length the early sown tends to record higher values compared to the late sown. The variation in ginning percentage due to varied environments is of a low order.

TABLE II.—*Cambodia strains—Scattered block trials—1951-52 (Winter sown).*
(Summary of results.)

Cultures.	Irrigated trials.										Rainfed trials.										General mean.			
	Coimbatore district.					Tiruchirappalli district.					Manaparal taluk.					Late sown.								
	Coimbatore taluk.		Early sown.		Avanashi taluk.	Late sown.		Coimbatore district.		Manaparal taluk.	Late sown irrigated.		Manaparal taluk.		Late sown.		(Number of trials 16.)							
	(a)	(b)	(c)	(d)		(a)	(b)	(c)	(d)		(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
0734 ..	1,181	81	27	35	1,340	102	26	35	1,260	91	27	35	1,128	92	26	34	606	125	26	35	1,066	96	26	35
0811 ..	1,312	90	23	36	1,279	98	27	36	1,296	94	27	36	1,123	92	28	36	573	116	24	35	1,103	99	27	35
9030 ..	1,352	92	28	36	1,366	105	26	35	1,359	99	27	36	1,068	88	27	36	438	92	24	35	1,054	95	26	35
9995 ..	1,408	97	28	35	1,302	99	25	35	1,355	99	27	35	1,212	100	25	35	490	100	25	36	1,113	100	26	36
MU 1 (Control)	1,456	100	27	35	1,305	100	25	35	1,380	100	26	35	1,133	..	27	35	524	..	25	35	1,084	..	26	35
General mean.	1,342	..	28	35	1,318	..	26	35	1,350	..	27	35	1,133	..	27	35	524	..	25	35	1,084	..	26	35
Whether 'Z' test is satisfied.	No.	..	No.	No.	No.	..	No.	No.	No.	..	No.	No.	No.	..	No.	No.	No.	..	No.	No.	No.	..	No.	No.
Standard error mean per cent.	3.15	..	3.96	2.58	4.56	..	9.60	0.63	2.80	..	2.10	1.20	3.93	..	1.51	1.26	5.6	..	0.86	0.83	3.70	..	1.5	0.63

(a) Mean yield of kapas in lb./acre.
(b) Percentage over control.
(c) Mean halo length in m.m.
(d) Ginning percentage.

(a) Mean yield of kapes in lb./acre.
(b) Percentage over control.

(c) Mean halo length in m.m.
(d) Ginning percentage.

4. *Irrigated cambodia.*—The existing farming systems in the Cambodia area are diverse. Cambodia cotton under irrigation is planted both as winter and summer crops in Madras. So far, the work on winter Cambodia has been carried on at Coimbatore which represents the early planted region, while the major area would fall under the late-planted category. It was therefore thought that it would be more appropriate to obtain advance information about the behaviour of several new cultures isolated at Coimbatore by growing them in the different sub-zones. Concurrent trials were therefore laid out during the year at Avanashi (late planted zone) and Tiruchengode (droughty area) in addition to Coimbatore, which represented the main sub-zones of irrigated winter Cambodia in Madras.

Hybrid cultures of advanced generation built up at the Cotton Breeding Station, Coimbatore, where conditions represent the early September planting practice, were tested at Avanashi and Tiruchengode which represent the late October sown areas. Comparisons were made with strain M.U. 1 which has now been recommended to replace the long established Cambodia 2 variety.

Eighteen cultures were tested in the co-ordinated trials at Coimbatore, Avanashi and Tiruchengode. Of these, nine were under trial for the third year. The summary of the results is furnished in Table III. The yield levels were low at Coimbatore due to the combined effect of inadequate irrigation and lack of rainfall in the later stages of the crop. Six cultures namely, 0734, 0744, 9030, 0811, 0752 and 8893 have given significantly better yields than control at Tiruchengode. Of these, all except 0734 were significantly poorer at Avanashi, while at Coimbatore 0811 was poorer than M.U. 1. Reviewed against the background of previous performance, 0734, 9995 and 9030 were found to be consistent in yield throughout the range of conditions sampled, viz. (3 seasons X 3 centres). Nine thousand and thirty in addition had recorded significantly better halo length and ginning percentage than M.U. 1. 0734 has recorded a higher spinning value than M.U. 1. It has also proved itself, in the scattered block trials to be adaptable to unirrigated conditions in Tiruchirappalli district.

TABLE III.—*Co-ordinated yield trials of promising cultures.*

	Cotton Breeding Station		
	Coimbatore.	Avanashi.	Tiruchengode.
1 Year	1951-52.	1951-52.	1951-52.
2 Location	Coimbatore.	Avanashi.	Tiruchengode.
3 Name of the experiment.	Co-ordinated yields trials.	..	..
4 Object of the experiment.	Varietal test.	..	..
5 System of layout ..	Randomized plots replicated four times.	..	..
6 Area of each plot ..	0.38 cents.	0.19 cents.	0.19 cents.
7 Date of planting ..	30th August 1951.	30th September 1951.	5th October 1951.
8 Period of harvest ..	January—March.	February—April.	February—April.
9 Number of irrigations ..	Five.	Ten.	Twelve.
10 Manure applied—kind and rate.	60 lb. of N. per acre in the form of Ammonium sulphate in two doses.	..	..
11 Previous crop	Horsegram.	Gingelly and sorghum.	Paddy.
12 Rainfall during growth period.	12.50".	12.46".	4.36".
13 Pests and diseases ..	Jassid, boll-worm and black-arm.	Jassid, boll-worm and black-arm.	Jassid and boll-worm.

Yield of seed cotton in lb.										
Serial number and culture number.			Coimbatore.		Tiruchengode.		Avanashi.		Mean halo length in m.m.	Mean ginning percentage.
			Adjusted yield per acre.	Percentage on control.	Crude yield per acre.	Percentage on control.	Adjusted yield per acre.	Percentage on control.		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		
1 0734	508	79	1,827	112	1,685	86	24.8	32.8		
2 9995	512	79	1,782	109	1,708	87	24.8	32.8		
3 0744	537	83	1,871	114	1,630	83	28.0	33.0		
4 9030	528	81	1,815	111	1,818	93	27.0	35.0		
5 8850	537	83	1,628	99	1,533	78	27.0	32.8		
6 0811	430	66	1,873	115	1,610	82	29.0	35.5		
7 9708	541	85	1,764	108	1,844	94	25.8	30.5		
8 019	498	78	1,652	101	1,390	71	25.5	33.0		
9 068	409	64	1,510	92	1,241	63	25.5	32.0		
10 0872	673	105	1,729	106	1,879	96	25.0	33.0		
11 0796	636	99	1,654	101	1,779	91	25.8	32.3		
12 0752	603	94	1,855	113	1,513	77	27.0	31.8		
13 0831	702	109	1,597	97	1,600	82	24.5	32.8		
14 01197	603	94	1,776	109	1,448	74	28.0	33.0		
15 8893-2/4	599	94	1,914	117	1,597	82	27.8	32.8		
16 X-82	545	85	1,788	109	1,623	83	26.0	31.3		
17 01216	673	105	1,646	101	1,607	82	24.3	33.5		
18 01102	611	95	1,587	97	1,630	83	23.8	34.5		
19 7682	636	99	1,701	104	1,531	81	29.0	33.0		
20 Cambodia-2	355	55	1,538	94	1,435	73	22.5	30.8		
21 Madras Uganda-1	644	100	1,640	100	1,957	100	24.8	33.0		
Whether 'Z' test is satisfied.	Yes.	..	Yes.	..	Yes.	..	Yes.	Yes		
Critical difference	149	..	178	..	303	..	0.7	6.8		
Standard error mean per cent.	..	..	..	..	..	..	1.0	0.9		
Mean percentage	94	87.2	3.6	105.2	7.0	82.9				

Conclusions—

(2) 13, 10, 17, 21, 11, 19, 18, 15, 12, 14, 10, 7, 5, 3, 4, 1, 2, 8, 6, 9, 20.

(4) 15, 6, 3, 12, 1, 4, 16, 2, 14, 7, 10, 19, 11, 8, 17, 21, 5, 13, 18, 20, 9.

(6) 21, 10, 7, 4, 11, 2, 1, 3, 18, 16, 6, 17, 13, 15, 19, 5, 12, 14, 20, 8, 9.

(8) 19, 3, 5, 8, 10, 7, 11, 12, 2, 14, 15, 16, 4, 6, 17, 9, 21, 18, 1, 13, 20.

(9) 6, 4, 18, 17, 14, 10, 8, 3, 19, 21, 1, 2, 5, 13, 15, 11, 9, 12, 16, 20, 7.

Another set of 15 long linted cultures were simultaneously tested for yield and purity in small bulk trials and family blocks, respectively, at Coimbatore. Amongst these, nine were equal to control in yield, two of which had better halo length and ginning percentage combination and 3 had improved halo length alone, compared to M.U. 1. The results are furnished in Table IV.

TABLE IV.—Summary of characters for cultures tested in family block and small bulk trials.

Year—1951-52.	Date of planting—4th September 1951.
Location—Cotton Breeding Station, Coimbatore.	Period of harvest—January to March.
Name of the experiment—Family block and small bulk trials.	Number of irrigations—Five.
Object of the experiment—Varietal tests.	Manure applied—Ammonium sulphate to give 60 lb. of N. per acre applied in two doses.
System of layout—Compact family block; split plot replicated four times; Small bulk trial—Randomized block 18 x 4.	Previous crop—Horsegram.
Area of each plot—0.38 cents.	Rainfall during growth period—12.56".
	Pests and diseases—Jassid, bollworm and blackarm.

Serial number and culture number	Yield of seed cotton in lb.				Family block.		Sib analysis for		
	Small bulk trial.		Compact family block.		Mean halo length in m.m.	Ginning percentage.	Yield.	Length.	Ginning.
	Yield per acre.	Percentage on control.	Yield per acre.	Percentage on control.					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1 8842-6	721	94	741	113	26.8	34.8	N	N	S
2 0777-14	678	87	578	88	26.5	34.0	N	S	N
3 8843-4	729	95	778	119	26.8	33.0	N	N	S
4 0777-8	667	86	618	94	27.3	32.8	N	S	S
5 8842-7	664	86	681	104	25.3	32.8	S	N	S
6 0958	647	84	627	95	26.3	32.8	N	N	N
7 01315-1	610	79	621	94	25.0	32.8	N	N	N
8 01451-4	880	112	763	116	24.0	33.8	N	N	N
9 036	678	87	545	83	23.8	32.8	N	N	N
10 0828-3	552	71	638	98	25.0	33.3	N	N	N
11 0775-1	535	76	523	80	29.5	31.0	N	S	S
12 01332-3	553	71	699	106	23.3	34.0	S	S	N
13 01328-2	567	73	708	108	22.3	35.3	N	N	S
14 0901-1	527	68	440	63	24.5	33.0	S	N	N
15 01333-6	434	56	476	73	22.8	31.0	N	N	S
16 7682	667	86	621	94	24.5	33.0	N	N	N
17 Cambodia-2	338	44	262	40	22.0	31.3	N	N	N
18 Madras Uganda-1	772	100	654	100	23.0	33.0	N	N	N
Significance by 'Z' test	Yes.	..	Yes.	..	Yes.	Yes.	..	..	..
Critical difference	166	..	139	..	0.8	0.9	..	..	..
Standard error mean per cent	..	9.5	..	9.2	1.1	1.0	..	..	..
Conclusions—	(1)	(2)	(3)	(4)	..	..	..	..	..

2, 8, 18, 3, 1, 2, 9, 4, 5, 16, 6, 7, 11, 13, 10, 12, 14, 15, 17.

4, 3, 8, 1, 13, 12, 5, 18, 10, 6, 4, 16, 7, 2, 9, 11, 15, 14, 17.

6, 11, 4, 1, 3, 2, 6, 5, 7, 10, 14, 16, 8, 9, 18, 12, 15, 13, 17.

8, 13, 1, 2, 12, 8, 10, 3, 14, 16, 18, 4, 5, 6, 7, 9, 17, 11, 15.

Reference to symbols—

N = Not significant.

S = Significant.

In addition 465 cultures were tested in replicated progeny rows. Eleven progenies were better than control in yield. Another eleven showed improvement in halo length and ginning percentage. Forty-two exhibited improvement in halo length or ginning percentage alone. Six sibs of 9485 were consistently longer in staple, the increase ranging from 4 to 5 millimetres over that of control.

Five hundred and sixty-seven single plants with desirable economic characters were selected from the second generation hybrids. In addition such of the first generation crosses that combined good halo-length and high ginning percentage were selected and harvested.

Central American upland types, studied for the second year, proved to be poor in vigour, short in staple, and low in ginning percentage and as such, they may not be directly useful for the improvement of Madras American cottons. Amongst the newly acquired collections two types from Barberton were found to be long linted, two from Rhodesia were early with profuse squaring and two from Shambat were highly resistant to blackarm. These have been utilized to synthesise fresh crosses for improving specific attributes in otherwise useful cultures.

Thirty cultures were sown under replicated progeny row trials. Based on field observation for morphological characters, vigour, earliness and productivity, seven alone were harvested and examined. Only one has recorded significantly better than control, yield, halo length and ginning percentage, while two others have shown combination for better yield and ginning percentage. The other four equal yielders have registered significantly better ginning percentage and halo length.

From the second generation hybrids studied, two hundred and sixteen single plants combining earliness and productivity were harvested and examined in the laboratory. A high percentage of the hybrids, Rozi X Nadam and 7112 B30 X Hexaploid, were observed to combine good halo length and high ginning percentage.

7. *Unirrigated Karunganni*.—Scattered block trials with cultures 5341, 7036, 7112 and K-5 were arranged in nine localities of Coimbatore district, in three localities of Madurai district and in one of Tiruchirappalli district. The trial in Tiruchirappalli district had to be abandoned. The trials at Manjanaickenpatti, Chathrapatty and Velur in Madurai district were irrigated. The results are furnished in Table VII. In Coimbatore district all the improved strains have recorded significantly better yields than standard strain K-5, 5341, leading the others. In halo length 5341 is significantly better than others, while 7112 is significantly better than others, in ginning percentage. In Madurai district differences were not significant for yield, halo length or ginning percentage.

TABLE VII.—*Karunganni strains Scattered Block Trials, 1951-52.*

Serial number and cultures.	Unirrigated.				Irrigated.							
	Coimbatore district.				Madurai district.				General Mean.			
	Number of trials-9.				Number of trials-3.				Number of trials-12.			
	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1 5341	348	129	24	32	517	118	23	32	390	121	24	32
2 7036	328	121	22	33	431	98	22	33	354	118	22	32
3 7112	318	118	23	35	429	98	23	34	346	110	23	34
4 K. 5 (Control)	270	100	23	32	440	100	22	33	313	100	23	32
Significance by 'Z' test	Yes.	..	Yes.	Yes.	No.	..	No.	No.	Yes.	..	Yes.	No.
Critical difference	33	..	0.9	1.0	..	..	..	..	45	..	0.9	..

Conclusions—

2.—1 2 3 4
4.—1 3 4 2
5.—3 2 1 4
10.—1 2 3 4
120.—1 3 4 2

Reference to symbols:

- (a) Mean of yield of kapas in lb. per acre. (c) Mean halo length in m.ms.
(b) Percentage on control (K. 5). (d) Ginning percentage.

In the breeding area at the Cotton Breeding station, the studies included the test of eight selections in bulk yield trials, twelve in small bulk trials, forty-six in replicated progeny rows, the study of five crosses in second generation and nine crosses in their first generation.

Results of bulk yield trials are furnished in Table VIII. Six cultures were tested against K-2 and K-5 the standard Karunganni strains and B. 32-48/51 an inter-racial early hybrid culture, isolated as suitable for red soil, but tested for the first time in black soil. All the cultures have recorded significant yield

increases ranging from 45 per cent to 60 per cent over control (K-5). This improvement, especially under adverse seasonal conditions for cotton, should be considered an achievement of great practical importance. The two derivatives of 7070, namely, 7070-2/51 and 7070-3/51, which were advanced to bulk yield trial this season only, have both recorded higher yields than K. 5. This requires to be confirmed by further trials. B. 32. 48/51 has exhibited its suitability to black soil conditions also. Five thousand three hundred and forty-one and B. 32-48/51 were observed to be early in flowering. In ginning outturn also, all the cultures are significantly and consistently better than control. The 6 per cent higher ginning of 7112 B 7/51 is a substantial additional improvement of economic value. The mean fibre length of 7070-2/51, 7070-3/51 and 5341 are superior to that of control. Five thousand three hundred and forty-one has maintained its fineness also. The spinning values of 5341, 7112 B. 7 and 7036 are considered equivalent to K. 5. In conclusion it may be said that 5341 has combined yield, length, ginning percentage, fineness, spinning value and an adaptability for adverse seasonal conditions and so is an improvement for all attributes. The results of scattered block trials during this year have also indicated its suitability to a variety of soil conditions in the Karunganni area. The trials would be repeated for confirmation.

TABLE VIII.—*Unirrigated Karunganni—Bulk Yield Trial.*

Year—1951-52.
Locality—Cotton Breeding Station.
Name of the experiment—Bulk yield trial.
Object—To test the yield.
Variants—Eight.
System of Layout—Randomized block.

Number of replications—Six.
Experimental area of each plot—0.344 cents.
Date of sowing—24th September 1951.
Period of picking—11th February 1952 to 14th April 1952.
Previous crop—Bengalgram.

Serial number and selection.	Yield of seed cotton.		Halo—length in m.ms.	Ginning percent.	Mean fibre length in inches.	Mean fibre weight per c.m. × 10-6 gm.
	In lb. per acre.	As percentage on control.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 7070-3/51	490	179	23	34	0.90	2.03
2 7112-B-7/51	436	160	21	35	0.85	2.19
3 B-32-48/51	431	158	21	34	0.85	2.18
4 5341/51	428	157	22	33	0.89	1.96
5 7036/51	396	145	21	33	0.87	2.20
6 7070-2/51	372	136	23	33	0.92	2.01
7 K. 2	370	133	21	32	0.87	2.01
8 K. 5	273	100	22	31	0.85	2.13
Significance by 'Z' test	Yes.	..	Yes.	Yes.	..	..
Critical difference (P=0.05)	80	..	0.7	1.0	..	..
Standard error mean percentage.	..	7.0	0.1	1.1	..	..

Conclusions—

Yield—1 2 3 4 5 6 7 8

Halo length—1 6 4 8 5 7 2 3

Ginning percentage—2 1 3 6 4 5 7 8

The twelve selections that were tested in small bulk trials consisted of seven cultures which required to be purified further for certain attributes, three desirable cultures that had a long pedigree associated with good performance and the two standard Karunganni strains K. 2 and K. 5. The results are furnished in Table IX. Seven thousand one hundred and twelve B2/51 is the only culture, barring 7036, 5341 and 7112 B. 7 that is found to be pure for yield, halo length

and ginning percentage and at the same time significantly better for yield in both small bulk trial and compact family block. This culture will be advanced to bulk yield trials, maintenance and multiplication plots.

TABLE IX.—*Unirrigated Karunganni—Comparative data for cultures under purity test and small bulk trial—1951-52.*

1 Year	Small bulk trials—1951-52.	Compact family block—1951-52.
2 Locality	Cotton Breeding Station, Coimbatore.	Cotton breeding station, Coimbatore.
3 Name of experiment	Small bulk trial.	Compact family block.
4 Object	To test the yields of different cultures.	To test the yield and purity of different cultures.
5 Variants	Twelve.	Twelve.
6 System of layout	Randomized block.	Restricted randomized block.
7 Number of replications	Four.	Eight.
8 Experimental area of each plot.	0.344 cent.	0.188 cent.
9 Date of sowing	24th September 1951.	24th September 1951.
10 Period of picking	11th February to 14th April 1952.	11th February to 14th April 1952.
11 Previous crop	Bengalgram.	Bengalgram.

Serial and culture number.	Yield of seed cotton.			Small bulk trial.		Compact family block.		Sib differences of			Mean length in inches.	Mean weight per 10-6 gm.	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	Yield.	Length.	Ginning.			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	
1 7112-B-2/51 ..	394	195	140	22	34	23	34	N	N	N	0.91	2.15	
2 7112-B-19/51..	380	188	120	23	35	23	34	N	N	S	0.89	2.15	
3 7109-1/51 ..	209	103	115	24	31	23	30	N	S	S	..	..	
4 7070-1/51 ..	205	101	88	20	33	21	32	S	S	N	..	..	
5 7070-25/51 ..	191	94	89	21	33	21	32	S	N	S	..	..	
6 1498/51 ..	102	51	112	22	30	22	30	N	N	S	..	..	
7 7036/51 ..	369	183	108	21	33	Not examined being pure cultures.						0.87	2.20
8 5341/51 ..	351	174	118	22	33							0.89	1.95
9 7112-B-7/51 ..	306	151	121	21	35							0.85	2.10
10 K. 2 ..	306	151	107	21	33							0.87	2.01
11 K. 5 (control) ..	202	100	100	21	31							0.85	2.13
12 7125/51 ..	135	67	39	24	32							..	..
Significance by 'Z' test.	Yes.		Yes.	Yes.	Yes.								
Critical difference .. (P=0.5).	107		24	0.8	1.1								
Standard error mean percent.	1.2		8.1	3.9	1.2								

Conclusions—

(a) 1 2 7 8 9 10 3 4 11 5 12 6.

(c) 1 9 2 8 3 6 7 10 11 5 4 12.

(d) 3 12 2 8 1 6 5 9 7 10 11 4.

(e) 2 1 9 8 5 4 7 10 12 3 11 6.

Reference to symbols:

(a) Small bulk trial—Yield of seed cotton in lb. per acre.

(b) Small bulk trial—Yield as percentage on control (K. 5).

(c) Compact family block—Yield as percentage on control (K. 5).

(d) Halo length in m.ms.

(e) Ginning percentage.

(f) Halo length in m.ms.

(g) Ginning percentage.

Among the cultures under progeny row trials, eleven cultures were selected for harvests after field examination for vigour, earliness and productivity. Four of them yielded significantly better than control. Two of these, in addition, have recorded significantly better halo length and ginning percentage than control. One has shown better halo length with equal ginning percentage and the other better ginning percentage with equal halo length. The other two have improved over control either in halo length or ginning percentage.

From a field examination of the second generation crosses of multiple hybrids, 512 single plants were harvested from five crosses. Laboratory examination indicated a large improvement in mean halo length while ginning percentage was either equal to or slightly better than control. All the five crosses have shown high selection value.

Five crosses in first generation (with K. 5 as one parent, 5341, 7112, 7125 and very early plants selected from a ryot's field at Tadpatri, as the other parent) were examined for economic characters. The crosses 7125 X K. 5 and 5351 X K. 5 have shown improvement in mean halo length and ginning percentage respectively. The Tadpatri crosses have not shown much improvement in either of the attributes but the progeny of one crossed boll showed remarkable earliness.

In addition, bulk yield trials with eleven cultures and small bulk trials with fifty-four cultures (which were tested at Koilpatti) were also sown at Coimbatore, duplicating the trials under the auspices of the Karunganni scheme, Koilpatti. In yield, ten cultures in bulk yield trials were equal to the standard strain K. 2 while all the eleven excelled K. 5 in yield and mean halo length and all excepting one in ginning percentage. Thus it is seen that all the Karunganni strains of Koilpatti are better than K. 5 for all the three attributes under Coimbatore conditions. Hence, it is proposed to include the best of the Koilpatti strains in scattered block trials with K. 2 and K. 5 as controls. Eight of these cultures had recorded significantly better ginning percentage and halo length than K. 2 while three were found to be better in halo length only. The results of the trials are presented in Table X. Culture 6186-9 was found to have given consistently good yields in the previous two years' trials also. Of the fifty-four cultures tested in small bulk trials in comparison with K. 2, nineteen had recorded significantly better yields, five of these had better halo length and ginning percentage, five had better halo length and nine had better ginning percentage alone. Of the equal yielders, eleven had combined better halo length and ginning percentage while six and eight were found to have recorded better halo length and ginning percentage respectively. Six cultures were significantly poorer in yield. Compared to K. 5 four were significantly better for yield, twenty-one for mean halo length and forty-seven for ginning percentage.

TABLE X.—*Bulk yield trials—Karunganni Scheme—1951-52—Coimbatore.*

1 Year	1951-52.
2 Locality	Cotton Breeding Station, Coimbatore.
3 Name of the experiment	Bulk yield trials.
4 Object	To test the yields of selections.
5 Variants	Set I—Four variants. Set II—Seven variants.
6 System of layout	Randomized replicated plots.
7 Number of replications	Set I—Six replications. Set II—Four replications.
8 Experimental area of each plot	Set I—1.66 cents. Set II—1.66 cents.
9 Date of sowing	24th September 1951.
10 Period of harvest	5th December 1951 to 1st April 1952.
11 Previous crop	Bengalgram (clear arctium).

Serial number and selection.	Yield of seed cotton in lb. per acre.	Percentage on control K. 5.	Halo length in m.m.	Ginning percent.	Mean fibre length in inches.	Mean fibre weight per inch $\times 10^{-6}$ gm.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Set I.</i>						
1 6374	313	114	23.5	33.2	0.91	2.02
2 6186-9.. ..	306	111	23.9	32.5	0.91	2.10
3 6188-8.. ..	301	109	24.2	32.8	0.91	2.10
4 63 12-4/B ..	217	79	24.0	31.5	0.92	1.89
5 K. 5	275	100	22.6	30.8	0.84	2.27
6 K. 2	310	113	21.8	31.7	0.85	2.25
Significance by 'Z' test.	Yes.		Yes.	Yes.		
Critical difference (P = 0.05).	54		0.9	0.8		
Standard error mean percentage.	..	6.5	1.4	2.6		

Conclusions—

Yield—1 6 2 3 5 4.
Halo length—3 4 2 1 5 6.
Ginning percentage—1 3 2 6 4 5.

<i>Set II.</i>						
1 7225	350	185	24.5	34.5	0.91	2.03
2 7200	292	154	24.3	35.0	0.91	1.90
3 7510	291	154	23.9	35.0	0.94	2.11
4 6434-4-B ..	289	153	23.5	34.8	0.93	2.09
5 7353	270	143	25.0	34.3	0.91	2.19
6 6383-1-A ..	263	139	23.3	35.0	..	..
7 6381-3-A ..	266	141	23.3	33.8	0.96	1.88
8 K. 5	189	100	21.5	31.5	..	..
9 K. 2	289	153	21.7	32.8	..	..
Significance by 'Z' test.	Yes.		Yes.	Yes.		
Critical difference (P = 0.05).	66.4		1.0	1.3		
Standard error mean percentage.	..	8.3	1.5	1.3		

Conclusions—

Yield—1 2 3 4 9 5 7 6 8.
Halo length—5 1 2 3 4 6 7 9 8.
Ginning percentage—6 2 3 4 1 5 7 9 8.

8. *Perennial cottons*.—Caramura a perennial cotton from Brazil obtained during the year 1950-51 was sown during 1951-52 and compared with Moco the standard perennial cotton recommended at present for backyard and hedge cultivation in the State. The new variety was observed to be profuse in squaring, very efficient in boll setting and promising in respect of yield and halo length though the fibres were less mature than those of Moco. In order to test its suitability and adaptability to different regions of the State, Moco and Caramura have been distributed to ten research stations for trial. The seeds were sown in September 1951 and results are not yet available. The study of other perennial types like Kaiyuann, Wenshan Moco 1 and Moco 2 and Moco-moderia branca is underway. Purification of Moco has been taken up since variability for fuzz grade and halo length was observed. Thirty pounds of Moco seeds were supplied to the Secretary, Indian Central Cotton Committee, for trial in other States, besides supplying 9 pounds for distribution under the rural development scheme.

9. *Wild cotton hybrids*.—The study of selections from crosses involving *darwinii*, *tailense* and *raimondii* was continued. The basic crosses, viz., Hexaploid (4463 X *raimondii*, colchicine doubled) and *darwinii* X *tailense*, have been crossed with the cultivated *hirsutum* types like M.U. 1, M.U. 2, 4463, H 19 and 1908. These multiple hybrids were tested in the fifth and seventh generations. A total of 475 cultures was under study in replicated and non-replicated rows. Based on field examination, fifty-seven cultures from the replicated test were harvested and examined for economic characters. The results show that one culture has given significantly better yield and higher ginning percentage than control, four cultures significantly better yield alone and from the equal yielders three have recorded better ginning and nine have recorded better halo length. It is observed that length improvement is achieved generally in crosses involving M.U. 2. Two hundred and forty single plants in the non-replicated cultures are found to have combined desirable halo length and earliness.

10. *Studies for blackarm resistance*.—Fourteen derivatives of culture 2196, an inter specific hybrid involving *hirsutum* and *herbaceum*, eleven derivatives of hexaploid multiple hybrid with M.U. 2, and two of the Central American collections of the R.A. series received from Shambat were tested in replicated progeny rows, subjecting the materials to artificial infection with bacterial suspension, which was sprayed eight times, at intervals of a fortnight, starting the first spraying when the plants were six weeks old. Grading for spots and vein attack was done at close intervals and the analysis of the results shows that all the derivatives of 2196 and the two Central American collections namely RA 8-18, RA-23 tested for the first time, were resistant under field conditions. Only four of the eleven derivatives of the hexaploid cross were found to be resistant. Though the yield levels, except that of the hexaploid crosses, were numerically lower than that of the control, differences were not statistically significant. In mean halo length, only one derivative of 2196 and three of hexaploid crosses were found to be equal to control. The susceptible check plots of CO.2, CO.3, M.U.1 and HA XI (American cottons) took the infection and showed hundred per cent attack. Desi types K.2, K.5, W.1 and 1027 ALF showed infection varying from 4 per cent to 6 per cent. Now that the resistance of 2196 has been established and confirmed by independent results obtained at Siruguppa and Coimbatore, the higher yielders of these derivatives will be utilized to impart resistance to other desirable cultures which are susceptible to the disease.

11. *Spacing experiment*.—The spacing trials which were studied in relation to time of showing during the past three years, were continued during 1951-52 limiting the enquiry to spacing only, under early sowing. The conclusions arrived at from the data of the previous trials indicated that :—

(i) the yield was decreasing significantly with successive later sowings, (ii) yield tended to increase with the decrease in spacing, close spacing recording consistently higher yields than wide spacing, (iii) one year's data on the effect of spraying with Gueserol-550, under both early and late sowings was significantly better in yield than unsprayed plots, (iv) the interaction for yield between sowing date and spacing was significant only in one out of three years, (v) the interaction for yield between sowing date and spraying was significant and (vi) second order interaction between spraying, sowing date and spacing was not significant (the late sown plot under non-sprayed condition benefiting the close spaced treatment).

The attributes studied this year, viz., yield, halo-length and ginning percentage do not show any significant differences between the treatments. However, it was observed that 3 inch spacing had produced greater height in growth possibly due to crowding, but as per expectations earliness was not observed.

12. *Presoaking experiment with nutrient solutions*.—By presoaking cotton seeds in nutrient solutions increased yields have been reported at Indore. Co-ordinated trials were started in this State in five research stations with six varieties testing ammonium sulphate and mono-potassium phosphate, using molar, half molar and quarter molar strengths. The results are furnished in Table XI.

The seeds in the germination trays at Nandyal got mouldy resulting in very poor germination. At other places the germination obtained in the field was more or less in conformity with the trend of results obtained in germination trays for the different treatments. Though statistically significant differences in germination between treatments were not obtained in all the centres, there seems to be a tendency for the half molar and molar solutions of mono-potassium phosphate and ammonium sulphate to affect germination adversely. In yield, differences were not significant at places other than Nandyal and Guntur. It should be noted that at Nandyal the yields were not only lowest but also below the average for the tract, since only 1.05 inches of rain was received, subsequent to sowing. In both the above places, none of the treatments was better than control. The fertility status of fields, No. 14 of Cotton Breeding station and No. 71 of Central Farm where the experiments with K5 and M.U.1 were conducted, was estimated by chemical analysis and remarked by the Government Agricultural Chemist that both the fields contained sufficient quantity of nitrogen and phosphate and declared as fairly fertile. The trend of results does not warrant the repetition of the experiment with the same nutrient chemicals.

TABLE XI.—Presoaking trials on cotton seeds with nutrient solutions.

Localities ..	(1) (2) Coimbatore, (3) Kollpatti, (4) Hagari, (5) Nandyal, (6) Guntur.
Name of the experiment ..	Presoaking experiment of cotton seeds.
Object ..	To study the effect on germination and yield of soaking cotton seeds in nutrient chemical solutions.
Variants ..	Eight as given below.
System of lay out ..	Randomised and replicated.
Number of replications ..	Four.
Experimental area ..	(1) (2) 0.53, 0.41 (3) — (4) 0.39 (5) — (6) 0.34 cents.
Date of sowing ..	(1) (2) 23rd August 1951, 27th September 1951, (3) — (4) 13th September 1951, (5) 13th September 1951, (6) 4th October 1951.
Period of harvest ..	(1) 21st December 1951 to 22nd February 1952, (2) 11th February 1952 to 17th March 1952, (3) — (4) 15th February 1952 to 8th March 1952, (5) — (6) —.

Germination percentage in the Lab. (T) and in the field (F)

Serial number and locality.	Strain	Particulars	Mono-potassium phosphate.			Ammonium sulphate.			Water soaked.	Dry seeds.	Significance by 'Z' test.	Critical differences (P = 0.05.)	Standard error mean per cent.
			Molar.	† Molar.	† Molar.	Molar.	† Molar.	† Molar.					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1 Coimbatore ..	M.U. 1	T F T	69	73	69	71	70	72	90	81	No	..	23
2 Coimbatore ..	K. 5	T F T	84	87	86	87	86	86	90	88	No	..	..
3 Kollpatti ..	K. 2	T F T	55	48	43	42	44	48	42	38	No	..	3.0
4 Hagari ..	W. 1	T F T	95	97	99	86	86	97	98	97	No	..	1.0
5 Nandyal ..	N. 14	T F T	95	98	99	84	89	96	99	98	Yes	6.3	..
6 Guntur ..	C. 1	T F T	38	82	90	36	45	67	91	91	Yes	14.1	..
		F	23	36	49	14	26	42	37	42	Yes	5.39	7.89
		F	11	11	16	9	10	15	24	73	No	..	..
		F	69	83	92	47	68	85	90	92	Yes	5.5	2.3
		F	51	74	59	29	53	53	55	55	No	..	..
		F	25	29	35	13	24	36	37	32	Yes	5.1	6.11

Yield of seed cotton in lb. per acre.

1 Coimbatore ..	M.U. 1	Irrigated.	1,356	1,361	1,386	1,410	1,313	1,455	1,433	1,436	No	..	6.3
2 Coimbatore ..	K. 5	Rain-fed.	219	223	221	251	195	218	177	219	No	..	3.5
3 Kollpatti ..	K. 2	..	416	397	427	363	297	371	383	319	No	..	10.4
4 Hagari ..	W. 1	..	304	295	315	245	315	272	284	261	No	..	9.6
5 Nandyal ..	N. 14	..	128	134	124	108	133	93	146	124	Yes	44	11.4
6 Guntur ..	C. 1	..	538	393	544	375	368	478	380	568	Yes	132	9.6

Conclusions—Germination in field.

K. 2—11, 7, 12, 6, 10, 5, 9, 8.

Germination in Tray W. 1—12, 11, 7, 6, 10, 9, 5, 8.

Germination in field W. 1—7, 12, 10, 11, 6, 9, 5, 8.

Germination in field N. 14—7, 12, 11, 10, 6, 5, 9, 8.

Germination in field C. 1—11, 10, 7, 12, 6, 5, 9, 8.

Yield N. 14—11, 6, 9, 5, 7, 12, 8, 10.

Yield C. 1—12, 7, 5, 10, 11, 6, 8, 9.

13. *Seed storage studies.*—The trials on the viability of the desi and Cambodia strains in storage conducted in previous years had revealed that the seeds maintain over 80 per cent viability even after 20 months of storage, when the seeds were packed in single or double gunnies and sun dried or not every month. With the object of testing the field performance of one year old seeds against fresh seeds, seeds carried over for one season and seeds of the immediate previous harvests were sown in co-ordinated trials with four *desi* varieties under rainfed conditions and three American varieties under irrigated conditions. Germination, yield, combed halo length, ginning percentage, lint weight and weight per seed were the attributes studied. The results are furnished in Table XII. It is observed that in most of the cases the field germination was slightly higher in the new seeds, though statistical significance was obtained only for N.14 at Nandyal. In *kapas* yield, combed halo length and ginning percentage no differences between treatments were observed for any of the strains. In the weight per seed also no difference was observed for the three strains in which this attribute was studied. In lint weight per seed, W.1 at Hagari showed higher lint weight for the new seed treatment.

In conclusion it may be stated, for purposes of practical application, seeds obtained from seedfarms, even if they are one year old can be recommended for sowing without suffering loss on yield or quality, provided the seeds are protected against insect attack and if viability is not reduced.

TABLE XII.—Seed storage studies—Data on field experiment.

Localities ..	(1) Coimbatore for K. 5, 4463, M.U. 1 (Winter), (2) Kollpatti for K. 2 (3) Srivilliputtur, M.U. 1, (Summer), (4) Hagari W. 1 and (5) Nandyal N. 14
Name of the experiment ..	Seed storage studies.
Object ..	To study the effect of storage on cotton seeds.
Variants ..	Two, varieties seven.
System of layout ..	A.B.B.A.
Number of replications ..	Twelve.
Experimental area ..	Localities, (1) 0.217, 0.366, 0.41, (2) — (3) 1.0 (4) 1.1 (5) 0.66 cents.
Date of sowing ..	Localities (1) 19th September, 1950, 31st August 1951, 4th September 1951, (2) — (3) 31st March 1951, (4) 9th September 1951, (5) 17th September 1951.
Period of harvest ..	Localities (1) 5th February 1952 to 26th February 1952, 4th March 1952 to 7th April 1952, 4th March 1952 to 1st April 1952, (2) — (3) 15th July 1951 to 31st August 1951, (4) 6th February 1952 to 27th February 1952, (5) 28th February 1952 to 14th March 1952.

Germination percentage.

Particulars and treatments.	Strains.						
	K. 5	4,463	M.U. 1 (Winter).	K. 2	M.U. 1 (Summer).	W. 1	N. 14
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A. Old seeds ..	40	68	97	89	44	..	170
B. New seeds ..	53	71	97	94	70	..	254
Significance by 'Z' test ..	No	No	No	No	No	..	Yes
Critical difference (P = 0.05.) ..	1.80	0.95	..	3.00	0.60	..	2.10
Standard error mean per cent ..	..	..	..	..	..	..	..

Yield of seed cotton in lb. per acre.

A. Old seeds ..	170	618	143	312	449	225	207
B. New seeds ..	220	571	120	342	451	209	236
Significance by 'Z' test ..	No	No	No	No	No	No	No
Critical differences (P = 0.05) ..	0.71	1.68	0.71	3.00	2.31	4.42	4.70
Standard error mean per cent ..	..	..	..	..	..	..	..

Halo length in m.m.s.

A. Old seeds ..	23	24	24	23	29	22	21
B. New seeds ..	22	24	24	23	28	21	21
Significance by 'Z' test ..	No	No	No	No	No	No	No
Critical difference (P = 0.05.) ..	0.43	0.15	1.20	1.80	0.31	1.28	..
Standard error mean per cent ..	..	..	..	..	..	..	..

Ginning percentage.

A. Old seeds ..	29	31	34	20	30	31	25
B. New seeds ..	28	31	35	30	30	31	25
Significance by 'Z' test ..	No	No	No	No	No	No	No
Critical difference (P = 0.05.) ..	0.80	0.90	0.82	0.80	1.42	..	..
Standard error mean per cent ..	..	..	..	..	..	..	..

* No variation between two treatments.

Particulars and treatments.	Strains.						
	K. 5	4,463	M.U. 1 (Winter).	K. 2	M.U. 1 (Summer).	W. 1	N. 14
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lint weight in m.gms.							
A. Old seeds	25	59	42	..	36	24	15
B. New seeds	26	58	43	..	37	28	16
Significance by 'Z' test ..	No	No	No	..	No	Yes	No
Critical difference (P = 0.05)	..	..	..	..	..	..	..
Standard error mean per cent..	0.63	1.15	0.98	..	0.34	2.11	3.70
Seed weight m. gms.							
A. Old seeds	65	131	84	..	87	52	42
B. New seeds	67	134	86	..	87	62	43
Significance by 'Z' test ..	No	No	No	..	No	No	No
Critical difference (P = 0.05)	..	..	..	..	..	..	..
Standard error mean per cent..	0.93	2.11	2.56	..	0.94	3.59	2.10

Conclusions—

N. 14—Germination B > A.

W. 1—(Lint weight) B > A.

Reference to symbols—

A. Old seeds.

B. New seeds.

14. *Fundamental studies.*—The study of mutants covering antho-cyanin pigmentation, leaf shape, petal spot, lintlessness and dwarfness in Asiatic cottons was continued.

Inheritance of lint quality.—Crosses involving a cultivated linted *arboresum* type, three hairy lintless types, one with immature lint and the other with short lint were studied in first and second generations. The study of harvested materials is under way. From the results gathered so far it would appear that a lintless type carries a gene for fibre maturity which finds expression when brought into association with a gene for 'lint'. It was already reported that the short lint of CST 1 behaves as a monogenic recessive. The cross CST 1 × CST 4 (short lint × immature lint) has thrown out mature long lint, immature long lint, mature short lint and immature short lint to conform to a dihybrid ratio. Back-crosses have been effected between F. 1s and respective parents.

Inheritance of fibre fineness.—Fine linted types like N. 14, 1027 A.L.F. and G. anomalum were crossed with coarse linted types like Wagad, Podupathi and *Burmanica* types. Thirty-eight crossed bolls have been obtained for study in the next year.

15. *Utilization of rice fallows for cotton cultivation.*—During 1951 summer; preliminary trials had been laid out at the Agricultural Research Stations, Aduthurai, Pattukkottai and Palur with the object of (i) isolating an early variety of desi or American cotton suitable for cultivation in rice fallows, (ii) assessing their responses to irrigated and rainfed conditions, (iii) fixing an optimum date of sowing and (iv) estimating the response of cotton to manuring. The salient features of the trials and tentative observations recorded were (i) *desi* cottons were unsuited both under rainfed and irrigated conditions, (ii) American varieties responded well under irrigation, (iii) sowing could be extended up to the end of January and profitable responses to 40 lb. of nitrogen, in the form of ammonium sulphate applied in two doses, could be obtained. Other observations made were (a) amongst the American types, Punjab varieties had the requisite earliness, yielding 75 per cent of their total yield within 4½ months from the date of sowing, giving as such as 900 to 1,300 lb. by this period and (b) amongst the Punjab varieties P 216F was more productive than others combining a staple of 15/16 inch and a ginning percentage of 30 and spinning capacity of 36s. However, variability was observed in P 216F for length, ginning percentage and seed coat

characters. Though P 216F has come to stay in Tanjore delta and has proved a profitable strain under good farming condition it was found to be susceptible to jassid and red-leaf attack under indifferent farming with inadequate water-supply and lack of manuring. Shoot-borer attack was also widespread.

Encouraged by the results obtained last year at Aduthurai, coordinated trials were arranged during 1951-52 in thirteen research stations of the State representing rice fallows of the delta and non-delta areas. The enquiries were directed towards (i) isolation of a suitable variety of American cotton under irrigation, (ii) to fix the optimum date of sowing (after the harvest of paddy), (iii) to assess the response to manuring with ammonium sulphate and (iv) to find out the residual effect of growing cotton on the succeeding paddy crop. Though the final yield data are not yet available, it can be stated that (i) economic level of yields can be obtained at Aduthurai, Pattukkottai and Coimbatore, (ii) West Coast stations do not offer possibilities for fitting cotton in rice fallows, (iii) the low temperature in the initial stages and high temperature in the flowering phase may not be congenial for producing economic level of yields at Tirurkuppam (Chingleput), Siruguppa (Bellary), Anakapalle, Samalkote, Maruteru and Bapatla (Circars), (iv) dibbling cotton seeds in paddy stubbles immediately after the harvest of paddy can produce a good stand by covering the seeds with wet loam, (v) large-scale shoot-borer attack stimulated monopodial development resulting in delayed harvests, (vi) *Jassid* attack could be controlled by timely sprayings, (vii) the onset of red-leaf could be delayed and severity reduced by protection against *jassids* and copious and frequent irrigation, (viii) the severe *blackarm* attack observed at Pattukkottai has to be tackled, (ix) P 23F was earlier than P 216F but not higher in yield, (x) M.U. 1 and M.U. 2 were late for rice fallows of short duration as in Aduthurai and Pattukkottai but suitable for Coimbatore having longer fallow period and (xi) response in the shape of better growth to manuring was observed in all places but perceptible yield increases might be obtained only at Aduthurai and Pattukkottai. The residual effect of cotton has to be watched.

16. *Other crops—Fodder.*—Periamanjil cholam for fodder was raised in an area of 27.66 acres. Except for the low yields in certain fields as a result of *striga* infestation, the crop in general gave normal yields and should be considered very satisfactory for a droughty season. The yields of fodder in red and black soils were 4,630 lb. and 3,268 lb. per acre respectively. A total quantity of 42.7 tons of fodder was obtained making the Cotton Breeding station not only self-sufficient but also provide a sufficient carry over to tide over a lean year. Surplus fodder amounting to 12,550 lb. was transferred to other Government farms in the Agricultural College. An area of 52 cents was grown to lucerne with restricted irrigation. In eight cuttings the crop gave an acre yield of 19,385 lb. of green fodder meeting a daily requirement of about 40 lb.

Grain crops.—Periamanjil cholam for grain was sown in an area of 8.64 acres to meet the seed requirements of the farm for the next season. The yield of grain and fodder obtained were 365 lb. and 6,594 lb. per acre respectively. Two improved strains received from the Millet Specialist were also raised in an observation plot of sixteen cents and compared with the bulk of Cotton Breeding station. The yield is furnished below:—

Strain.	Acre yield in lb.	
	Grain.	Straw (wet weight).
(1)	(2)	(3)
8002	656	11,130
8112	456	11,800
Bulk	688	16,300

Chittarai cholam as an irrigated summer crop was raised in an area of three acres, with strain Co. 12 supplied by the Millet Specialist for purposes of multiplication. The crop was rogued and purity maintained. The yield of straw and grain were respectively 1,583 lb. and 822 lb. per acre.

Pulse crops.—Horsegram was raised in an area of 21.13 acres under rainfed conditions. With the ideal distribution of rain in the early stages, the crop put forth rank vegetative growth. Due to continuous drought in the flowering phase, pod setting was poor resulting in a low yield of 246 lb. of gram per acre.

Bengalgram was grown in 7.00 acres in black soil. During the second week of the crop growth, *Laphygma species* attacked the crop in an epidemic form. Timely insecticidal measures prevented further spread and reduced the extent of damage. However, due to adverse seasonal conditions, yield was reduced. Strains 468 and 2965 gave 140 and 143 lb. of seed per acre respectively.

Four varieties of cowpea were raised under rainfed conditions in observation plots. The green pods of each variety were tested for cooking qualities. C. 419 was less fibrous, sweet and cooked early. The yields of green organic matter obtained were 13,552 lb, 10,309 lb, 9,293 lb. and 10,007 lb., respectively, for varieties G. 4, C. 419, African and Saunders.

Green manure.—Out of a total of 1,549 seedlings of *Glyricidia* planted in September 1951, 997 plants were alive at the end of June 1952. The maintenance of the seedlings was difficult due to lack of water and droughty conditions that prevailed from December onwards. Two varieties of *Lotus corniculatus* introduced from United States of America were tested under careful nursery conditions in pots with grass sods, after inoculating the soil with the bacterial cultures received with the seeds. The growth was very poor, slow and disappointing. These were declared to be unsuitable for conditions at the Cotton Breeding Station. A few seeds of *Indigofera tesymani*, an introduction from Perydemia, Ceylon, sown in pots did not germinate. Fresh seeds were received and few seedlings have come up.

Orchard plants.—Thirteen lemon seedlings planted in 1948-49 are making slow progress. One hundred and twenty pounds of Papaya fruits were obtained from ten trees.

17. *Manures.*—One hundred and thirty-five tons of organic manure by composting cotton stalks and gliricidia twigs and all available organic material from the farm and seventy tons of cattle manure were prepared.

18. *Livestock.*—Two new pairs of Kangayam bullocks were purchased at a cost of Rs. 1,500 for each pair. The general condition of the animals was satisfactory except for an attack of foot-and-mouth disease which appeared in an epidemic form causing considerable loss to cattle wealth of the district. All the animals were protected against rinder pest.

COIMBATORE,
8th August 1952.

S. M. KALYANARAMAN.
Cotton Specialist.

APPENDIX.

STATEMENT OF RECEIPTS AND EXPENDITURE OF THE COTTON BREEDING STATION,
COIMBATORE, FOR THE YEAR ENDING 30TH JUNE 1952.

Expenditure.

A. Research Institute—Cotton Section—										RS.	A.	P.
Pay of officers	..	..	..	..	..	..	..	..	..	8,513	4	0
Pay of establishment	..	..	..	..	..	..	..	..	..	24,356	9	0
Dearness allowance	..	..	..	..	..	..	..	..	..	10,486	13	0
Travelling allowance and Other Compensatory Allowances	..	..	..	..	..	..	..	..	..	8,325	11	0
Apparatus and materials and capital outlay—												
Apparatus and materials	..	..	..	..	..	..	..	..	..	1,977	3	6
Deadstock	..	..	..	..	..	..	..	..	..	174	13	9
Livestock	..	..	..	..	..	..	..	..	..	3,000	0	0
Working expenses—												
Repairs and upkeep	..	..	..	..	..	..	..	..	..	856	4	6
Maintenance of cattle	..	..	..	..	..	..	..	..	..	1,119	14	6
Mazdoor labour	..	..	..	..	..	..	..	..	..	4,359	4	0
Miscellaneous cultivation expenses	..	..	..	..	..	..	..	..	..	2,372	12	3
Other miscellaneous charges	..	..	..	..	..	..	..	..	..	3,540	1	2
Dearness allowance to menials	..	..	..	..	..	..	..	..	..	2,529	7	6
Office contingencies—												
Other contingencies	..	..	..	..	..	..	..	..	..	1,404	11	6
Other charges—												
Petty construction and repairs	..	..	..	..	..	..	..	..	..	6,943	12	3
Total, Expenditure										79,960	9	11

Receipts.

XXIX. Agriculture—										RS.		
By sale of farm produce and miscellaneous including adjustments	..	..	..	..	..	..	..	..	..	4,045	6	11

**ANNUAL REPORT OF THE PADDY BREEDING STATION,
COIMBATORE, FOR THE YEAR 1951-52 (FASLI 1361).**

Season.—It was another year of failure for the fifth time consecutively. The total rainfall received was 17.12 inches in 42 days, which was short of the normal by 8.43 inches. The south-west monsoon set in rather late and 5.35 inches were received during the whole of this monsoon period against the normal of 6.13 inches. The north-east monsoon was miserable and brought only 9.21 inches, which fell short of the normal by 4.04 inches. The rainfall during the hot weather of 1952 was also not normal. The rainfall data are given in Table I.

TABLE I.—Statement of rainfall for the year 1951-52 (fasli 1361).

Month.	Week.	1951-52.		1950-51.		Average for the previous ten years.	
		Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
South-west monsoon.							
1951.							
June ..	7-13	0.88	4	..	..	0.90	1.1
	14-20	..	..	..	..	0.21	1.5
	21-27	0.02	..	0.36	1	0.33	1.1
June-July ..	28-4	..	..	..	..	0.33	1.2
	5-11	0.01	..	0.48	2	0.75	2.2
	12-18	0.03	..	0.11	1	0.60	2.1
	19-25	1.96	6	2.05	5	0.42	1.4
July-August.	26-1	0.03	..	1.17	2	0.28	0.8
	2-8	..	..	0.31	1	0.52	1.0
	9-15	0.10	1	0.06	..	0.30	1.2
	16-22	..	..	1.92	3	0.42	1.0
	23-29	0.09	..	0.06	..	0.24	1.1
August-September.	30-5	..	..	0.16	1	0.13	0.5
	6-12	..	..	0.13	1	0.11	0.9
	13-19	1.68	3	..	..	0.16	0.4
	20-26	0.55	2	0.95	1	0.43	1.4
Total ..		5.35	16	7.76	18	6.13	18.9
North-east monsoon.							
September-October.	27-3	0.61	3	4.04	3	1.09	1.7
	4-10	1.59	2	0.03	..	0.70	2.2
	11-17	..	..	1.07	2	1.60	3.2
	18-24	0.85	2	0.70	1	1.30	2.6
November ..	25-31	0.07	..	..	..	1.67	1.9
	1-7	2.04	3	0.05	..	1.14	1.7
	8-14	2.33	4	2.69	3	1.45	2.1
	15-21	1.00	3	0.82	1	0.98	2.0
	22-28	..	..	..	..	1.02	1.4
November-December.	29-5	0.60	1	..	..	0.56	1.2
	6-12	..	..	..	..	0.64	1.3
	13-19	..	..	0.07	..	0.49	0.7
	20-26	..	..	..	..	0.13	0.4
December-1952.	27-3	..	..	..	..	0.06	0.1
	4-10	0.05	..	..	..	0.31	0.5
	11-17	..	..	..	..	0.003	0.1
	18-24	..	..	..	..	0.13	0.3
	25-31	0.07	..	..	..	0.03	0.2
Total ..		9.21	18	9.52	10	13.253	23.6
Hot weather.							
February ..	1-7	..	..	..	..	..	..
	8-14	..	..	0.02	..	0.09	0.3
	15-21	0.03	..	..	..	..	..
	22-29	0.64	3	..	..	0.05	0.2
March ..	1-7	..	..	..	..	0.09	0.1
	8-14	..	..	..	..	..	..
	15-21	0.89	2	..	..	0.32	0.2
	22-28	..	..	0.15	1	0.39	0.4
March-April.	29-4	..	..	0.09	..	0.44	0.5
	5-11	0.72	1	0.52	1	0.47	0.9
	12-18	0.04	..	2.90	3	0.91	1.1
	19-25	0.11	1	..	..	6.82	1.3

Month.	Week.	1951-52.		1950-51.		Average for the previous last ten years.	
		Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Hot weather—cont.							
1952.							
April-May ..	26-2	..	..	..	..	0.50	1.1
	3-9	..	..	..	..	0.32	0.6
	10-16	0.02	..	0.07	..	0.49	0.8
	17-23	..	..	0.63	1	0.66	1.2
	24-30	..	..	0.62	2	0.62	1.2
May-June ..	31-6	0.11	1	0.49	1	0.20	0.7
Total ..		2.56	8	5.50	9	6.17	10.6
Grand total ..		17.12	42	22.78	37	22.553	53.1

The farmers, of both dry and wet land, around Coimbatore were equally affected. The wells which used to supplement rainfall also became dry at the critical moment and the canal supplies were also low. The turn system adopted was very unsuccessful and the wet land received four turns for the whole period. The whole paddy cultivation was almost solely carried on with the help of the bore well in A block and also with the feeble intermittent supplies from the other wells. The yields of the early strains were very poor and that of the late ones were slightly below normal.

2. *Cultivation routine.*—The first ploughing was generally done with the iron plough. Green manure was then applied at 4,000 lb. per acre and the trampler worked. After a week, the plots were puddled with the country plough and finished with the levelling board. The crop was top dressed with 150 lb. of ammonium sulphate per acre. The nursery area was manured with five tons of cattle manure before the planting of paddy, after removal of the nursery.

3. *Sowings and transplanting.*—(a) *Main crop.*—Sowings were started with the help of the first irrigation turn on 11th July 1951 and continued till late in September due to the uncertain supplies in the tank and the prolonged turns. In all 15,691 beds of nursery were sown over an area of 4.91 acres. Transplanting was begun on 20th August 1951 and continued right up to middle of November with the consequent harvests till mid April.

(b) *Second crop.*—Navarai paddy was planted in an area of 2.11 acres, comprising mostly of the yield trials of exotic short duration types and certain short duration strains for seed multiplication. Planting commenced on 11th February 1952 from seed beds which were sown from 10th January 1952.

The details of units planted for the season are given in Table II.

TABLE II.—Details of planting, etc.

Particulars.	First crop.		Second crop.	
	Number of units planted.	Area.	Number of units planted.	Area.
		ACS.		ACS.
Yield trials	1,161	4.62	574	1.11
Pure-line selections for study	1,365	1.17	72	0.09
Types	2,882	1.96	52	0.09
Agronomic experiments	80	0.82	12	0.09
Hybrid progenies (crosses made for blast resistance, saline, drought and flood resistance).	11,051	10.71	209	0.28
Other studies	357	0.81	192	0.08
Seed multiplication	59	7.06	12	0.37
Total	16,955	27.15	1,123	2.11

4. *Growth and harvest.*—There was a very severe drought even from the time of planting. Even one good wetting could not be received from the channel and the

available water from the bore well in A block was carefully rationed to mature the crop and save the breeding material. There was severe infection of *blast* in some of the strains, which however, gave an opportunity for rigorous selection for this character in the breeding material. The late varieties were, however, fair and they pulled up the otherwise poor average of yield. The average acre yield for the farm including all the area planted worked out to 1,824 lb. for the main crop and 2,150 lb. for the second crop which might be considered fair considering the season.

5. *Pure line selection.*—Selection work in the important varieties in those tracts, where there are no research stations was taken up at Coimbatore and after promising cultures are obtained, these are sent to the respective tracts for trials. The following are the details of work in this direction.

(a) *Improvement of Pudupatti Samba.*—This is a quality-rice common in the Salem district. Studies in this variety made for the past eight years resulted in the isolation of two promising cultures. These were sent to the district for trial. One culture 9,127 was found to do better in the several places of trial and it gave an increased yield of 7.6 per cent on the average of four years' work on the station and 8 to 10 per cent in the district. This is proposed to be issued as Co. 27 *Pudupatti Samba*.

(b) *Bangarutheegalu.*—It is a popular variety in the Kurnool and Cuddapah districts and is grown for its fineness and quality of rice. One culture 6612, which was doing well in the station and gave 12 per cent increased yield in previous season, was under trial in the district, where it was tried in three places. The ryots have appreciated culture 6612 and side by side with the trials, the seed was multiplied and 1,500 lb. were distributed for raising seed farms in 1952. It is proposed to conclude work on this variety and issue culture 6612 as Co. 28 *Bangarutheegalu* for large scale cultivation.

(c) *Wynad and Gudalur varieties.*—(i) *Palthondi and Marathondi.*—These two varieties occupy the largest area in the Wynad and Gudalur taluks of the hill tract. Selection work on these, which was started at Coimbatore, was concluded with the fixing up of six high yielding cultures in each and the work was continued at the Ambavalavayil farm in collaboration with the Superintendent of the Wynad Colonization Scheme. Culture 9114 in *Palthondi* was found to do well on the station and gave 35 per cent increased yield; it did well also on some of the colonists' lands where it was tried. It is proposed to christen it as WND 1 *Palthondi*. Culture 8748 in *Marathondi* also acquitted itself well and gave 31 per cent increased yields. It is therefore proposed to issue it as WND 2 *Marathondi*.

(ii) *Other Wynad varieties.*—A few other varieties which are normally grown in Wynad, besides *Palthondi* and *Marathondi* were also sought to be improved by selection. By studies for the past five seasons, two cultures in each of *Kothandan*, *Chettuvaliyan* and *Velumbala*, which were found promising, were multiplied and would be tried in the colonists' lands for fixing up the better of the two as compared to the local before issuing as strains.

(d) *Ramnad varieties.*—In the district of Ramanathapuram and portions of Madurai and Tirunelveli, rice cultivation is carried on under tanks which get some water in the south-west monsoon, but which get filled up with the north-east monsoon rains. These areas therefore require special varieties, which withstand late planting. The preliminary work in some of the common varieties of the tract, viz, *Vadakathikar*, *Varagumilagi*, *Kattavellai* and *Aryan*, was undertaken at Coimbatore and two cultures in each of the above were under trial in the district in the scattered plot design. Last year the season was a failure as also in the year 1951-52. The results were therefore rendered inconclusive, but wherever there was normal water-supply, the culture proved to be higher yielding than the local bulk. *Vadakathikar* culture 1014 gave 10 per cent increase, *Varagumilagi* 1151 gave 15 per cent increased yield while 30 per cent increase was recorded by culture 1417 of *Kattavellai*. The work in these varieties is proposed to be shifted to Paramakudi station, recently sanctioned.

(e) *Barigavadlu*.—This is a variety common in portions of Anantapur, Kurnool and Cuddapah and grown under rainfed conditions. Selection work was started at Coimbatore to fix up some promising cultures which could be later tried in the tract itself. From the crop grown with samples of seed collected in the district, 300 plants were selected and studied. Of these, fifty lines promising in the preliminary stage of studies, were carried forward for further work.

(f) *Vadan Samba*.—During the tour of Paddy Specialist in Nellore district, selections from Vadan samba were made and they were raised at Coimbatore. Some of them were found to be better than ADT. 22 (*Vadan samba*) in height, tillering and length of earhead. These will be taken over to preliminary trials next season.

6. *Hybridization*—(1) *Breeding strains for blast resistance (Piricularia Oryzae)*.—Rice blast is a very serious disease in the southern districts and portions of the central districts including Nellore, specially in areas where there is high humidity and drizzling weather at the time of blooming of rice. Some of the popular short duration strains also succumb and the very cosmopolitan GEB. 24 when planted late also is very usually affected. As the evolution of resistant strains is the only way of combating this deadly disease, a considerable portion of the time of the section was devoted to breeding work on this problem, using the most resistant Co. 4 strain as one of the parents. When the material is promising from agronomic characters and attained certain amount of homozygosity, it is subjected to rigorous trials by the Government Mycologist in his study plots.

(i) *Long duration strains ADT 10 × Co. 4*.—Two strains Co. 25 and Co. 26 from this cross, suitable for the Cauvery-Coleroon deltas were evolved and it was gratifying to note that these together occupied at a modest estimate, two lakhs of acres by 1951. In certain parts of Madurai, Tirunelveli Co. 25 is being largely grown. Some ryots in Nellore have also reaped benefits by growing this strain. There is still a demand for a slightly shorter duration strain, as well as also strains better in 'quality' than Co. 25. For these ends, crosses were effected previously between Co. 25 and Co. 26 on one hand with better quality rice of Co. 19, Co. 2 and PLR 1 and 680 progenies in F₄ stage were studied. The season which brought on a heavy incidence of the blast was helpful in making an intensive study on this blast resistant character. Three promising pure breeding progenies as well as 8 further selections from splitting families were carried forward for further work.

(ii) *Co. 4 × other Coimbatore and sub-station strains*.—All the important and popular strains issued from the research stations in the south are noticed to possess no blast resistance and in order to infuse the blast resistant character of the parent Co. 4, a number of crosses between this strain on one hand and several promising and popular strains on the other were made and studied for the past few years. The results of these studies made last year are summarised below:—

(a) *Short duration crosses—Co. 13 × Co. 4*.—Two pure breeding cultures, 6517 and 6522 were under yield trials for the third time against Co. 13. Both of these are highly resistant to blast. The season was very droughty and their performance is given in Table III. Co. 13 was completely affected by blast giving a very poor yield of less than 200 lb. per acre this season. These cultures were multiplied on small area and they were sent to the other sub-stations and also to a few districts for trial.

Back crossing was done between one blast resistant culture and Co. 13 to shorten the duration and also improve the yield. The progenies were under study in the F₅ stage and promising material selected for further tests.

Co. 9 × Co. 4.—Three cultures were again compared for yield against Co. 9. The Co. 9 parent had very severe blast while the cultures were considerably resistant to the disease. The results are set out in Table III. It is seen that these have acquitted themselves well in a season of disease.

Co. 10 × Co. 4.—Two hundred and thirty-seven cultures were studied and most of them were splitting for various characters and there was severe attack of blast. Thirty-six were selected and these were raised in the second-crop season.

There was no blast and eight of these were found to be promising. The studies will be continued.

Co. 22 × Co. 4.—Co. 22 is a vigorous growing red riced strain and crosses were made to combine blast resistance with this vigour. From a study of 180 progenies in F₂ generation 300 further selections were made, based on vigour as well as resistance to blast. Further studies will be continued.

TABLE III.—Performance of short duration blast resistant cross progenies, 1951-52.

Layout—Randomized blocks.				Harvested—			
Replication—				Series 1 (a)—18th December 1951.			
Series 1 (a)—8.				" 1 (b)—3rd June 1952.			
" 1 (b)—4.				" 2—2nd January 1952.			
" 2—6.				" 3—3rd June 1952.			
" 3—4.				Size of plot—			
Sown—				Series 1 (a)—4' × 12'.			
Series 1 (a)—7th August 1951.				" 1 (b)—4' × 10'.			
" 1 (b)—30th January 1952.				" 2—4' × 16'.			
" 2—7th August 1951.				" 3—4' × 10'.			
" 3—30th January 1952.				Variants—			
Transplanted—				Series 1 (a)—2 cultures and standard.			
Series 1 (a)—24th September 1951.				" 1 (b)—2 Do.			
" 1 (b)—29th February 1952.				" 2—3 Do.			
" 2—24th September 1951.				" 3—3 Do.			
" 3—29th February 1952.							
Series and cross.	Culture number.	Percentage on control.	Duration (days).	'Z' test (P=0.05).	Standard error.	Critical difference.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1 Co. 13 × Co. 4—							
(a) First crop ..	6517	765.8	89	Yes.	6.9	15.0	..
	6522	635.8	84	..	..	..	Co. 13 is very
	Co. 13	100.0	81	..	..	..	badly affected
							by
(b) Second crop ..	6517	150.8	..	Yes.	15.3	32.0	..
	6522	105.5	..	..	..	..	..
	Co. 13	100.0	..	..	..	..	..
2 Co. 9 × Co. 4—							
First crop ..	6444	249.6	92	Yes.	3.9	8.4	..
	6448	261.5	93	..	..	..	..
	6494	99.6	95	..	..	..	..
	Co. 9	100.0	90	..	..	..	Co. 9 is badly
							affected by
							blast.
	(Karsamba red).						
3 Co. 22 × Co. 4—							
Second crop ..	7305	149.2	100	Yes.	15.3	32.0	..
	7442	104.7	92	..	..	..	..
	7538	166.2	92	..	..	..	..
	Co. 13	100.0	86	..	..	..	..
Conclusion—							
Series 1 (a)—6517, 6522, Co. 13.							
Series 1 (b)—6517, 6522, Co. 13.							
Series 2—6448, 6444, Co. 9, 6494.							
Series 3—7538, 7305, 7442, Co. 13.							

(b) *Medium-duration crosses*.—Most of the Coimbatore strains are not resistant to blast and GEB. 24 specially suffers when planted slightly late in the season. The other strains also exhibit different degrees of susceptibility. A number of crosses were made between Co. 2, GEB. 24, Co. 1 on one hand and Co. 4 on the other. A large number of progenies in different generations were studied and promising selections were carried forward. It was reported from the studies in the Government Mycologist's plot, culture 6538 almost of the same duration as GEB. 24 was highly resistant to blast. The culture would be multiplied and sent to the district for large scale trials. In the yield trial, a few of the progenies were also higher yielding than Co. 1. But in the Co. 2 duration group none proved superior to Co. 2.

TABLE IV.—Performance of medium duration cross for blast resistance, 1951-52.

Layout—Randomized blocks.				Harvested—			
Replications—				Series 1—9th February 1952.			
Series 1—4.				" 2—25th January 1952.			
" 2—6.				Size of plot—			
Sown—				Series 1—4' × 12'.			
Series 1—7th August 1951.				" 2—3' × 14'.			
" 2— Do.				Variants—			
Transplanted—				Series 1—9 cultures and standard.			
Series 1—24th September 1951.				" 2—3 cultures and standard.			
" 2—19th September 1951.							

Series and cross	Culture number	Yield as percentage on general mean	Duration	'Z' test (P = 0.05)	Standard error	Critical difference (P = 0.05)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 GEB. 24 × Co. 4 ..	6583	113.1	..	Yes.	7.2	15.1
	6538	83.3				
	8544	136.4				
	6555	76.8				
	6577	83.3				
	6589	104.0				
	6606	115.4				
	6610	111.2				
	6613	76.4	(Very badly affected and yield was about nil.)			
	GEB. 24 (Control).	..				
2 Co. 2 × Co. 4 ..	6629	103.5	..	Yes.	8.4	18.0
	6635	91.5				
	6645	111.8				
	Co. 2	93.8				
<i>Remarks</i>—Most of the cultures 7 days longer in duration, <i>Conclusion</i>— Series 1—<u>6544, 6606, 6533, 6610, 6589, 6538, 6577, 6555 6613.</u> Series 2—<u>6645, 6629, Co. 2, 6635.</u>						

(c) *Long-duration crosses.*—Crosses were also effected in the past between Co. 3, Co. 6, Co. 8, Co. 19 and PLR. 1, all of which are susceptible to blast to different degrees on the one hand and Co. 4 on the other. Promising progenies in two crosses were compared with the respective parents. It was seen (vide Table V) that some cultures yielded better than the control strain, Co. 6 and Co. 8 and were also more blast resistant than the parents. Promising selections were made from the other crosses and await studies in the Mycologist's plot.

TABLE V (a).—Performance of progenies of long duration crosses for blast resistance.

Layout—Randomized blocks.

Replications—

Series 1—8.

„ 2—4.

Size of plot—

Series 1—8' x 14'.

„ 2—8' x 14'.

Sown—

Series 1—15th July 1951.

„ 2— Do.

Transplanted—

Series 1—19th September 1951.

„ 2— Do.

Harvested—

Series 1—2nd February 1952.

„ 2—4th February 1952.

Variants—

Series 1—2 cultures and standard.

„ 2—5 cultures and standard.

Series and cross.	Culture number.	Percentage on control.	'Z' test (P=0.05).	Standard error.	Critical difference (P=0.05).
(1)	(2)	(3)	(4)	(5)	(6)
1 Co. 6 x Co. 4 ..	6681	100.9	No.	3.7	..
	6700	108.6			
	Co. 6	100.0			
	(standard)				
2 Co. 8 x Co. 4 ..	6701	61.3	Yes.	2.3	5.1
	6716	122.6			
	6717	114.0			
	6718	99.8			
	6720	105.5			
	Co. 8	100.0			

Conclusion—

Series 2—6716, 6717, 6720, Co. 8, 6718, 6701.

TABLE V (b).

Cross	Number of families studied	Number of progenies carried forward	Number of selections made
(1)	(2)	(3)	(4)
Co. 19 × Co. 4	108 (F ₈)	78	..
Co. 11 × Co. 4	124 (F ₇)	34	54
PLR. 1 × Co. 4	139 (F ₉)	..	396
Co. 25 × Co. 4	57 (F ₅)	54	..
Co. 6 × Co. 4	145 (F ₆)	35	..
Co. 7 × Co. 4	162 (F ₇)	56	..

(iii) *Other crosses.*—It was found that Bam. 3, Bam. 6 and MTU. 19, the most popular rice strains grown in the Circars are to some degree susceptible to blast in certain years. To aim at evolution of blast resistant strains similar to these, crosses were also effected with Co. 4 as the other parent. A large number of progenies in F₂ were grown and studied. A very wide variation in a number of characters was met with including susceptibility to blast, offering a big scope of selection for different durations, morphological and other characters. A large number of selections were carried forward for further study and replicated progeny row trial next year.

TABLE VI.—Details of crosses made for blast resistance in medium-duration strains of Northern districts, 1951–52.

Cross	Number of families studied	Number of progenies carried forward	Number of selections made
(1)	(2)	(3)	(4)
MTU. 19 × Co. 4	95 (F ₂)	39	42
SLO. 17 × Co. 4	102 (F ₂)	..	300
BAM. 6 × Co. 4	155 (F ₂)	..	438
T. 892 × Co. 4	39 (F ₂)	6	36

(iv) *Evolution of blast resistant Molagolukulu.*—It was found that the two strains BCP. 1 and BCP. 2 evolved in the Molagolukulu from Buchiredipalem are yet susceptible to blast though not to the same degree as the local. Hence these strains were crossed with Co. 4 blast resistant strains and 314 cultures in F₂ stage were studied. Blast was very severe and this gave an opportunity to select promising material. Further work on them will be continued. The work was also reinforced by studies at Buchiredipalem. The results of study are set out in Table VII.

TABLE VII.—Crosses for blast resistant Molagolukulu, 1951–52.

Cross	Number of families studied	Number of families for further work	Number of selections made
(1)	(2)	(3)	(4)
BCP. 1 × Co. 4	105 (F ₂)	9	62
BCP. 2 × Co. 4	209 (F ₂)	17	306
BCP. 1834 × Co. 4	237 (F ₂)	64	..
Co. 16 × Co. 4	102 (F ₂)	24	..
Co. 15 × Co. 4	106 (F ₂)	21	..
ADT. 17 × Co. 15	11 (F ₂)	11	..

(2) *Evolution of non-lodging short duration strains.*—Certain of the Burma types particularly T. 301 and T. 285 have thick stalk, bunched heading, though poor tillered, and thus do not normally lodge. Crosses were effected between the high yielding popular strain Co. 10 and the Burma types and the crosses were studied in the past. Pure breeding cultures were compared with Co. 10 for yield during the first and second crop seasons. The crop was in general poor this season. A number of cultures were, however, found to be very much higher yielding than Co. 10 and were also having thick stalk and were less lodging (vide Table VIII). Further crosses were attempted between certain short duration popular strains and 'non-lodging' parents. Crossed seed was secured.

TABLE VIII.—Performance of cross progenies for evolution of short duration non-lodging strains.

Layout—Randomized blocks.		Transplanted—	
Replications—		Series 1—5th October 1951.	
Series 1—6.		.. 2—6th October 1951.	
.. 2—4.		Harvested—	
Size of plot—		Series 1—31st December 1951.	
Series 1—4' × 20'.		.. 2— Do.	
.. 2—4' × 10'.		Variants—	
Sown—		Series 1—3 cultures and 1 standard.	
Series 1—23rd August 1951.		.. 2—7 cultures and 1 standard.	
.. 2— Do.			

Summary of results.

Series and cross.	Culture number.	Percentage on standard.	'Z' test (P = 0.05).	Standard error.	Critical difference (P = 0.05).
(1)	(2)	(3)	(4)	(5)	(6)
1 Co. 10 × T. 285.	4476	98.0	Yes.	6.6	13.5
	4495	106.8			
	4504	100.0			
	Co. 10	100.0			
	(standard)				
2 Co. 10 × T. 301.	4651	201.0	Yes.	0.8	1.8
	4635	237.8			
	4714	237.8			
	4728	222.5			
	4734	229.4			
	4739	225.9			
	7282	235.8			
	Co. 10	100.0			

Conclusion—
 Series 1—4495, 4504, Co. 10, 4476.
 Series 2—4651, 4714, 7282, 4734, 4739, 4728, 4651, Co. 10.

(3) *Isolation of cosmopolitan strains of different duration by interstrain multiple crosses*—(a) *Short-duration group*.—The original intention of the cross which was to isolate a few strains which might be useful over large tracts and thus lessen the number of strains was not fulfilled as it was found that no single culture from these crosses did better than the several strains usually grown in separate localities. The inherent limitation in this type of crosses amongst rice was thus brought to light. However, it was found that one culture from these crosses was better than Co. 10 and two cultures similar to ASD. 1 were promising. The former was multiplied for trial in areas where Co. 10 is common and the other two cultures which were sent to Tirunelveli were maintained at this station.

(b) *Medium-duration group*.—In this group also none was found to be cosmopolitan. Some cultures which did better than Co. 3 were again under trial. The growth in general was poor and the 'Z' test was not satisfied. Two cultures which are promising will be carried forward for further work (vide Table IX).

(c) *Long duration group* (Co. 6, Co. 8, Co. 11).—Due to the drought, the growth of the long duration strains was not very satisfactory. One culture was better than Co. 6 and it was however, on par with Co. 8, though it was slightly higher yielding. This will be multiplied for trials in the Salem and Tiruchirappalli areas where *Sadai samba* is grown.

TABLE IX.—Performance of interstrain hybrids, 1951-52.

Layout—Randomized blocks.

Replications—

Series 1—4.

Series 2—4.

Series 3—4.

Size of plot—

Series 1—4' × 20'.

Series 2—4' × 20'.

Series 3—4' × 20'.

Sown—

Series 1—17th September 1951.

Series 2—13th September 1951.

Series 3—Do.

Transplanted—

Series 1—18th November 1952.

Series 2—18th November 1951.

Series 3—19th November 1951.

Harvested—

Series 1—23th March 1952.

Series 2—24th March 1952.

Series 3—27th March 1952.

Variants—

Series 1—5 cultures and standard.

Series 2—5 Do.

Series 3—6 Do.

Series and cross.	Culture number.	Percentage on standard.	Yield per acre.	'Z' test (P = 0.05).	Standard error.	Critical difference (P = 0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 Co. 3 × Co. 7	9539	101.0	1,511	No.	14.4	..
	9591	109.0	1,625			
	9617	156.0	2,334			
	9619	126.3	1,889			
	9992	119.5	1,788			
	Co. 3	100.0	1,496			
(standard)						
2 Co. 1½ × Co. 6	3496	109.2	1,614	Yes.	9.7	17.9
	3497	85.2	1,082			
	9896	96.4	1,600			
	9919	109.4	1,816			
	9951	110.3	1,829			
	Co. 6	100.0	1,660			

TABLE IX.—Performance of interstrain hybrids, 1951-52—cont.

Series and cross.	Culture number.	Percentage on standard.	Yield per acre.	'Z' test (P = 0.05).	Standard error.	Critical difference (P = 0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)
3 Co. 11 × Co. 6 and Co. 11 × T. 1279.	3521	120.8	} Very poor yields.	Yes.	7.8	16.7
	3522	111.4				
	3527	173.8				
	3528	170.5				
	9163	124.8				
	9200	127.8				
	Co. 11	100.0				
Conclusion—						
Series 1—'Z' not satisfied.						
,, 2—9951, 9919, 3496, Co. 6, 9896, 3497.						
,, 3—3527, 3528, 9200, 9163, 3521, 3522, Co. 11.						

(4) *Deep-water crosses*.—To cater to the submersible areas of the State, early work was diverted to making cross between the deep-water rices from Burma and some strains, but due to the absence of facilities for testing the material under typical deep-water conditions, studies were concentrated to eliminating the poor yielders by yield trials. This year studies have shown (vide Table X) that certain progenies are better in yield than PTB. 15 which is hitherto being recommended for moderately submersible areas. With the opening of the station at Collair, most of the material was sent to that station for trial under typical deep-water conditions. The nucleus of the several pure breeding cultures was maintained at this station.

TABLE X.—Yield trials of cultures in 'Deep-water crosses'—1951-52.

Layout—Randomized.

Replications—

Series (1) a—4.

" (2) —4.

Size of plot—

Series (1) a—4' × 20'.

" (2) —5' × 10'.

" (2) —4' × 20'.

Sown—

Series 1 (a)—17th September 1951.

Series 1 (b) Do.

" 2—13th September 1951.

Transplanted—

Series 1 (a)—13th November 1951.

" 1 (b) Do.

" 2—19th November 1951.

Harvested—

Series 1 (a)—5th April 1952.

" 1 (b)—24th March 1952.

" 2—7th April 1952.

Variants—

Series 1 (a) 5 cultures and 1 standard.

" 1 (b) 4 " 1 "

" 2 5 " 1 "

Summary of results.

Series and cross.	Culture number.	Yield as per cent over control.	'Z' test (P = 0.05).	Standard error.	Critical difference (P = 0.05).	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) a PTB. 15 × Co. 14 ..	3452	138.2	Yes.	8.8	18.5	
	3460	95.0				
	3470	110.4				
	7700	97.8				
	7713	121.8				
(1) b Do.	PTB. 15	100.0	Yes.	3.5	7.4	Cultures slightly earlier than PTB. 15.
	4780	110.1				
	4793	104.3				
	4795	101.2				
	4798	109.1				
(2) Co. 16 × PTB. 15 ..	PTB. 15	100.0	Yes.	13.6	27.8	The cultures are earlier than PTB. 15.
	3484	64.5				
	3485	108.3				
	3487	107.6				
	3488	92.6				
	3489	116.2				
PTB. 15		100.0				

Conclusion—

Series 1 (a)—3452, 7713, 3470, PTB. 15, 7700, 3460.

" 1 (b)—4780, 4798, 4793, 4795, PTB. 15.

" 2 —3489, 3485, 3487, PTB. 15, 3488, 3484.

(5) *Breeding for saline resistance*.—From different parts of the State and also from other States, 74 varieties reputed to stand salinity (alkalinity) were collected and these were maintained at the station. In the earlier studies, some of these collections were tried under known concentrations of salt (Na_2C_1). It was found that the short duration *Tellathokavadlu* (T. 892) of Chittoor and SR 26 B, an

introduction from Orissa tolerated salinity better than others. With the co-operation of the District Agricultural Officers, Tiruchirappalli, Tirunelveli, Pattukottai, Tanjore and Chingleput, some of these varieties were tried in alkaline areas. The results of trials are not very conclusive, as in some cases the selection of the sites was not proper and in certain others the season was failure due to drought. It was, however, seen again that T. 892 and SR 26 B, *Uvarkondan* and *Chuvadu Samba* were more resistant to salinity than certain other varieties. Near the Paddy Breeding Station, Coimbatore, all the seventy-four varieties were tried on saline patch belonging to a progressive landlord. The season was very adverse, but it transpired that varieties, *Pandy*, *kullakar*, *kallimadayan* and *Vellakattai* tolerated salinity better and gave even better yield than SR 26 B.

In the past years, crosses were effected between T. 892 and SR 26 B on one hand and some of the long and short duration strains on the other with a view to get material with different durations possessing saline resistance. The material had accumulated as at none of the rice research stations typical saline conditions exist. More than 1,900 progenies were, however, grown on the station and based on examination of other agronomic characters, promising material was carried forward for trials at the proposed station for work on evolution of saline resistant strains. Some of the progenies of crosses between short duration strains and T. 892 (*Tellathokavadlu*) were again grown in second crop for further sifting. The crop grew well and agronomically useful, better quality, short duration progenies were selected.

(6) *Crosses for drought resistance*.—F₄ progenies of crosses between the cultivated parents and wild rice *Oryza sativa forma spontanea* were studied for their reaction to drought under dry conditions as well as under wet conditions. One hundred and forty-five progenies which were grown in a dry field during the previous season were again grown under similar conditions in well prepared dry field in A block. Seeds were dibbled 6 inches apart in lines in strips of 3' × 7' using two seeds per hole. The plots were irrigated whenever necessary and after the germination was complete, the seedlings were uniformly thinned to one per hole. Progenies of cross Co. 13 × T. 469 were the earliest to flower. Some of the progenies showed promise by surviving the drought test. The other medium duration cross progenies were found to be late and not quite suitable for trial under this extremely droughty condition. Since germination was poor, the crop was not uniform. Flowering was very much protracted owing to the droughty condition and single plants which had successfully withstood the drought test were selected after going through the individual plants. This will be again grown in a dry field for further trial. Two hundred and five selections from six sets of crosses were finally selected for further trial (vide Table XI).

The progenies grown under wet conditions had a fairly uniform growth. Though they were not actually subjected to drought, the crop suffered for want of water after transplanting. Most of them were segregating for their parental characters. Awning and shedding of grains were exhibited by the progenies. Promising plants resembling the cultivated parents with good bunched earheads and non-shedding character were selected from the segregating progenies. The uniform and pure breeding ones were carried forward for preliminary yield trial during the next season. From seven sets of crosses, 1,255 progenies were studied and 193 pure breeding ones were marked for preliminary yield trials. Further selections were made from splitting families.

TABLE XI.—Results of studies on drought resistant crosses, 1951-52.

Cross.	Progenies studied.	Single plant selected.
Co. 13 × T. 469	84	111
GEB. 24 × T. 1601	3	9
Co. 1 × T. 1702	10	38
Co. 2 × T. 1602	21	37
Co. 2 × T. 162	24	10
Co. 5 × T. 123	3	Nil.
Total	145	205

Natural crosses in wild rices.—Fifty-six progenies of natural crosses in wild rice from Cuttack, Pattambi and Vijayavada were studied for their morphological and physiological characters, such as tillering, height, awning and shedding. Most of them were found to be pure breeding, though some were segregating for awning and duration and a few were exhibiting shedding character. A total of 47 single plants, one from each of the promising progenies, was taken for trial at Paddy Breeding Station, Coimbatore, to test their resistance to drought. Thirty pure breeding progenies were sent to Rice Research Station, Tirurkuppam, for trial during the coming season under semi-dry condition to test their drought resistant nature. The following gives the number of selections carried forward :—

NX in wild rice from Cuttack	32 single plant selections.
Do. Pattambi	12 do.
Do. Vijayavada	2 do.
NX in <i>Oryza latifolia</i>	1 do.
Total	47

Crosses were effected with the following dry varieties and wild rice varieties as parents with the idea of evolving drought resistant strains. The details of the crosses and the number of seeds set are given below :—

	Number of seeds.
TKM. 1 × T. 1602	4
TKM. 1 × T. 1601	11
TKM. 2 × T. 1602	1
TKM. 2 × BAM. 3	9
TKM. 2 × MTU. 4	5
ADT. 22 × BAM. 3	1
Bairuvadlu 2999 × T. 740	2
Bairuvadlu 2999 × T. 113	10

7. *Kavunginpoothala* × GEB. 24.—The variety Kavunginpoothala, an introduction from Burma, has a very long bunched head, fine grain size, thick stalk but poor tillering. Crosses were effected in the past between Kavunginpoothala and GEB. 24, which has a wide distribution in the State with good tillering. The resulting material had a very wide variation in a number of economic characters. By intensive studies a large number of pure breeding families were selected with different duration and they were compared with the standard strains already available in these durations. The results of the trials are set out in Table XII. It is seen that one culture gave significantly better yield than Co. 3 and one culture better than Co. 14. Two cultures were higher yielding than Co. 8.

Certain families were still splitting and promising selections were carried forward for further studies in the several duration groups.

TABLE XII.—Results of Kavunginpoothala × GEB. 24 progenies.

Layout—Randomized blocks.	Variants—
Replications—	Medium duration—
Medium duration—	Series 1-6 cultures and 1 standard.
Series 1-4.	" 2-4 " 1 "
" 2-6.	" 3-7 " 1 "
" 3-4.	Long duration—
Long duration—	Series 1-2 cultures and 1 standard.
Series 1-8.	Sown—17th September 1951.
Size of plot—4' × 20' (for all series).	Transplanted—8th November 1951.
	Harvested—6th March 1952.

Summary of results.

Duration and Series and cultures.	Control.	Yield of grain per acre.	Yield of percentage over control.	Flowering dates.	'Z' test (P = 0.05).	Standard error.	Critical difference (P = 0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Medium duration.							
Series (1)—		LB.					
4472 ..	Co. 2	1765	95.0	2nd January 1952.	Yes.	9.3	21.4
4477 ..	"	1859	100.0	8th January 1952.			
6337 ..	"	1144	61.5	8th January 1952.			
6437 ..	"	1828	98.3	6th January 1952.			
7382 ..	"	2041	109.8	22nd January 1952.			
1269 ..	"	2096	112.7	8th January 1952.			
Co. 2 ..	"	1859	100.0	2nd January 1952.			
Series (2)—							
1293 ..	Co. 3	1769	97.9	10th January 1952.	Yes.	7.4	15.7
1307 ..	"	2318	127.7	14th January 1952.			
4502 ..	"	1100	61.1	6th January 1952.			
6332 ..	"	1171	65.0	2nd January 1952.			
Co. 3 ..	"	1801	100.0	10th January 1952.			
Series (3)—							
1305 ..	Co. 14	1680	80.5	10th January 1952.	Yes.	8.8	18.5
1355 ..	"	2031	97.5	16th January 1952.			
6362 ..	"	1739	83.3	16th January 1952.			
6364 ..	"	1253	60.0	14th January 1952.			
6370 ..	"	1877	89.9	16th January 1952.			
7387 ..	"	2540	121.7	12th January 1952.			
Co. 14 ..	"	2088	100.0	10th February 1952.			

Long duration.

Series (1)—	Control.	Yield of grain per acre.	Yield of percentage over control.	Flowering dates.	'Z' test (P = 0.05).	Standard error.	Critical difference (P = 0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
2115 ..	Co. 8	2167	152.6	18th February 1952.	Yes.	5.8	12.7
3725 ..	"	1967	138.6	18th February 1952.			
Co. 8 ..	"	1418	100.0	16th January 1952.			

Conclusion—

Medium duration—

Series 1—1269, 7382, 4477, Co. 2, 6437, 4472, 6337.
 " 2—1307, Co. 3, 1293, 6332, 4502.
 " 3—7387, Co. 14, 1355, 6370, 6392, 1805, 6364.

Long duration—

Series 1—2115, 3725, Co. 8.

8. Other crosses.—Yield trials of promising progenies in the following crosses were continued:—

(a) GEB. 24 × T. 619.—T. 619 Kolamba, a fine grained strain with bunched earhead was crossed with GEB. 24 to combine the bunched heading with the other desirable characters of GEB. 24 and the studies resulted in a number of progenies which though were slightly shorter in duration, did not give higher yields in the previous seasons. For confirmatory tests, the trials were run for a third time. The season in general was poor and the yields were below normal. One culture, however, gave higher yield than GEB. 24. This will be studied in a number of places in the coming years, where GEB. 24 is usually grown.

Other Kolamba strains were got down from Bombay and crosses were effected between GEB. 24 and these strains. F. 1 was grown in this season and studies will be continued.

(b) Co. 23 × GEB. 24 and Co. 23 × Co. 2.—In the Bhavani area, where two crops of rice are raised, it was found that T. 672 (Patna) is preferred for the first crop and Co. 23 for the second crop. The above crosses were planned to see if it should be possible to evolve a cosmopolitan Co. 23 type suitable for both the seasons. Certain progenies of the GEB. 24 × Co. 23 cross were compared against Co. 23 in replicated trial. The yields in general were poor and though 'Z' test was satisfied. The increased yields of the progenies did not reach the level of significance due to the very high critical difference (vide Table XIII). The other cross is being studied and promising selections made for yield trial next season.

TABLE XIII.—Performance of GEB. 24 × CO. 23 progenies.

Layout—Randomized blocks.
 Replications—Four.
 Size of plot—4' × 10'.
 Sown—23rd August 1951.

Transplanted—6th October 1951.

Harvested—26th January 1952.

Variants—Five cultures and one standard.

Summary of results.										
	3025 4	3025 5	5416 30	5416 46	5460	Co. 23.	General mean.	'Z' test (P = 0.05).	Standard error.	Critical difference (P = 0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Yield per acre	1,020	1,110	1,050	1,020	1,110	980	1,048	..	..	..
Percentage on control.	103.6	113.0	106.4	103.6	112.9	100	..	Yes.	18.4	33.2

NOTE.—High critical difference due to irregular water-supplies.

Conclusion—All cultures are on par.

(c) Natural cross in Adt. 11.—Further confirmatory tests with regard to yield and resistance to blast were made in regard to the progenies of a natural cross, which was earlier, spotted in Adt. 11. The pure breeding progenies were compared amongst themselves. There was severe attack of *pyricularia* and some of the cultures were, however, from this and these were marked out for further studies. The results are set out in Table XIV. Their duration is much shorter than Adt. 11 and the blast resistant ones will be sent to the Tanjore district for further trial.

TABLE XIV.—Performance of natural cross in ADT. 11 (Early).

Series.	Culture number.	Percentage over general mean.	'Z' test (P = 0.05).	Standard error.	Critical difference (P = 0.05).
(1)	(2)	(3)	(4)	(5)	(6)
I ..	8199/2	82.5	Yes.	15.2	32.0
	8199/4	89.1			
	8199/16	83.7			
	8199/19	144.6			
II ..	8200/5	107.0	No.	20.1	..
	8200/9	83.1			
	8200/10	100.0			
	8200/13	106.2			
	8200/17	103.5			

Conclusion—8199/19, 8199/4, 8199/16, 8199/2.

(d) Crosses between geographical races.—Breeders have recently been laying some stress that crossing of 'geographical races' of crop plants leads to certain desirable combinations of genes. To explore the possibility of this line of study, seventeen sets of crosses were made between ten *Japonica* types (obtained through the courtesy of the Director, Central Rice Research Institute) and some of the popular short duration strains (*Indica* types). A few crosses with exotic types (Italian and Belgian Congo) were also made. F-1s. of these were raised during the 1951-52 season. As may be expected, the F-1 showed different degrees of fertility. The F-2s will be studied next season. F-1 seed of a few sets of crosses between GEB. 24 and certain Norin types (from Japan) were sent by the Director, Central Rice Research Institute. These will also be grown along with the other F-2s and studied.

9. Induction of mutations—(a) Acenaphthene.—(i) The one plant which showed some variation in acenaphthene treated GEB. 24 selected last year, was again under yield tests this season. It was just four days longer in duration and also yielded higher than GEB. 24 (vide Table XV). The studies will be continued.

(ii) The mutant produced by treating Co. 13 with acenaphthene was again under yield trial and was also studied for other characters. It maintained its

week's longer duration, taller growth and more or less similar grain size. The results are gathered in Table XV.

TABLE XV.—Details of mutants obtained by *Acenaphthene* treatment.

(1)	Co. 13.		GEB-24.	
	Mutant. (2)	Parent. (3)	Mutant. (4)	Control. (5)
Average height	4'-0"	3'-5"	2'-9"	2'-8"
Number of tillers per plant ..	5	5	5	4
Average length of ear (cm.) ..	17.5	14.3	21.3	20.4
Number of grains per ear ..	42	34	76	65
Size of grain—				
Length (mm.)	7.9	7.7	7.6	7.5
Breadth (mm.)	2.8	2.9	2.3	2.3
Thickness (mm.)	1.9	1.9	1.7	1.6
Duration—Flowering (days) ..	92	82	106	100
Weight of 1,000 grains (gm.) ..	25.4	21.8	16.8	16.4
Yield as per cent of parent—				
Coimbatore—				
(1)	196.0	100.0	126.5	100.0
(2)	109.2	100.0	..	..
(3)	134.2	100.0	..	..
Tirurkuppam—				
(1)	108.7	100.0	..	..
(2)	131.2	100.0	..	..

(b) *Ceresan*.—Seeds of strain Co. 13 and Co. 2 were treated with 4 and 5 grams of *ceresan* per 1 lb. weight two seasons ago. Some plants grown from this seed were found to be longer in duration, taller with other characters more or less similar to Co. 13. These were compared with the parent Co. 13 for yield also. The results are set out in Table XVI. The trials will be continued. In Co. 2, two cultures gave higher yield.

TABLE XVI.—Details of mutants in *Ceresan* treatment.

(1)	Co. 13 mutant.			Co. 2 mutant.		
	257. (2)	291. (3)	Parent. (4)	893. (5)	5860. (6)	Parent. (7)
Average height	3'-5"	3'-4"	3'-3"	..	..	..
Number of tillers per plant ..	4	5	3	4.4	4.2	3.6
Size of grain—						
Length (mm.)	7.6	7.8	7.7	7.7	7.6	7.7
Breadth (mm.)	2.8	2.9	2.9	2.5	2.5	2.5
Thickness	1.9	1.9	1.9	1.7	1.7	1.8
Duration—Flowering (days).	84	85	76	134	137	127

(c) *Benzene vapour*.—The abnormal plants which were spotted out in Co. 13 whose flowers in bloom are treated with benzene vapour for 30 seconds were again grown. They were again a week days longer, taller, were more vigorous and yielded better than Co. 13 both in the first and second crop season. The results are given in Table XVII and the trials will be continued.

TABLE XVII.—Mutants with benzene treated Co. 13.

(1)	Co. 13 mutants.		Co. 13 parent.
	180. (2)	182. (3)	
Height of plant	3'-5"	3'-6"	3'-4"
Number of tillers per plant ..	6	6	5
Duration—Flowering (days) ..	80	83	81
Size of grain—			
Length (mm.)	7.8	7.6	7.7
Breadth (mm.)	2.9	2.8	2.9
Thickness (mm.)	1.9	1.9	1.9
Weight of 1,000 grains (gm.) ..	22.3	21.6	21.8
Yield as per cent of parent—			
First crop—			
(1)	160.9	215.2	100
(2)	100.5	109.0	100
Navarai	107.2	108.2	100

10. *Inducing dormancy in short-duration strains*.—Most of the short-duration strains evolved by the department germinate immediately on ripening and this results in some wastage in years and places where the harvests synchronize with rainy weather. It was found that certain exotic short duration types show a certain amount of 'dormancy'. Thirteen sets of crosses were made between these and the popular second crop strains to induce the dormancy of the exotic types in them. The F-1s. were studied for germination every fortnight for six fortnights beginning from the day of harvest. It transpired that in ten F-1s. the germination per cent on ripening was less than 5. The 'dormant' parents remain dormant for 45 days and most of the non-dormant parents show 30-45 per cent germination on the day of harvest and reach the full germination value within a fortnight. Further studies of inheritance as well as selection for economic characters will be continued.

11. *Crosses for evolution of foot-rot resistant types*.—It was found that foot-rot sometimes assumes some importance in the second crop season of the Godavari delta and in the short duration strains of the Coimbatore district. Agrosan treatment of seed before sowing was found to be a useful prophylactic. It was, however, found that PTB. 7 (*Parambuvattan*) was found to be very resistant to foot-rot. To see if evolution of a short duration foot-rot resistant strains similar to the 'dalwa' varieties of the Godavari delta as a cheap method, certain crosses were undertaken using PTB. 7 as one parent. One hundred and seventeen promising selections were made and these are proposed to be studied for their resistance to foot-rot in collaboration with Government Mycologist.

12. *Types*.—New accessions totalling 75 comprising of 12 from foreign countries and 63 from other States were grown and described. The total collection now stands at 2,645. A sample of *O. glaberrima* and *O. breviligulata* from Nigeria were amongst the new acquisitions. Hill rices were found to be more vigorous. One of the Siamese types and a few Chinese were found to be very impressive for their short duration. During the navarai season 1951-52, 178 exotic types were compared with the departmental strains of similar duration. The crop came up very well and some of the types were found to be higher yielding. The promising ones will be sent to sub-stations also for trial to find out their suitability to these tracts, either for direct cultivation or for using in a scheme of hybridising programme. The section continued to supply types on request to a number of outside States and countries.

13. *Manurial experiments*—(a) *Graded phosphate doses experiments*.—The experiment with four doses of green leaf 0, 2,000, 4,000 and 6,000 lb. per acre and four doses of P_2O_5 0, 30, 45 and 60 lb. per acre was conducted for the second time on the station. For increased application of P_2O_5 , there is not the same proportionate increase in grain yield. Statistical analyses show that the 'Z' test is satisfied only for doses of green leaf but not for doses of P_2O_5 or for the interaction of P_2O_5 × green leaf. Peculiarly without basal dressing of leaf P_2O_5 had shown increasing responses with increasing doses. The yields are given in Table XVIII. Last year 6,000 lb. leaf + 30 lb. P_2O_5 gave the highest yield of grain and 6,000 lb. leaf + 45 lb. P_2O_5 gave the highest straw yield.

TABLE XVIII.—Summary of results for Graded phosphate doses experiment, 1951-52—First crop.

Size of plot—	Date of sowing—3rd October 1951.
Gross—15' × 24'.	Date of planting—16th to 17th November 1951.
Nett—14' × 23'.	Date of flowering—12th to 15th February 1952.
Replications—Four.	Date of harvest—1st to 2nd April 1952.
Variety—Co. 25.	
Treatments.	
1 0 lb. green leaf + 0 lb. P_2O_5 .	9 4,000 lb. green leaf + 0 lb. P_2O_5 .
2 0 lb. green leaf + 30 lb. P_2O_5 .	10 4,000 lb. green leaf + 30 lb. P_2O_5 .
3 0 lb. green leaf + 45 lb. P_2O_5 .	11 4,000 lb. green leaf + 45 lb. P_2O_5 .
4 0 lb. green leaf + 60 lb. P_2O_5 .	12 4,000 lb. green leaf + 60 lb. P_2O_5 .
5 2,000 lb. green leaf + 0 lb. P_2O_5 .	13 6,000 lb. green leaf + 0 lb. P_2O_5 .
6 2,000 lb. green leaf + 30 lb. P_2O_5 .	14 6,000 lb. green leaf + 30 lb. P_2O_5 .
7 2,000 lb. green leaf + 45 lb. P_2O_5 .	15 6,000 lb. green leaf + 45 lb. P_2O_5 .
8 2,000 lb. green leaf + 60 lb. P_2O_5 .	16 6,000 lb. green leaf + 60 lb. P_2O_5 .

(a) Green leaf.

Particulars.	Green leaf.				General mean.	Standard error.	'F' value satisfied or not (P=0.05).	Critical difference (P=0.05).
	Control—0 lb.	2,000 lb.	4,000 lb.	6,000 lb.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Acre yield in lb.	1,975	2,119	2,093	2,401	2,147	53.3	Yes.	150.1
Percentage on control	100.0	107.3	106.0	121.6	..	2.7	..	7.6
Conclusion—6,000 lb. 2,000 lb. 4,000 lb. Control 0 lb.								

(b) P₂O₅.

Particulars.	P ₂ O ₅ .				General mean.	Standard error.	'F' value satisfied or not.	Critical difference (P=0.05).
	Control Ott.	30 lb.	45 lb.	60 lb.				
Acre yield in lb.	2,126	2,069	2,110	22,83	2,147	..	No.	..
Percentage on control	100.0	97.3	99.3	107.4	..	2.8	..	7.9

(c) Green leaf × P₂O₅.

(c) Leaf yield in lb.												
Particulars.	Leaf—0 lb.				Leaf 2,000 lb.				Leaf 4,000 lb.			
	P2O5.				P2O5.				P2O5.			
	(Control) Oth.	30 lb.	45 lb.	60 lb.	Oth.	30 lb.	45 lb.	60 lb.	0	30 lb.	45 lb.	60 lb.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Acre yield in lb. ..	1,831	1,860	1,966	2,240	2,160	2,071	2,046	2,200	2,264	2,120	1,886	104
Percentage on control.	100.0	101.6	107.4	122.3	118.0	113.1	111.7	120.2	123.6	115.8	103.0	114.9
(d) Leaf 6,000 lb.												
Particulars.	P2O5.				Standard error.	General mean.	F value satisfied or not (P=0.05).	Critical difference (P=0.05).				
	0	30 lb.	45 lb.	60 lb.								
	(14)	(15)	(16)	(17)								
(18)	(19)	(20)	(21)									
Acre yield in lb. ..	2,248	2,226	2,542	2,588	2,147	..	..	..				
Percentage on control.	122.8	121.6	139.0	141.4	..	5.0	No.	14.2				

(b) *Placement of phosphate experiment.*—It has been the experience with the experiments using phosphates that no consistent results were obtainable. They have always been erratic. But it has been found as a result of the experiments elsewhere that phosphates should always be 'placed' before the crop is planted. The present experiment designed this year has three treatments, viz.:—

(1) Basal dressing of 5,000 lb. leaf + 30 lb. N as ammonium sulphate + 45 lb. P₂O₅ as super spread on surface and puddled in.

(2) Five thousand pound green leaf + 30 lb. N + 45 lb. P₂O₅ as super. The super is made into a paste with mud and the roots of seedlings are dipped in the paste before planting and the balance is applied to the plot.

(3) Five thousand pound green leaf + 30 lb. N + 45 lb. P₂O₅ as super applied as top dressing by broadcasting (as is usually the practice) at the time of planting.

Co. 25 was used for the experiment. 'Z' test was not satisfied (vide Table XIX).

TABLE XIX.—Placement of phosphate fertilisers manurial experiments.

Size of plot— Gross area 10½ × 24'. Net Area 10 × 23½. Replication 8.	Variety—Co. 25. Date of planting—11th November 1951. Date of flowering—12th February 1952 to 15th February 1952. Date of harvesting—29th March 1952.
Treatments— I. 45 lb. P ₂ O ₅ (super) spread on surface and puddled in. II. Treating seed in super solution, dipping seedlings in super and mud paste and balance to be puddled in. Date of sowing—13th September 1951.	III. Control—45 lb. P ₂ O ₅ applied as top dressing broadcasting. (Basal dressing of 5,000 lb. green leaf + 30 lb. N ammonium sulphate to all plots.

Summary of results.

Particulars.	Treatments.			Standard error.	'F' value satisfied or not (P=0.05).	Critical difference (P=0.05).
	I	II	III			
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Grain.						
Acre yield in lb.	2,992	3,104	3,008	..	No	..
Percentage on control	94.3	103.2	100.0	2.94	..	8.9
Straw.						
Acre yield in lb.	6,325	6,407	6,210	..	No	..
Percentage on control	102.0	103.4	100.0	2.52	..	7.7

14. *Japanese method of cultivation.*—To test the efficacy of the Japanese method of cultivation, which among other things involves the use of 'placement' of ammonium sulphate and inter-cultivation, as compared to the local method, an experiment was laid. The details of the treatments are given in Table XX. It was found that in the Japanese method, the plants had a tendency to grow shorter and were also 2-3 days later in flowering. The results (vide Table XX) showed that in the first crop season the Japanese method was 7 per cent better than the local method and as the quantity of nitrogen was increased from 0 to 30 and 45 lb., the increases ranged from 17 to 50 per cent in the case of the Japanese method, while in the case of local method, the increases were from 13 to 78 per cent. In the second crop, the no-manure plot was omitted for want of space in the field and the raking was also dispensed with. The results were interesting (vide Table XXI). In the Japanese method the crop did not lodge and the interaction was significant, showing that the Japanese method gave higher increases with 30 and 45 lb. nitrogen than the corresponding dosages in the local method.

TABLE XX.—Japanese method of cultivation.

First crop season.	
Size of plot— Gross 17' × 24'. Net 16½' × 23½'. Spacing—6" apart—doubles and bulk for local method. Weeding and raking once in 15 days for Japanese method.	Date of sowing—13th September 1951. Date of Planted—12th November 1951. Date of flowering—12th to 16th December 1951. Date of harvest—21st March 1952.
First year trial (in modified form)—B 4 bc, 5 bc.	
Treatment.	
Japanese method— 1. No Manure. 2. Green leaf 4,000 lb. + 45 lb. P ₂ O ₅ as super puddled in before planting. 3. As 2 + ammonium sulphate to supply 20 lb. N before planting 10 lb. N a month after planting. 4. As 2 + ammonium sulphate to supply 30 lb. N before planting 15 lb. N a month after planting.	Local method— 5. No manure. 6. Green leaf 4,000 lb. + 45 lb. P ₂ O ₅ puddled in before planting. 7. Same as 6 ammonium sulphate to supply 30 lb. N a month after planting. 8. Same as 6 + ammonium sulphate to supply 45 lb. N a month after planting.

Summary of results.

(a) Japanese method × local method.

Particulars.	Japanese method.	Local method.	General mean.	Standard error.	'Z' value satisfied or not (P=0.05).	Critical difference (P=0.05).
Acre yield in lb.	3,108	2,904	3,006	21.78	..	97.9
Percentage on control	107.1	100.0	..	0.75	Yes.	3.37
Conclusion—Japanese method, local method.						

(b) Main plot treatments.

Particulars.	Treatments.				Standard error.	'Z' test satisfied or not (P=0.05).	Critical difference (P=0.05).
	(No manure).	(Basal dressing.)	(Ammonium sulphate) 30 lb. N.	(Ammonium sulphate) 45 lb. N.			
Acre yield in lb.	2,140	2,598	3,584	3,701	3,006	45.1	185.3
Percentage on control.	100.0	121.3	167.4	172.1	..	2.92	8.7
Conclusion— Ammonium sulphate, Ammonium sulphate Basal dressing. No manure. 45 lb. N. 30 lb. N							

(c) Interaction.

Treatments.	Japanese method, Local method.								General mean.	Standard error.	'Z' test satisfied or not (P = 0.05).	Critical difference (P = 0.05).
	1	2	3	4	5	6	7	8				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Acre yield in lb.	2,226	2,752	3,702	3,752	2,055	2,441	3,467	3,653	3,006	..	No	..
Percentage on general mean.	74.1	91.6	123.1	124.8	68.4	81.2	115.3	121.2	100.0	5.79	..	17.2

TABLE XXI.—Summary of results for Japanese method × local method.

(Second crop.)

Lay out—Split plot.	Date of sowing—30th January 1952.
Japanese × local—Main plot treatments.	Date of planting—29th February 1952.
Dosages of arm sulphate sub-plot treatments.	Date of harvest—4th June 1952.
Replications—4.	Plots size—10' × 21 3/4'.
Basal dressing 4,000 lb. leaf + 45 lb. P205.	
Treatments—	
Local method—1. 0 lb. nitrogen	All applied three weeks after planting by broadcast.
2. 30 lb. Nitrogen as ammonium sulphate	
3. 45 lb. Do.	
Japanese method—4. 0 lb. Nitrogen	All applied three weeks after planting by broadcast.
5. 20 lb. Nitrogen as ammonium sulphate at planting + 10 lb. N. after 3 weeks.	
6. 30 lb. Do. do. do. + 10 lb. do.	
The nitrogen in Japanese method is placed by mixing with clay—2 to 3 inches below the surface.	

Summary of results.

(a) Japanese and local methods.

Particulars.	Japanese method.	Local method.	General mean.	Standard error.	F. value satisfied or not (P = 0.05).	Critical difference (P = 0.05).
Acre yield in lb.	2,503	2,089	2,296	10.33	Yes.	186.0
Percentage on control	119.9	100.0	..	0.45	Yes.	8.1
Conclusion—	Japanese method, Local method.					

(b) Doses of nitrogen.

Particulars.	Treatments.			General mean.	Standard error.	F value satisfied or not (P = 0.05).	Critical difference (P = 0.05).
	Control 0 lb. N.	30 lb. N.	45 lb. N.				
Acre yield in lb.	2,011	2,336	2,541	2,296	55.10	Yes.	318.1
Percentage on control	100.0	116.1	126.3	..	2.4	Do.	9.5
Conclusion—	45 lb. N., 30 lb. N., 0 lb. N.						

(c) Interaction.

Particulars.	Local method.			Japanese method.			General mean.	Standard error.	F value satisfied or not (P = 0.05).	Critical difference (P = 0.05).
	Control 1.	2	3	4	5	6				
Acre yield in lb.	1,958	2,223	2,083	2,004	2,448	2,398	2,296	75.8	Yes.	298.5
Percentage on control.	100.0	113.5	106.4	105.4	125.0	153.1	..	3.3	Do.	13.0
Conclusion—	0, 5, 2, 3, 4, 1.									

TABLE XXII.—Seed distribution, 1951-52.

	Quantity.		Value.		
	LB.	OZ.	RS.	A.	P.
Paddy seeds	21,000	..	2,625	0	0
Other seeds—					
Gourds	2	1	4	12	7
Tomato	12	4	201	8	0
Lady's finger	16	0	35	0	0
Cowpea, beans, etc.	82	4	184	0	0
Amaranthus	20	0	10	0	0
Papaya	30	0	90	0	0
Sesbania	1,180	0	295	0	0
Gliricidia	69	4	311	10	0
Seedlings—Sesbania	1 1/2 (lakhs)				
Gliricidia	5,890				
			Not valued.		

15. *Trials of varieties for early navarai.*—It frequently happens that the intended planting of Samba cannot be done due to the failure of timely north-east monsoon and a problem generally arises as to which variety would come up well in December plantings. A preliminary trial conducted with a few short-duration strains showed that Co. 23 is the best, giving an yield of about 3,000 lb.

16. *Other crops*—(1) *Green-manure crops.*—During the Samba season 1951, sunn-hemp over 15 acres, Daincha on 2 acres and 3 acres of *Sesbania speciosa* were raised. Sunnhemp gave 20,000 lb. of green matter in 4 acres and in the rest 1,500 lb. of seeds were collected, as the plots could not be ploughed up in time due to absence of canal supplies for planting. Daincha gave 850 lb. and *Sesbania speciosa* 3,340 lb. per acre of green matter. These were sufficient to give basal dressing of 4,000 lb. of leaf over 20 acres.

Sesbania speciosa.—*Sesbania speciosa* was planted at 2 feet apart to intensify seed production along the edges of the first crop of paddy field bunds. In the A block in which a second crop of rice was grown, *Sesbania* planted at 6 inches apart gave 3,470 lb. of green matter which was cut from the field edges and applied to the fields. In the other areas the plants were allowed to flower and 1,138 lb. of seed were collected. The stumps and dried plants were sold for fuel purposes.

Gliricidia.—The shrubs planted in the A block three years ago gave 16 lb. per plant from the cutting in August and again 10 lb. in February for the *navarai* planting. A quantity of 6,660 lb. of leaf was cut from all the shrubs on the farm and was applied to the Samba crop in 1951. A quantity of 59 lb. of seed was also collected. A total of 4,733 potted seedlings were transplanted on one bund of all double-bunded fields and all odd corners.

Indigofera teysmanii.—The seeds received from the Director of Agriculture were sown in seedling pans. The germination was poor and the eight plants that germinated was planted in July 1952 after six months' slow growth.

(2) *Fruits—Grape vine.*—During the year the two plants were given two prunings, one in July 1951 and another in December 1951. During the year under report 1/2 lb. of grapes were harvested and distributed.

Mango.—The mango trees were free from any severe pest or disease attack. The three varieties, Peter, Neelam and Khudadad had also yielded off-season fruits during the year. The following quantities of mango fruits were distributed during the year :—

Variety.	Number of trees.	Produce. LB.
Peter	2	1,698 1/2
Mulgoa	1	137 1/2
Neelam	1	137 1/2
Khudadad	1	83 1/2
Pickle mangoes	1	1,896 1/2
Total	..	5,353 1/2 at 2 annas per pound for fruit and 1 anna per pound for pickle mangoes Rs. 550-10-9.

During the year, 11,130 mango stones were sown to raise root stocks for grafting with the yard Peter tree. But the stones showed only very little germination. Forty-five seedlings were grafted on the Peter tree and were handed over to the Fruit Specialist. Hundred potted seedlings are ready by end of June for grafting.

Grape fruits.—Three seedlings were received from Kallar in August 1951 for planting on the Paddy Breeding station. The seedlings were planted behind the farm office. Due to the severe summer and the drought two seedlings succumbed though watering was done regularly. One has established and is making very slow progress.

Papaya.—The papaya plants were healthy. Thirty-five seedlings were planted during the year in the farm to replace old trees. During the year under report 1,739 lb. of fruits (pulp) were distributed and 30 lb. 14 oz. of seeds collected.

Jambolana.—The tree is healthy. But the tree had not put forth any flush during the year under report. Thirty-two seedlings were potted for distribution.

Custard apple.—The plants on the western side of the cage came to yield this year. Thirteen pounds of fruit were harvested and distributed.

Malta lemon.—The eleven plants behind the farm office were quite healthy. Spraying with one per cent bordeaux mixture was done whenever found necessary. During the year under report 446 fruits were distributed.

(3) *Vegetables—Bread fruit*.—Three bread fruit seedlings were received from the Fruit Research Station, Kallar, in August, 1951. As the seedlings were small to transplant in fields, they were maintained in the pots themselves. They were transplanted in July 1952 (one in yard, one in A block high piece and one in H block high piece).

Brinjal.—The brinjal crop in A block (sown in February 1951 and transplanted on 14th April 1951) did not come up well due to borer attack. Only 2 lb. 6½ oz. of seeds were collected from the 4 cent crop.

Snake gourd.—Six pits of snake gourd were sown in January 1951 with the two varieties, Aduthurai Long and Maruteru Long on the H block high piece. The crop came up well. The crop was allowed to set seed. One pound and five and quarter ounce of seeds were collected from the crop. The crop was removed in August 1951.

Cowpea.—The crop was sown during two seasons in the year. The first crop was sown in A-3 ab in May 1951, to an extent of 25 cents. Another crop was sown to an extent of 8 cents in December 1951. The crop came up well and yielded 91 lb. 8 oz. of seeds, which valued at Rs. 2 per pound works out to Rs. 183.

Lady's finger.—Two crops were raised in A-3 ab and in F-8 c on a total area of 21 cents. In A-3 ab the crop was sown in May 1951 and in F-8 c in December 1951. Vein clearing disease due to a virus was noted in a few plants which were removed and destroyed. Seventeen pounds and eight ounce of seeds were collected from the two crops, valued at Rs. 35 at annas two per ounce.

Tomato.—Eleven varieties of tomatoes received from the head of division of Botany, New Delhi, were raised in F-8 cd in 15 cents on 9th June 1951. The crop came up well with bumper yields. Two thousand four hundred and forty-one pounds of fruits were harvested from the crop from which 12 lb. 9½ oz. of seeds and 663¼ lb. of pulp were obtained. This yield of fruits works out nearly to 16,260 lb. per acre and the total proceeds amounted to Rs. 222-3-6.

Dolichos lablab.—The crop was grown on H block high piece, behind the cart-stand and in the L block well high piece in ten pits spaced 12 feet apart. The crop came up well. The crop yielded 22 lb. 6 oz. of seeds. The crop behind the cart-stand is putting forth a second flush of flowers. The setting is good and hence the crop is retained to note the performance.

Coccinia.—The plants were healthy during the year. They were manured with ammonium sulphate and super phosphate. The crop yielded 76½ lb. of vegetable during the year.

Roselle (Hibiscus subdariffa).—The seeds received had poor germination. Seeds were sown in pots on 18th March 1952. The plants came up well. So far the plants have not put forth any flowers.

(4) *Fodders—Stylosanthus guyanensis*.—The plants failed to make progress under field conditions. Hence they were potted so that more care could be taken to establish them. But attempts proved futile and all died one after another.

Cumbu grass.—Slips were planted behind the farm office during the year to a length of 200 running feet. They had established well. One hundred and thirty pounds of grass were cut and fed to cattle during the year.

(5) *Ornamental plants—Roses*.—Eight hundred and thirty-three roses were distributed during the year from 12 plants.

Jasmine.—Two hundred and sixty-four ounces of flowers obtained from 19 plants were distributed during the year.

(6) *Coconuts*.—Two vigorous growing seedlings were planted in A block high piece in October 1951. They are coming up well.

One thousand seven hundred and sixty coconuts were auctioned and Rs. 307-8-0 realized during the year under report. The yield was obtained from 110 trees.

(7) *Bastard sago*.—One pound of seeds was received from the Special District Agricultural Officer, Araku, in May. They were sown in tube pots. But till now no sign of germination is observed.

(8) *Crops in rice fallow—Cotton*.—Cultivation of cotton in fallow lands was started during the year. Cotton was cultivated in F-1 a, b, c, d to 5 a, b, c, d. Only in F3 a, b, c, d M.U. 1 cotton was grown and in the rest, variety P 216 F. was grown. Seeds were sown in January 1952 in the paddy lands without any preparatory cultivation. Holes ¾ inches deep were made in the wet soil and two seeds per hole were sown. Over the seeds red soil was put to cover the seeds, so as to prevent the clay soil from cementing the surface and consequently inhibiting the germination. Spacing adopted for the crop was 2' × 9". The crop received eight irrigations till 1st July 1952. P 216 F had almost completed its harvest and M.U. 1 is still producing bolls. The following are the details:—

Variety.	Area.	Expected yield per acre.
	CENTS.	
M.U. 1	27.26	450 lb.
P. 216 F	109.0	400 lb.

Groundnut.—In 8 cents groundnuts were dibbled in the paddy stubble after the rice harvests and in about 0.32 acre, the land was prepared and TMV. 2 groundnuts were dibbled. The crop came up exceedingly well. The following are the details:—

Plot number.	Date of sowing.	Date of harvest.	Area.	Number of irrigations given.	Acre yield (wet weight in lb.)	Acre yield (dry weight in lb.)
			CENTS.			
D 1c	14th February 1952.	2nd June 1952.	8	5	1,881	1,250
D 1a	1st March 1952.	18th June 1952.	16	6	2,800	1,625
D 1b	Do.	26th June 1952.			2,587	1,275
D 2b	9th April 1952.	30th June 1952.	16	7	3,075	2,063

17. *Miscellaneous*.—The financial statement is given as Appendix I and the steps to increase revenue as Appendix II.

PADDY BREEDING STATION,
COIMBATORE,
25th August 1952.

A. ABDUL SAMAD,
Assistant Paddy Specialist.

AGRICULTURAL COLLEGE AND RESEARCH
INSTITUTE, LAWLEY ROAD P.O.,
COIMBATORE,
28th August 1952.

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

APPENDIX I.

FINANCIAL STATEMENT OF THE PADDY BREEDING STATION, COIMBATORE,
FOR THE YEAR 1951-52.

A. Expenditure.

40. g.—Agriculture—Experiment and Research—(i) Excluding Post-war Reconstruction—
A. Research Institute—

	Amount.
	RS.
1. Pay and Allowances—	
Pay of officers	8,091
Pay of establishment (permanent)	21,193
„ (temporary)	845
Dearness allowance	9,532
Travelling allowance	3,114
House-rent allowance	2,002
2. Contingencies—	
Petty construction and repairs	2,035
Other contingencies	1,474
Livestock	..
Deadstock	2,225
Repairs and upkeep	2,777
Maintenance of cattle	2,445
Mazdoor labour	8,245
Miscellaneous cultivation expenses	470
Other miscellaneous charges	2,838
Dearness allowance to menials	2,219

B. Receipts.

XXIX. Agriculture—Agricultural receipts—

Agricultural stations	7,585
Sale of green manure seeds	..
Miscellaneous	786
Recovery of over payments	100

XIII. Other Taxes and Duties—

Sales tax	47
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XLV. Stationery and Printing—

Stationery and Printing	9
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APPENDIX II.

STEPS TO INCREASE THE REVENUE OF THE STATION.

The present supply of water was found to be inadequate to cope up with even the cultivation of a normal paddy crop. However with the available supplies during the off-season and the choice of suitable crops, the following additional crops were raised :—

(1) Cotton on 1.36 acres and groundnuts on 0.40 acre after the harvest of the rice crops were raised with a few irrigations.

(2) Area under vegetables was increased and all odd corners were used for planting quick-growing papaya.

(3) A bore-well was attempted opposite the laboratory building and even at 150 feet depth, there was no yield of water.

(4) Green manure shrubs of *gliricidia* were planted on field bunds and green manure *sesbania speciosa* along the edges of field bunds was raised to effect saving in the manure bill.

ANNUAL REPORT OF THE AGRICULTURAL RESEARCH STATION,
MARUTERU, FOR THE YEAR 1951-52 (FASLI 1361).

Season.—A total rainfall of 47.29 inches distributed over 54 rainy days was recorded during the year, as against 53.58 inches in 54 rainy days of the previous year, and the decennial average of 41.58 inches in 60 days. The total was thus in excess of the normal by about 3.85 inches. The rainfall was evenly distributed throughout the growing phases of the rice crop. The south-west monsoon started early in June and gained in strength during the second week of July. The rains were distributed evenly during the rest of the months. Thus a total rainfall of 34.03 inches was received during this monsoon which was in excess of the normal by 10.52 inches. On account of the early onset of the monsoon, the canal supply was full which facilitated the quick transplantation of the main crop rice, thus the season started very favourably.

The north-east monsoon followed normally and thus there was no break in the rainy weather. The season recorded a total rainfall of 11.15 inches on 14 rainy days. The quantity was in deficit from the normal by 3.47 inches. The dry spell that prevailed in December was taken advantage of for the harvest of main crop rice.

The hot weather period was not very severe and a total rainfall of 2.11 inches distributed on 5 rainy days was registered in this season. Most of the quantity was received in the last week of May which hindered the harvest of second crop rice. The total fall was in deficit from the normal by 0.68 inch during this part of the season.

With the help of the early and heavy rains in June and with the canal supply being full, preparatory cultivation for main crop rice was commenced in time. During this season, May which is normally the hottest month of the year, was moderate and the temperature ranged from 72°F to 102°F. The rainfall data are given in Table I.

TABLE I.—Rainfall statement at Agricultural Research Station, Maruteru,
for the year 1951-52.

Month.	Week.	1951-52.		1950-51.		Average for the past ten years.		Average for the past twenty-four years.	
		Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
South-west monsoon.									
June	7-13	2.13	2	0.49	1	1.05	1.9	0.94	1.8
	14-20	0.36	1	0.85	2	0.34	0.9	0.84	2.0
	21-27	1.14	3	..	..	0.97	1.9	0.96	2.3
	28-4	..	..	2.61	2	1.56	2.8	2.02	3.4
July	5-11	..	..	2.91	5	2.07	4.0	1.57	3.6
	12-18	4.70	3	1.09	2	1.31	2.5	1.35	3.2
	19-25	11.53	7	2.87	6	1.99	3.3	2.03	3.9
July-August	26-1	2.12	2	0.31	1	1.07	2.2	1.81	3.0
	2-8	2.11	3	1.54	2	1.06	1.7	1.33	3.0
	9-15	1.18	2	0.09	..	1.80	2.8	1.23	3.1
	16-22	3.27	2	..	..	1.32	2.1	1.53	2.8
	23-29	0.17	1	2.96	5	1.90	3.2	1.50	3.0
August-September.	30-5	1.21	2	10.18	6	3.24	2.8	1.86	1.3
	6-12	2.58	3	10.85	4	2.73	2.9	1.58	3.2
	13-19	0.35	1	..	..	1.10	2.2	1.25	3.0
	20-26	1.18	3	1.07	2	1.66	2.9	1.56	2.6
Total	..	34.03	35	37.82	38	25.17	40.1	23.51	45.2

Month.	Week.	1951-52.		1950-51.		Average for the last ten years.		Average for the past twenty-four years.	
		Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
North-east monsoon.									
Sep.-October	27-3	3.94	5	0.70	2	1.21	2.1	2.00	3.1
	4-10	0.70	3	1.05	1	1.75	1.9	1.87	2.4
	11-17	4.17	3	0.80	2	2.85	3.1	1.97	3.2
	18-24	..	..	3.03	2	1.18	1.9	2.24	2.8
	25-31	0.03	..	..	..	1.93	1.0	2.31	1.8
November	1-7	1.54	1	3.26	5	1.33	2.0	1.54	1.8
	8-14	0.04	..	..	..	0.91	0.7	0.78	1.0
	15-21	..	..	..	..	1.09	1.3	1.04	1.1
	22-28	0.54	1	..	..	0.63	0.1	0.43	0.13
Nov.-December	29-5	..	..	..	..	0.01	..	0.36	0.2
	6-12	..	..	..	..	..	..	0.01	0.1
	13-19	0.19	1	..	..	0.62	0.5	0.33	0.3
	20-26	..	..	..	..	..	..	0.07	0.2
Dec.-January	27-3	..	..	..	..	..	..	0.02	0.04
	4-10	..	..	..	..	..	..	0.07	0.01
	11-17	..	..	..	..	0.02	0.01	0.50	0.03
	18-24	..	..	..	..	0.04	0.01	0.03	0.03
	25-31	..	..	..	..	..	..	..	..
Total	..	11.15	14	8.89	12	13.62	14.62	15.37	17.81
Hot weather.									
February	1-7	..	..	..	..	0.06	0.3	1.14	0.24
	8-14	..	..	..	..	..	..	0.09	0.03
	15-21	..	..	..	..	0.03	0.1	0.08	0.20
	22-28	0.39	1	..	..	0.04	0.1	0.04	0.20
March	1-7	..	..	..	..	0.02	..	0.03	0.20
	8-14	..	..	..	..	0.05	0.1	0.23	0.24
	15-21	..	..	..	..	..	..	0.01	0.03
	22-28	..	..	..	..	0.36	0.4	0.14	0.20
March-April	29-4	..	..	..	..	0.01	0.1	0.03	0.24
	5-11	..	..	..	..	0.37	0.4	0.28	0.23
	12-18	..	..	..	..	0.11	0.1	0.07	0.20
	19-25	..	..	0.17	1	0.18	0.2	0.21	0.52
April-May	26-2	..	..	..	..	0.14	0.2	0.05	0.03
	3-9	..	..	..	..	0.35	0.2	0.25	0.36
	10-16	..	..	..	..	0.18	0.5	0.31	0.80
	17-23	1.28	2	..	..	0.24	0.6	0.43	0.60
May-June	24-30	0.39	2	0.03	..	0.55	0.7	0.38	0.80
	31-6	0.05	..	6.87	3	0.10	1.0	0.73	0.92
Total	..	2.11	5	6.87	4	2.79	5.0	4.56	6.24
Grand total	..	47.29	54	53.58	54	41.58	59.72	43.44	69.25

2. *Cultivation routine—Main crop sowing and planting.*—Sowings for the first crop were commenced on 5th May 1951 and completed by 20th June 1951. A total number of 1,991 units was sown in an area of 5.70 acres.

Transplantation of main crop rice was started on the station on 12th June 1951. With the help of early and heavy rains in June and with the adequate canal supply due to early receipt of freshes in the river, planting operations continued till 31st July 1951. The number of units planted during the main crop season of 1951-52, was, 4,569 units, covering an area of 39.52 acres. The details are furnished below:—

Particulars.	Number of units.	Area in acres.
(1)	(2)	(3)
1 Bults, seed multiplication lots, foundation seed stocks.	1,130	27.42
2 Yield trials of cultures	1,164	5.04
3 Manurial and cultural experiments	209	3.81
4 Pure lines	138	0.29
5 Study material	577	1.33
6 Crosses	12	0.09
7 Cultures for study including progenies of artificial crosses	1,339	1.54
Total ..	4,569	39.52

3. *Main crop manuring and harvest.*—The general manurial regimen to the rice crop on the station consisted of a basal dressing of 2,000 lb. of green leaf or 10 cart-loads of farm-yard manure per acre and superphosphate at 100 lb. per acre except for the manurial experiments. At the time of weeding, i.e., about a month after planting, ammonium sulphate as a top dressing at 100 lb. per acre was applied. Harvest was commenced in the last week of September and was concluded by middle of December. An average acre yield of 2,530 lb. was recorded during the year as against 2,633 lb. recorded during the previous year.

4. *Second crop sowings and plantings.*—With adequate supply of water in the canal, the second crop sowings and plantings were done in time. The sowings were taken up from 20th December and concluded on 13th January 1952. In all 833 units were sown in an area of 3.05 acres. Transplantation was taken up on 5th February 1952 and came to a close on 27th February 1952.

A total area of 19.75 acres was transplanted with 1,497 units as detailed below:—

Particulars.	Number of units.	Area in acres.
(1)	(2)	(3)
1 Yield trials of cultures	626	2.56
2 Manurial and cultural experiments	126	3.95
3 Single plant and earhead selections	531	1.17
4 Pure lines	34	0.05
5 Bults, foundation seed stock and seed multiplication lots	180	12.02
Total ..	1,497	19.75

5. *Second crop manuring and harvest.*—The second crop rice area received a basal dose of 2,000 lb. of green leaf or 10 cart-loads of farm yard manure plus 100 lb. of superphosphate plus 20 lb. of N as ammonium sulphate at planting and at the time of weeding another 10 lb. of N were applied. The superphosphate and ammonium sulphate were applied before second and final puddings so that the manure was placed 3 inches to 4 inches below the surface to make it available to the plants as necessary. The predominant feature in this season was that the crops established very quickly soon after planting and turned green. This may be attributed to the placement effect of ammonium sulphate which was applied before the final puddling. Harvest was commenced on 22nd April 1952 and completed by 27th May 1952. The average grain yield of the second crop worked out to 2,772 lb. per acre as against 2,098 lb. per acre during the previous year. The yields of the several strains are given in Table II.

TABLE II.—Grain yields of MTU. strains.

Strain number.	Area in acres.	Acre yield in lb.	Strain number.	Area in acres.	Acre yield in lb.
(1)	(2)	(3)	(1)	(2)	(3)
MTU. 1	6.59	2,466	MTU. 12	0.45	1,033
MTU. 2	0.21	3,333	MTU. 13	0.29	1,337
MTU. 3	3.70	3,158	MTU. 14	0.42	3,385
MTU. 4	0.45	2,758	MTU. 15	1.28	2,973
MTU. 5	6.12	2,555	MTU. 16	0.53	2,400
MTU. 6	0.10	3,316	MTU. 17	0.24	1,000
MTU. 7	0.88	1,457	MTU. 18	0.13	708
MTU. 8	0.24	1,387	MTU. 19	0.65	2,852
MTU. 9	0.40	2,760	MTU. 20	0.20	2,971
MTU. 10	2.92	3,257	MTU. 21	0.44	2,950
MTU. 11	0.52	3,650	GEB. 24	0.75	1,796

6. *Rice improvement work—Pure line selections.*—Two cultures, Nos. 4250 and 4280 in Pedda Atragada were multiplied for trials in the district. During this season these were tried in Repalle taluk along with MTU. 12 in 5 cent plots. Culture 4250 gave an increase of 3.3 per cent over MTU. 12 while 4280 was on

par with MTU. 12. Culture No. 4688, a pure line selection from Pedda Kusuma, was tried against ryots' bulk and it gave 76 per cent significantly increased yield over the ryots' bulk. (Table III).

TABLE III.—Performance of pedda kusuma culture.

Layout—12 reversed pairs (ABBA). Size of plot—5' x 30'. Spacing—6" x 6" doubles.		Sown—16th May 1951. Harvested—6th December 1951.							
Particulars.	Mean yield of		Mean difference (A—B).	Values of 'z' (P=0.05).		Results significant or not (P=0.05).	Standard error.	Critical difference (P=0.05).	
	4688	Ryots' pedda kusuma.		Observed.	Calculated.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Grain yield in lb. per acre..	3,763	2,149	1,634	3.7	0.7889	Yes.	126.4	278	
Percentage on control ..	176.0	100	76.0	..	..	..	5.88	12.9	
Conclusions—4688, Ryots' Pedda Kusuma.									

In rainfed rice, out of 55 cultures grown last year, 16 fresh selections were made for further study. Among *Akkullu* cultures received from Samalkot, culture 1781 tried along with three cultures having the same duration and type of grain as *Akkullu* and the two standards SLO. 13 and MTU 1 gave the highest yield with an increase of 9.4 per cent over MTU. 1.

Four secondary selections in MTU. 15, six in MTU. 9 and eight in Nallarlalu were compared with their respective standards. The general effect of the treatments was significant for the cultures of MTU. 15 only. The results indicated that all the four cultures gave significantly increased yields over the standards MTU. 15 and MTU. 9. The increases ranged from 11.6 to 22.0 per cent. (Table IV-A.) The general effect of the treatments was not significant in the other two series. (However, only culture 12504 in MTU. 9 and two cultures 9567 and 9597 of Nallarlalu gave 5 per cent increased yields over the respective standards.) [vide Table IV (b) and (e).]

TABLE IV (a).—Performance of secondary selections in MTU. 15.

Size of strip—5' x 20'. Layout—6 x 6 randomised blocks. Spacing—6" x 6" doubles.		Sown—29th December 1951. Harvested—12th May 1952.							
Particulars.		Grain yield in lb. per acre.	Percentage on control (MTU. 15).	'Z' test satisfied or not (P=0.05).	Standard error.	Critical difference (P=0.05).			
		(2)	(3)	(4)	(5)	(6)			
12515	..	3,014	111.6	..	..	..			
12518	..	3,039	112.6	..	..	..			
12524	..	3,205	122.0	Yes.	3.57	10.4			
12532	..	3,086	114.2	..	..	..			
MTU. 9	..	2,715	100.6	..	96.9 lb.	282 lb.			
MTU. 15	..	2,713	100.0	..	..	..			
General mean	..	2,977	110.2	..	..	..			
Conclusions—12524, 12532, 12518, 12515, MTU. 9, MTU. 15.									

TABLE IV (b).—Performance of secondary selections in MTU. 9.

Size of strip—5' x 20'. Layout—8 x 4 randomised blocks. Spacing—6" x 6" doubles.		Sown—29th December 1951. Harvested—11th May 1952.							
Particulars.		Grain yield in lb. per acre.	Percentage on control (MTU. 9).	'Z' test satisfied or not (P=0.05).	Standard error.	Critical difference (P=0.05).			
		(2)	(3)	(4)	(5)	(6)			
12502	..	2,943	102.7	..	..	..			
12504	..	2,988	104.3	..	..	..			
12505	..	2,813	98.2	..	..	..			
12506	..	2,975	103.8	..	..	..			
12507	..	2,969	103.6	..	..	..			
12508	..	2,689	93.9	..	..	..			
MTU. 9	..	2,865	100.0	..	..	..			
MTU. 15	..	2,281	79.6	..	..	..			
General mean	..	2,815	98.3	..	..	..			

TABLE IV (c).—Performance of Nallarlalu cultures.

Size of strip—4' x 20'. Layout—7 x 4 randomized blocks. Spacing—6" x 6" doubles.		Sown—29th December 1951. Harvested—11th May 1952.							
Particulars.		Grain yield in lb. per acre.	Percentage on control (Nallarlalu).	'Z' test satisfied or not (P=0.05).	Standard error.	Critical difference (P=0.05).			
		(2)	(3)	(4)	(5)	(6)			
9567	..	2,731	106.2	..	..	..			
9597	..	2,774	107.9	..	..	..			
9602	..	2,688	104.6	..	..	..			
9607	..	2,365	92.1	..	..	..			
MTU. 9	..	2,493	97.0	..	..	..			
MTU. 15	..	2,688	104.6	..	..	..			
Nallarlalu	..	2,569	100.0	..	..	..			
General mean	..	2,615	101.8	..	..	..			
9640	..	2,353	104.0	..	..	..			
9643	..	2,359	104.3	..	..	..			
9710	..	2,249	99.4	..	..	..			
9711	..	2,333	103.1	..	..	..			
MTU. 9	..	2,398	106.0	..	..	..			
MTU. 15	..	2,554	112.9	..	..	..			
Nallarlalu	..	2,262	100.0	..	..	..			
General mean	..	2,359	104.2	..	..	..			

Out of 303 single plant selections of the strains MTU. 1, MTU. 3, MTU. 4 and MTU. 4 vig., MTU. 6, MTU. 14, MTU. 8, MTU. 13, MTU. 12, MTU. 16 and MTU. 19, 56 high yielding pure cultures were carried forward for comparison with their respective standards in the main crop season of 1952-53.

7. *Hybridization—Natural cross progenies in Kasipichodi.*—Three cultures were under yield trials along with SLO. 16. The general effect of treatments was not significant, by 'Z' test. The trial will be repeated in the next season [vide Table IV (d).]

TABLE IV (d).—Performance of Khasipichodi cultures.

Size of strip—5' × 20'. Layout—4 × 9 randomised blocks. Spacing—6" × 6" doubles.		Sown—12th January 1952. Harvested—25th April 1952.						
Particulars.	Mean yield of				General mean.	'Z' test satisfied or not (P=0.05).	Standard error.	Critical difference (P=0.05).
	6954.	7003.	8103.	SLO. 16.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Grain yield in lb. per acre	2,958	2,921	2,012	2,704	2,874	No.		
Percentage on standard	109.4	108.1	107.7	100.0	106.3			

8. *Study of progenies of crosses effected to isolate high yielding cosmopolitan strains for different durations.*—(a) Progenies of crosses between short duration varieties (Kar and Kuruvai groups of the southern districts).

Out of twenty cultures that underwent yield trials last season, two high yielding cultures 6825 and 6836 were compared with MTU. 9 and MTU. 15. The general effect of the treatments was not significant [vide Table IV (e)].

TABLE IV (e).—Performance of cultures of short duration cross progenies.

Size of strip—5' × 20'. Layout—4 × 8 randomised blocks. Spacing—6" × 6" doubles.			Sown—29th December 1951. Harvested—14th May 1952.						
Particulars.	Mean yield of					General mean.	'Z' test satisfied or not (P=0.05).	Standard error.	Critical difference (P=0.05).
	6825.	6836.	MTU. 9.	MTU. 15.					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Grain yield in lb. per acre	.. 1,921	1,895	1,953	1,698	1,888	No.			
Percentage on standard	.. 113.3	111.7	115.2	100.0	110.1				

(b) *Progenies of crosses between rainfed varieties.*—Culture 828 with the same duration as Jilama was multiplied for seed. Out of 87 progenies of crosses in rainfed varieties that were studied, 31 selections and 34 pure breeding cultures were carried forward for further study. In addition to these, 182 progenies of

crosses effected between wild rice and released strains, were studied to find out the suitability under rainfed conditions but these were later in duration than MTU. 17 or MTU. 18. Among these, 114 were carried forward for further study in wet condition. Twenty-three single plant selections were freshly made during this season for further study next year.

(c) *Sanna Basangi*.—Four hundred and forty-five selections made in the previous season and 72 single plant selections from the bulk crop, were studied intensively for their flowering, grain size, etc. Many of them were found to be not up to the mark. From these 204 further selections were made for studying them in the next main crop rice.

(d) Based on the results of the previous years three high yielding cultures 3185, 3278 and 3282 were tried along with culture number 1781 of Samalkot and two standards MTU. 1 and SLO. 13. The general effect of the treatments was significant. Culture No. 1781 was found to be superior to the rest with an increase of 9.4 per cent. The results are given in Table V.

TABLE V.—*Performance of Akkullu cultures.*

[illegible]

(e) *Krishnakatukalu duration and type of grain.*—Three cultures 513, 715 and 775 were multiplied for seed. In addition, thirty-four progenies of crosses effected between MTU. 5 and MTU. 10 were compared against MTU. 5 and MTU. 10. Out of these, eleven high yielding cultures were carried forward and regrouped with reference to duration and grain size of MTU. 5 and MTU. 10 for further trial in the next main crop season.

(f) *G.E.B. 24 duration and type of grain.*—Five cultures of similar duration and grain type of GEB. 24 were compared with GEB. 24. The general effect of the treatments was not significant. However, culture No. 4388 and 1246 gave 28.8 per cent and 23.2 per cent increased yield over the standard GEB. 24. The trial will be continued next year, with four high yielding cultures Nos. 1246, 4388, 4405 and 4420 (vide Table VI).

TABLE VI.—Performance of cultures of GEB. 24 duration and type of grain.

Size of plot—4' × 25'.
Layout—9 × 6 (randomized blocks).
Spacing—6" × 6" doubles.

Sown—19th May 1951.
Harvested—7th December 1951.

Particulars.	Mean yield of						General mean.	'Z' test satisfied or not (P=0.05).	Standard error.	Critical difference (P=0.05)
	1246	4388	4398	4405	4420	GEB. 24				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Grain yield in lb. per acre.	3,403	3,558	2,809	3,087	3,208	2,763	3,138	No.	..	..
Percentage standard.	123.2	128.8	101.7	111.8	116.1	100	113.5	No.	..	..

(g) *Cultures suitable for low-lying areas.*—Five promising cultures were multiplied on the farm. For want of typical deep-water conditions on the farm, these were compared with MTU. 16 in Collair area of Eluru taluk. This year also MTU. 1 maintained its superiority over the rest giving an acre yield of 1,760 lb. closely followed by culture 1405 with 1,498 lb. and MTU. 16 with 1,441 lb. per acre.

(h) *Sanna prayaga* duration and type of grain.—Three promising cultures Nos. 7584, 8240 and 9855 were multiplied for seed. The following quantities of seed were produced.

7584—16 lb., 8240—77 lb., 9855—96 lb.

(i) *Konamani duration and type of grain.*—The six progenies of cyclic crosses were compared with MTU. 11 and SLO. 15. The general effect of the treatments was significant. The results indicated that cultures 10569, 10572 and 10579 gave significantly increased yields over MTU. 11 from 18·6 to 29·3 per cent but they were on par with each other and with SLO. 15 [vide Table VI (a)].

TABLE VI (a).—Performance of cultures of Konamani duration and type.

Size of strip—5' x 30'. Layout—6 x 6 randomised blocks. Spacing—6" x 6" doubles.			Sown—24th May 1951. Harvested—8th December 1951.					
Particulars.			Mean yield of					
(1)			10550. (2)	10567. (3)	10570. (4)	10572. (5)	10579. (6)	10581. (7)
Grain yield in lb. per acre	..	..	3,325	3,523	3,534	3,666	3,996	3,510
Percentage on standard	..	..	107.6	123.7	114.3	118.6	129.3	113.5
			Mean yield of—cont.					
			MTU. 11.	S.L.O. 15.	General mean.	'Z' test satisfied or not (P = 0.05).	Standard error.	Critical difference (P = 0.05).
			(8)	(9)	(10)	(11)	(12)	(13)
Grain yield in lb. per acre	..	..	3,091	3,682	3,578	Yes.	184	529
Percentage on standard	..	..	100.0	119.2	115.8	..	5.96	17.1
Conclusions—10579, 10567, S.L.O. 15, 10572, 10570, 10581, 10550, MTU. 11.								

Two extracts from GEB. 24 selections which were of Konamani duration and type of grain were compared with SLO. 15. The general effect of the treatments was significant. Though 4214/5 gave an increase of 8.4 per cent over SLO. 15, the increase was not significant [Table VI (b)].

TABLE VI (b).—Performance of GEB. 24 selections of Konamani duration and type.

Size of strip—5' × 20'				Sown—19th May 1951.			
Layout—3 × 8 (randomized blocks).				Harvested—2nd December 1951.			
Spacing—6' × 6' doubles.							
Particulars.	Mean yield of			General mean.	'Z' test satisfied or not (P=0.05).	Standard error.	Critical difference (P=0.05).
	4214/5	4,236	S.E.O. 15				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Grain yield in lb. per acre	3,664	2,568	3,381	3,204	Yes.	267	720
Percentage on standard ..	108.4	74.3	109.0	94.3	Do.	7.89	21.3
Conclusions—4214/5. S.E.O. 15: 4236.							

Two cultures from Potti Atragada selections which were of the same duration and type of grain as *Konamani* along with two *Konamani* selections were compared with SLO. 15 and MTU. 11. The general effect of the treatments was significant. Though cultures 1543 and 1545 gave increased yields over MTU. 11 by 11.1 per cent and 15.4 per cent respectively, they were on par with each other with SLO. 15 [vide Table VI (c)].

TABLE VI (c).—Performance of cultures of *Konamani* duration and type.

Size of strip—5" × 30" Layout—6 × 6 (randomized blocks). Spacing—6" × 6" doubles.								Sown—24th May 1951. Harvested—8th December 1951.		
Particulars.	Mean yield of						General mean.	'Z' test satisfied or not (P = 0·05).	Standard error.	Critical differ- ences (P = 0·05).
	1643	1545	4468	4483	MTU · 11	SLO · 15				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Grain yield in lb. per acre.	3,560	3,697	3,097	3,173	3,203	3,502	3,372	Yes.	134	388
Percentage standard.	111·1	115·4	98·7	99·0	100	109·3	105·3	Do.	4·17	12·1
Conclusions—1545, 1543, SLO · 15, MTU · 11, 4483, 4468.										

(j) *Kusuma duration and type of grain.*—The best culture No. 1689 isolated from the cross between MTU. 11 and MTU. 16 was compared with MTU. 7 and MTU. 19. The general effect of the treatments was significant. The results indicated that the culture No. 1689 did not surpass the most popular strain MTU. 19 in yield [Table VII (a)].

TABLE VII (a).—Performance of cultures of *Kusuma duration and type*.

Size of strip—5' × 30'. Layout—3 × 12 (randomized blocks). Spacing—6" × 6" doubles.		Sown—16th May 1951. Harvested—6th December 1951.					
Particulars.		Mean yield of			General mean.	'Z' test satisfied or not (P = 0.05).	Critical difference (P = 0.05).
		1,689	MTU. 7	MTU. 19			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Grain yield in lb. per acre	2,992	2,358	3,205	2,352	Yes.	46	134
Percentage on standard (MTU. 19)	93.4	73.6	100.0	89.0	Do.	142	4.2
Conclusions—MTU. 19, 1,689, MTU. 7.							

(i) Five cultures of *Sanna Kusuma duration and type* extracted from GEB. 24 group of crosses were compared with MTU. 19. The general effect of the treatment was significant. From the results it was concluded that none proved better than MTU. 19 [Table VII (b)].

TABLE VII (b).—Performance of GEB. 24 group of crosses of *Sanna Kusuma duration and type*.

Size of strip—4' × 25'. Layout—6 × 6 (randomised blocks). Spacing—6" × 6" doubles.							Sown—19th May 1951. Harvested—4th December 1951.			
Particulars.	Mean yield of						General mean.	'Z' test satisfied or not (P=0.05).	Standard error.	Critical difference (P=0.05).
	4,242	4,245	4,248	4,272	4,401 MTU. 19					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Grain yield in lb. per acre.	3,848	4,220	3,649	4,092	3,924	4,533	4,029	Yes.	110	320
Percentage on standard.	84.7	92.9	80.3	83.1	86.4	100.0	88.7	Do.	2.42	7.1
Conclusions—MTU. 19, 4245, 4272, 4401, 4242, 4248.										

Fourteen cross progenies in each of MTU. 19 and SLO. 17 and MTU. 19 and SLO. 18 were compared with MTU. 19 and their respective Samalkot strains in four series. The general effect of the treatments was significant only for one series. The results indicated that four cultures 9944, 9983, 10214 and 10725 gave higher yields than MTU. 19 ranging from 4.9 to 10.9 per cent but these increases were not significant over MTU. 19 [vide Table VII (c)].

TABLE VII (c).—Performance of cross progenies of MTU. 19 × SLO. 17 and MTU. 19 × SLO. 18.

Size of strip—4' × 20'. Layout—9 × 4 randomized blocks. Spacing—6" × 6" doubles.				Sown—16th May 1951. Harvested—6th December 1951.				
Particulars.				Grain yield in lb. per acre.	Percentage on control (MTU. 19).	'Z' test satisfied or not (P = 0.05).	Standard error.	Critical difference (P = 0.05).
(1)				(2)	(3)	(4)	(5)	(6)
10689	..	..	..	2,569	74.6	Yes.	6.95 per cent.	20.3 per cent. 700 lb.
10702	..	..	..	2,204	64.0			
10713	..	..	..	2,706	78.5			
10714	..	..	..	2,519	73.1			
10716	..	..	..	2,698	78.3			
10723	..	..	..	3,055	88.6			
10725	..	..	..	3,616	104.7			
SLO. 17	..	..	..	3,608	104.7			
MTU. 19	..	..	..	3,444	100.0			
General mean				2,936	85.2			

Nine cultures from progenies of cyclic crosses were compared with MTU. 19. The general effect of the treatments was significant. The results indicated that none of them proved better than MTU. 19. [Table VII (d)].

TABLE VII (d).—Performance of cyclic crosses of *Kusma duration and type*.

Size of strip—5' × 25'. Layout—6 × 5 randomized blocks. Spacing—6" × 6" doubles.				Sown—24th May 1951. Harvested—5th December 1951.				
Particulars.				Grain yield in lb. per acre.	Percentage on control MTU. 19.	'Z' test satisfied or not (P = 0.05).	Standard error.	Critical difference (P = 0.05).
(1)				(2)	(3)	(4)	(5)	(6)
10880				3,209	88.9	Yes.	152 lb. 4.21 per cent.	448 lb. 12.4 per cent.
10892				3,296	91.3			
10894				2,798	77.5			
10896				2,836	78.6			
10904				2,672	74.0			
MTU. 19				3,611	100.0			
General mean				3,070	85.0			

9. (a) *Inter-strain and inter-varietal crosses.*—(i) Out of 124 cultures which were compared with their standards, 35 high yielding cultures were carried forward and put to comparative yields during the ensuing main-crop season.

(ii) *Crosses between main crop strains and wild rices.*—Eight sets of crosses were effected between released strains MTU. 1, MTU. 3, MTU. 5, MTU. 6, MTU. 7, MTU. 20, MTU. 3, Early II and MTU. 17 and wild rice *Oryza sativa*, var. spontanea in the year 1947-48. Out of 628 F₄s studied last season, 285 further selections were made for further study in the ensuing main-crop season.

(b) *Crosses between MTU. 9 and MTU. 15 and other earlier duration types to reduce the duration of dalva strains.*—Fifty-six pure cultures and another 13 sets of pure cultures extracted from the progeny row trials were compared with MTU. 9 and MTU. 15 in the second-crop season in eleven series. Out of these 12 cultures in two series were badly damaged by the rains received in May at the time of harvest. Among the rest of the series the general effect of the treatment was significant for six series. Twenty-three high yielding cultures as well as other 12 cultures which were damaged in rains were carried forward for further trials in the next second-crop season. In addition, out of 435 F₃s studied in the main-crop season, 334 further selections were made for study in the second-crop season. From these 440 further selections were made for study in the ensuing main-crop season of 1952-53. Along with them another 30 F₄s of MTU. 20 and other short duration varieties were carried forward for further study in the main-crop season of 1952-53.

(c) *New crosses.*—Two sets of new crosses between MTU. 9 and MTU. 3 and between MTU. 3 and MTU. 15 were made in the main-crop season 1951-52 and their F₁s were studied in second-crop season. Out of these 17 F₂s were carried forward for study in the main crop of 1952-53.

10. *Second crop—Nallartu hybrid cultures.*—Two cultures 3871 and 10021 were put to yield trials along with other short duration varieties under early and normal plantings. The general effect of the treatments was significant for both

the series. In early planting though 3871 gave increased yield over MTU. 15 by 3.6 per cent, the increase was not significant. Under normal conditions none of them proved superior to the standard MTU. 15 (Table VIII).

TABLE VIII.—Performance of pure-breeding Hybrid cultures of Nallarl under early and normal planted conditions.

Particulars.	Mean yield of						General mean.	'Z' test satisfied or not. (P = 0.05).	Standard error.	Critical difference. (P = 0.05).
	3871.	10021.	Nallarl.	MTU. 9.	MTU. 15.	MTU. 20.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Early planting— Size of strip—4' x 25'. Layout—6 x 6 randomized blocks. Planting—6' x 6' doubles. Sown—20th December 1951. Planted—19th January 1952. Harvested—23rd and 28th April 1952.										
Grain yield in lb. per acre.	2,372	2,034	2,032	2,318	2,289	2,321	2,232	Yes.	93.2	271
Percentage on standard MTU. 15.	103.6	88.9	88.8	101.3	100	101.4	97.5	..	4.07	11.8
Normal planting— Size of strip—5' x 20'. Layout—6 x 6 randomized blocks. Planting—6' x 6' doubles. Sown—6th January 1952. Planted—7th February 1952. Harvested—5th May 1952.										
Grain yield in lb. per acre.	2,787	2,354	2,375	3,187	3,083	2,636	2,736	Yes.	102.8	474
Percentage on standard MTU. 15.	90.4	76.4	77.02	103.4	100	85.5	83.7	..	5.28	15.4
Conclusions— Early planting—3871; MTU. 20; MTU. 9; MTU. 15; 10021; Nallarl.										
Normal planting—MTU. 9; MTU. 15; 3871; MTU. 20; Nallarl; 10021.										

11. Manurial experiments—(a) Compost experiment.—In the main-crop season experiment with compost and farm yard manure each supplying 60 lb. of 'N' per acre, were laid out with no manure plot as control, in single and double-crop areas with the variety MTU. 5, for the third and the second year respectively. The same experiment was repeated in the second-crop season with the variety MTU. 15 for a third time. The general effect of the treatments was not significant in both single and double crop areas either for grain or straw yields. In the case of the experiment in second-crop season, the general effect of treatment was significant only for grain. The results indicated that farm yard manure and compost giving an acre yield of 1,705 lb. and 1,719 lb. respectively, did not differ significantly among themselves but they gave significantly higher yields than no manure which gave an acre yield of 1,304 lb. The results are set out in Table IX (a) and (b).

TABLE IX (a).—Compost experiment—Single and double-crop areas 1951-52.

Particulars.	Mean yield of			General mean.	'Z' test satisfied or not. (P = 0.05).	Standard error.	Critical difference. (P = 0.05).
	No manure.	Compost to supply 60 lb. N per acre.	Farm yard manure to supply 60 lb. N per acre.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Main crop-1951-52— Single crop area— Size of plot—12' x 90'. Layout—3 x 6 randomized blocks. Spacing—Bulk planting. Sown—5th May 1951. Harvested—2nd December 1951. Variety—MTU. 5, main crop. MTU. 15, second crop.							
Grain yield in lb. per acre.	2,859	2,975	3,049	2,961	No.		
Percentage on no manure.	100.0	104.1	106.6	103.6			
Straw yield in lb. per acre.	3,872	4,450	4,766	4,363	No.		
Percentage on no manure.	100.0	114.9	123.3	117.7			
Double-crop area— Size of plot—9' x 90'. Layout—3 x 6 randomized blocks. Spacing—Bulk planting. Main crop— Sown—5th May 1951. Harvested—2nd December 1951. Second crop— Sown—1st January 1952. Harvested—18th May 1952.							

Particulars.	Mean yield of			General mean.	'Z' test satisfied or not. (P = 0.05).	Standard error.	Critical difference. (P = 0.05).
	No manure.	Compost to supply 60 lb. N per acre.	Farm yard manure to supply 60 lb. N per acre.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Main crop, 1951-52— Double-crop area— Grain yield in lb. per acre.	3,187	3,269	3,094	3,184	No.	..	..
Percentage on no manure.	100.0	103.1	97.6	100.2			
Straw yield in lb. per acre.	4,517	4,652	5,154	4,774	No.	..	..
Percentage on no manure.	100.0	103.0	112.1	105.0			
Second crop, 1951-52— Grain yield in lb. per acre.	1,304	1,719	1,705	1,576	Yes.	46	145
Percentage on control—manure.	100.0	131.8	130.8	120.9			
Straw yield in lb. per acre.	2,087	2,276	2,286	2,216	No.	3.54	11.2
Percentage on control—manure.	100.0	109.0	109.4	106.1			
Conclusions— Second crop—Grain—Compost; Farm yard manure; No manure.							

TABLE IX (b).—Results of previous years trials of compost experiments.

Year and particulars.	Mean yield of			General mean.	'Z' test satisfied or not. (P = 0.05).	Standard error.	Critical difference. (P = 0.05).
	No manure.	Compost.	Farm yard manure.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(i) Main crop.							
(a) Single crop area.							
1950-51— Grain yield in lb. per acre.	3,092	3,186	3,287	3,188	Yes.	44	141
Grain as percentage on control.	100	103.0	106.3	103.1	..	1.42	4.6
(b) Double crop area.							
1949-50— Grain yield in lb. per acre.	1,452	1,378	1,378	1,403	No.	..	..
Grain as percentage on control.	100	94.9	94.9	96.6	..	..	..
1950-51— Grain yield in lb. per acre.	2,841	2,903	3,173	2,972	Yes.	74	234
Grain as percentage on control.	100	102.2	111.6	104.6	..	2.60	8.3
(ii) Second crop.							
1950-51— Grain yield in lb. per acre.	1,398	1,613	1,604	1,568	No.	..	..
Grain as percentage on control.	100	115.4	121.1	111.8	..	..	..
Conclusions. C, B, A. Differences not significant. C, B, A. Differences not significant.							

(b) Fused phosphate experiment.—To gauge the relative merits of the fused phosphate fertiliser, an experiment was laid out in the main-crop season with different combinations of ammonium sulphate and super-phosphate with and without

Variety—MTU. 1
Sown—5th May 1951.
Harvested—21st November 1951.

Particulars.	Mean yield of					General mean.	Z* test satisfied or not (P=0.05).	Standard error.	Critical difference (P=0.05).
	Green leaf 2,500 lb. + ammonium sulphate 30 lb. N. Tr. 7.	Green leaf 2,500 lb. + ammonium sul- phate 30 lb. N. + super 30 lb. P ₂ O ₅ per acre, Tr. 8.	Green leaf 2,500 lb. + ammonium sul- phate 30 lb. N. + Fused phosphate 30 lb. P ₂ O ₅ per acre, Tr. 9.						
(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)		
Grain yield in lb. per acre ..	3,635	3,553	3,605	3,476	No.	..	..		
Grain as percentage on control (Tr. 1) ..	109.2	106.7	108.3	102.1	"	..	..		
Straw yield in lb. per acre ..	5,924	6,450	5,894	5,789	"	..	..		
Straw as percentage on control (Tr. 1) ..	108.7	116.4	108.2	106.0	"	..	..		

Variety—MTU. 1.
Sown—5th May 1951.
Harvested—20th November 1951.

Another experiment was laid out for the first time in second-crop season in a split plot design, with two kinds of green manures (sunnhems and daincha) as main plot treatments and phosphates applied as sub-plot treatments. The general effect of the treatments was significant for kinds of green manures, for treatments with P_2O_5 and for interaction between manures and treatments both

Sub-plot treatments are—

- A. No phosphate + No green manure.
- B. No phosphate + Green manure.
- C. 30 lb. P2O5 to green manure.
- D. Green manure without P2O5 + 30 lb. P2O5 to paddy.
- E. 45 lb. P2O5 to green manure.
- F. Green manure without P2O5 + 45 lb. P2O5 to paddy.
- G. 60 lb. P2O5 to green manure.
- H. Green manure without P2O5 + 60 lb. P2O5 to paddy.

Blocks	..	..	3	1,252.4	..	..	..	..
Main-plot treatments (green manures).			1	2,328.1	2328.1	51.1	10.13	Yes
Error 'A'	..	..	3	136.8	45.6	..	..	..
Sub-plot treatments (phosphates).			7	863.8	123.4	27.4	2.18	Yes
Interaction between manures × phosphates.			7	304.6	43.5	9.7	2.18	Yes
Error 'B'	..	..	42	188.3	4.5	..	..	..
Total	..	..	53	5,074.0	..	..	..	..

Particulars.	Mean yield of		General mean.	Standard error.	Whether 'Z' test satisfied or not (P=0.05).	Critical difference (P=0.05).
	Daincha.	Sunn hemp.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)
(i) Grain yield.						
Yield in lb. per acre	2,638	3,230	2,934	22.0	Yes	102.7
As percentage on general mean.	89.0	110.1	100	0.78	Yes	2.5
(ii) Straw yield.						
Yield in lb. per acre	2,646	3,340	3,243	118.7	Yes	542
As percentage on general mean.	81.6	118.4	100	3.66	Yes	16.71
Conclusion—						
Grain—Sunn hemp; Daincha.						
Straw—Sunn hemp; Daincha.						

TABLE X (c).—Summary of conclusions of treatments only.

Particulars.	Mean yield of								General mean.	Whether 'Z' test satisfied or not (P=0.05).	Standard error.	Critical difference (P=0.05).
	A	B	C	D	E	F	G	H				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(i) grain yields.												
Yield in lb. per acre.	2,374	2,901	3,081	2,938	3,100	2,982	3,045	3,001	2,934	Yes	120.9	346
Percentage on general mean.	81.0	98.9	105.0	101.9	105.6	101.6	103.7	102.3	100	Yes	4.12	11.8
(ii) Straw yields.												
Yield in lb. per acre.	2,302	3,342	3,490	3,280	3,416	3,292	3,490	3,329	3,243	Yes	69.7	119.1
Percentage on general mean.	71.0	103.1	107.7	101.2	105.3	101.5	107.7	102.6	100	..	2.15	6.1
Conclusions—												
Grain yields—E, C, G, H, D, F, B, A.												
Straw yields—C, G, E, B, H, F, D, A.												

TABLE X (d).—Summary of conclusions for interaction (green manures and phosphates).

Particulars.	Mean yield of								General mean.	Whether 'Z' test satisfied or not (P=0.05).	Standard error.	Critical difference P=0.05
	Daincha.											
(1)	A	B	C	D	E	F	G	H				
(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)					
Grain yield in lb. per acre.	2,344	2,492	2,839	2,704	2,765	2,679	2,679	2,604				
Grain percentage on general mean.	79.9	85.0	96.8	92.2	94.3	91.3	91.3	88.8				
Straw yield in lb. per acre.	2,252	2,574	2,797	2,898	2,772	2,673	2,723	2,673				
Straw percentage on general mean.	69.5	79.4	86.3	83.2	85.5	82.4	84.0	82.4				

Particulars.	Mean yield of								General mean.	Whether 'Z' test satisfied or not (P=0.05).	Standard error.	Critical difference P=0.05
	Sunn hemp											
A	B	C	D	E	F	G	H					
(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	
Grain yield in lb. per acre.	2,405	3,311	3,323	3,273	3,435	3,286	3,410	3,398	2,934	Yes	171.1	490
Grain percentage on general mean.	82.0	112.8	113.2	111.6	117.0	112.0	116.2	115.8	100	Yes	5.83	16.7
Straw yield in lb. per acre.	2,352	4,109	4,183	3,861	4,059	3,911	4,257	3,985	3,243	Yes	105.1	300
Straw percentage on general mean.	72.5	126.7	129.0	119.1	125.1	120.6	131.2	122.8	100	Yes	3.24	9.3

Conclusions—

Grain—

E (s); G (s); H (s); C (s); B (s); F (s); D (s); C (d); E (d); D (d); F (d); G (d);
H (d); B (d); A (s); A (d)

Straw—

G (s); C (s); B (s); E (s); H (s); F (s); D (s); C (d); E (d); G (d); D (d); F (d);
H (d); B (d); A (s); A (d).

12. Agronomical and cultural experiment—(a) Trial of MTU. 1 and ryots' Akkullu to compare the relative exhausting capacities on soil.—The experiment was repeated for a fourth time in this season to study the effect of continuously growing a strain compared to ryots' unselected bulk on the soil fertility in split-plot design in manured and unmanured plots both in single and double crop lands. The general effect of the treatments was significant for manures, for straw only in single crop area and for grain and straw in double crop area. In the case of varieties it was significant only for straw yields in double crop area. In the case of interaction for manures and varieties, the general effect of treatments was significant for grain and straw in double crop area alone. Unmanured plots recorded higher grain yields than manured plots while it was the reverse in case of straw. These results

are in accordance with those of the findings of the previous seasons thereby indicating that manuring the variety Akkullu under these delta conditions induces rank vegetative growth resulting in reduced grain yields. As regards grain yields for varieties, MTU. 1 gave higher yields than ryots' Akkullu in double crop area while in the case of straw ryots' Akkullu surpassed MTU. 1 under single and double crop areas. The results are set out in Table XI.

TABLE XI.—Trial of MTU. 1 and ryots' Akkullu under manured and unmanured conditions in single and double crop areas—1951-52.

Size of plot—10' x 30'.
 Layout—2 x 2 x 6 (split plot design).
 Spacing—6" x 6" (doubles).
 Sown—19th May 1951.
 Harvested—20th and 21st November 1951.

Manured plots received per acre—
 Green leaf at 2,000 lb.,
 Groundnut cake 400 lb.,
 Super phosphate 112 lb.,
 Ammonium sulphate 50 lb.

(a) Summary of results for main plot treatments (manures).

Particulars.	Manured.	Unmanured.	General mean.	'Z' test satisfied or not (P=0.05).	Standard error.	Critical difference. (P=0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Single crop area—						
Grain yield in lb. per acre ..	2,693	2,751	2,722	No.	..	..
Percentage on general mean ..	98.9	101.1	100.0			
Straw yield in lb. per acre ..	7,397	4,026	5,712	Yes.	{ 94.8 1.66	346 6.0
Percentage on general mean ..	129.5	70.5	100.0			
Double crop area—						
Grain yield in lb. per acre ..	2,629	6,590	3,110	Yes.	{ 157.7 5.07	572 18.40
Percentage on general mean ..	84.5	115.4	100.0			
Straw yield in lb. per acre ..	8,394	6,994	7,694	Yes.	{ 383.9 4.99	1,395 18.1
Percentage on general mean ..	109.1	90.9	100.0			
Conclusions—						
Single crop area—Straw—Manured; unmanured.						
Double crop area—Grain—Unmanured; manured.						
Straw—Manured; unmanured.						

(b) Summary of results for sub-plot treatments (varieties).

Particulars.	MTU. 1.	Ryots' Akkullu.	General mean.	'Z' test satisfied or not. (P=0.05).	Standard error.	Critical difference. (P=0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Single crop area—						
Grain yield in lb. per acre ..	2,689	2,755	2,722	No.	..	..
Percentage on general mean ..	98.8	101.2	100.0			
Straw yield in lb. per acre ..	5,492	5,932	5,712	No.	..	..
Percentage on general mean ..	96.1	103.9	100.0			
Double crop area—						
Grain yield in lb. per acre ..	3,252	2,967	3,110	No.	..	..
Percentage on general mean ..	104.6	95.4	100.0			
Straw yield in lb. per acre ..	7,072	8,316	7,694	Yes.	{ 124.6 1.62	392 5.1
Percentage on general mean ...	91.9	108.1	100.0			
Conclusions—						
Double crop area—Straw—Ryots' Akkullu, MTU. 1.						

(c) Summary of results for interaction between manures and varieties.

Particulars.	Manured.		Unmanured.		General mean.	'Z' test satisfied or not (P=0.05).	Standard error.	Critical difference (P=0.05).
	MTU. 1.	Ryots, Akkullu.	MTU. 1.	Ryots, Akkullu.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Single crop area—								
Grain yield in lb. per acre.	2,639	2,747	2,738	2,764	2,722	No.	..	..
Percentage on general mean.	96.9	100.9	100.7	101.5	100.0		..	..
Straw yield in lb. per acre.	7,073	7,720	3,912	4,145	5,712	No.	..	..
Percentage on general mean.	123.8	135.2	68.5	72.6	100.0		..	..
Double crop area—								
Grain yield in lb. per acre.	2,968	2,290	3,536	3,644	3,110	Yes.	{ 175.1	552
Percentage on general mean.	95.4	73.6	113.7	117.1	100.0		{ 5.63	17.7
Straw yield in lb. per acre.	8,083	8,704	6,061	7,927	7,694	Yes.	{ 177	558
Percentage on general mean.	105.1	113.1	78.8	103.0	100.0		{ 2.30	7.3
Conclusions—								
Double crop area—								

Grain—Unmanured ryots' Akkullu; unmanured MTU. 1; manured MTU. 1; manured ryots' Akkullu.
Straw—Manured ryots' Akkullu; manured MTU. 1; unmanured ryots' Akkullu; unmanured MTU. 1.

(d) Results of previous years' trials.

Year.	Particulars.	Mean yield of				General mean.	'Z' test satisfied or not (P = 0.05).	Standard error.	Critical difference (P = 0.05).
		Manured.		Unmanured.					
		MTU. 1.	Ryots' Akkullu.	MTU. 1.	Ryots' Akkullu.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(i) Single crop area.									
1943-49	Grain in lb. per acre ..	3,092	2,661	2,581	2,312	2,662	No.	..	..
	Grain as percentage on general mean.	116.3	99.9	97.1	86.7	100.0	No.	..	..
1949-50	Grain in lb. per acre ..	2,514	2,123	2,413	2,009	2,265	No.	..	..
	Grain as percentage on general mean.	106.1	95.9	107.8	90.2	100.0	No.	..	..
1950-51	Grain in lb. per acre ..	3,958	2,657	4,253	3,404	3,569	No.	..	..
	Grain as percentage on general mean.	110.9	74.5	119.3	95.4	100.0	No.	..	..
(ii) Double crop area.									
1948-49	Grain in lb. per acre ..	3,193	2,790	3,395	2,984	3,091	No.	..	..
	Grain as percentage on general mean.	103.0	90.1	109.6	97.2	100.0	No.	..	..
1949-50	Grain in lb. per acre ..	1,864	1,527	1,628	1,484	1,626	No.	..	..
	Grain as percentage on general mean.	114.8	93.9	100.1	91.2	100.0	No.	..	..
1950-51	Grain in lb. per acre ..	2,532	1,998	4,038	2,593	2,790	Yes.	105	320
	Grain as percentage on general mean.	90.7	71.6	144.7	92.9	100.0	Yes.	3.75	11.8*

Conclusions—

* MTU. 1. (M); Ryot's Akl. (UM); MTU. 1. (M); Ryot's Akl. (M).

(b) Trial of MTU. 3 and MTU. 20.—The experiment was repeated for a third time in the main crop season to gauge the superiority of MTU. 3 over MTU. 20 under different conditions of planting and manuring. The general effect of the treatments was significant for manures and varieties both for grain and straw under early and late planted conditions. In the case of interaction between manures and varieties the general effect of treatments was significant for grain and straw under early planted conditions only. The results indicated that manured plots gave significantly higher yields than unmanured plots. Similarly MTU. 3 proved significantly superior to MTU. 20. These findings are in conformity with those of previous seasons (vide Table XII).

TABLE XII.—Trial of MTU. 3 and MTU. 20 under manured and unmanured conditions in early and late plantings.

Early planting— Size of sub-plot—10' x 25' Layout—2 x 2 x 6—split plot design. Spacing—6' x 6' doubles. Sown—16th May 1951. Harvested—16th and 26th October 1951.	Late planting— Size of sub-plot—9½' x 25' Layout—2 x 2 x 6—split plot design. Spacing—6' x 6' doubles. Sown—3rd June 1951. Harvested—2nd November 1951. Manured plots received—2,000 lb. green leaf + super at 112 lb. + ammonium sulphate 50 lb. + ground-nut cake 400 lb. per acre.
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(a) Summary of results for manures only.

Particulars.	Manured.	Unmanured.	General mean.	'Z' test satisfied or not (P=0.05).	Standard error.	Critical difference (P=0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Early planting—						
Grain yield in lb. per acre	3,747	3,288	3,517	Yes.	{ 42.2 1.20	153 4.4
Percentage on general mean	106.6	93.5	100.0			
Straw yield in lb. per acre	5,491	3,853	4,672	Yes.	{ 218.2 4.67	793 17.0
Percentage on general mean	117.5	82.4	100.0			
Late planting—						
Grain yield in lb. per acre	2,016	1,810	1,913	Yes.	{ 18.2 0.95	66 3.5
Percentage on general mean	105.3	94.6	100.0			
Straw yield in lb. per acre	1,679	1,285	1,481	Yes.	{ 77.0 5.2	280 18.9
Percentage on general mean	113.3	86.7	100.0			
Conclusions—						
Early planting (Grain)—Manured; unmanured.						
(Straw)—Manured; unmanured.						
Late planting (Grain)—Manured; unmanured.						
(Straw)—Manured; unmanured.						

(b) Summary of results for varieties only.

Particulars.	Mean yield of		General mean.	'Z' test satisfied or not (P = 0.05).	Standard error.	Critical difference (P = 0.05).
	MTU. 3	MTU. 20.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Early planting—						
Grain yield in lb. per acre ..	3,914	3,120	3,517	Yes.	{ 30	94
Percentage on general mean ..	111.3	88.7	100.0			
Straw yield in lb. per acre ..	5,553	4,290	4,672	Yes.	{ 207.9	669
Percentage on general mean ..	118.9	81.1	100.0			
Late planting—						
Grain yield in lb. per acre ..	2,124	1,701	1,913	Yes.	{ 27.5	87
Percentage on general mean ..	111.2	88.7	100.0			
Straw yield in lb. per acre ..	1,564	1,399	1,481	Yes.	{ 49.0	154
Percentage on general mean ..	105.5	94.4	100.0			
Conclusions—						
Early planting—Grain—MTU. 3, MTU. 20.						
Straw—MTU. 3, MTU. 20.						
Late planting—Grain—MTU. 3, MTU. 20.						
Straw—MTU. 3, MTU. 20.						

(c) Summary of results for interaction between manures and varieties only.

Particulars.	Manured.		Unmanured.		General mean.	'Z' test satisfied or not (P=0.05).	Standard error.	Critical difference. (P=0.05).
	MTU. 3.	MTU. 20.	MTU. 3.	MTU. 20.				
	(2)	(3)	(4)	(5)				
(1)					(6)	(7)	(8)	(9)
Early planting—								
Grain yield in lb. per acre ..	4,209	3,283	3,619	2,957	3,517	Yes.	{ 42	133
Percentage on general mean ..	119.7	93.4	102.4	84.1	100.0		{ 1.20	3.8
Straw yield in lb. per acre ..	6,645	4,336	4,461	3,244	4,672	Yes.	{ 294.8	926
Percentage on general mean ..	142.4	92.8	95.4	69.4	100.0		{ 6.31	19.8
Late planting—								
Grain yield in lb. per acre ..	2,206	1,826	2,043	1,577	1,913	No.	{ ..	..
Percentage on general mean ..	115.3	95.3	106.8	82.2	100.0		{ ..	..
Straw yield in lb. per acre ..	1,712	1,646	1,416	1,153	1,481	No.	{ ..	..
Percentage on general mean ..	115.5	111.1	95.6	77.8	100.0		{ ..	..
Conclusions—								
Early planting—Grain—Manured MTU. 3, Unmanured MTU. 3, Manured MTU. 20, Unmanured MTU. 20.								
Straw—Manured MTU. 3, Unmanured MTU. 3, Manured MTU. 20, Unmanured MTU. 20.								

(d) Results of previous years' trials of MTU. 3 and MTU. 20.

Year.	Particulars.	Mean yield of				General mean.	'Z' test satisfied or not (P = 0.05).	Standard error.	Critical difference (P = 0.05).	Conclusions.
		Manured.		Unmanured.						
		MTU. 3.	MTU. 20.	MTU. 3.	MTU. 20.					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(i) Early planting.										
1949-50	Grain in lb. per acre.	2,933	2,579	2,563	2,291	2,590	No.	..	..	Difference not significant.
	Percentage on general mean.	113.2	99.4	99.0	88.5	100	No.	..	..	
1950-51	Grain in lb. per acre.	3,238	2,954	2,796	2,562	2,900	No.	..	..	Difference not significant.
	Percentage on general mean.	113.4	101.9	96.4	88.3	100	No.	..	..	
(ii) Late planting.										
1949-50	Grain in lb. per acre.	1,411	797	1,212	766	1,047	No.	..	..	Difference not significant.
	Percentage on general mean.	134.8	76.2	115.8	73.2	100	No.	..	..	
1950-51	Grain in lb. per acre.	2,575	2,225	2,566	2,095	2,365	Yes.	18	56	3 M., 3 UM., 20 M., 20 UM.
	Percentage on general mean.	108.8	94.1	108.5	88.6	100	Yes.	0.76	2.4	

(c) Japanese cultural methods on rice.—To find out the efficacy of the Japanese cultural methods on rice over local methods an experiment was laid out in the main and second crop seasons with two kinds of cultural methods and four levels of ammonium sulphate in randomized block arrangements repeated four times. In the Japanese method, in addition to the basal dose of green leaf at 4,000 lb. + 45 lb. of P. O. as super phosphate, 30 lb. N and 45 lb. N as ammonium sulphate were applied. Out of this quantity two-thirds was given before

planting and the balance one-third after one month. Planting was done in lines 1 foot by 9 inches in main crop season and 9 inches by 6 inches in second crop season. Once in a fortnight, weeding was done and the soil was stirred with a rake in between the lines. The local method differed as follows:—(1) Planting was done in bulk, (2) Ammonium sulphate was applied in one dose at the time of weeding, i.e., four weeks after planting in the main crop season and three weeks after planting in the second crop season and (3) no weeding and stirring of the soil were attended to every fortnight. In the main crop season, the general effect of the treatments was significant for manures for grain only, for cultural methods both for straw and grain and for interaction between manures and methods for grain only. The results indicated that Japanese method gave significantly increased yield over local method for grain only by 17 per cent green leaf at 4,000 lb. in conjunction with super at 45 lb. P₂O₅ per acre proved superior to the treatments which received additional dosage of 'N' at 30 lb. and 45 lb. per acre.

TABLE XIII (a).—*Japanese method of rice culture—Main crop, 1951-52.*

Treatments—						
Japanese method—Spacing—1 foot between lines and 9" within the line—3 to 4 seedlings per hole.						
A. No manure.						
B. Green leaf at 4,000 lb. + Super 45 lb. P ₂ O ₅						
C. Green leaf at 4,000 lb. + do. + 20 lb. N before planting and 10 lb. N after one month.						
D. Green leaf at 4,000 lb. + do. + 30 lb. N before planting and 15 lb. N after planting.						
Local method—Bulk planting—						
E. No manure.						
F. Green leaf at 4,000 lb. + Super 45 lb. P ₂ O ₅						
G. Green leaf at 4,000 lb. + do. + 30 lb. N after one month after planting.						
H. Green leaf at 4,000 lb. + do. + 4 lb. N do.						
(a) Analysis of variance (for grain).						
Due to	Degrees of freedom.	Sum of squares.	Mean sum of squares.	Value of F observed.	Value of F calculated.	'Z' test satisfied or not (P=0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Blocks	3	147,313				
Methods	1	340,106		62.9	4.32	
Manures	3	293,111		17.9	3.07	Yes.
Interaction (methods and manures)	3	345,625		20.9	3.07	Yes.
Error	21	115,327				
Total	31	1,241,482				

Size of strip—18' x 24'.

Layout—2' x 4' x 4' randomized blocks.

Planting—(i) Japanese method—Treatments 1 to 4—

1 foot between lines and 9" within the lines.

3 to 4 seedlings per hole.

(ii) Local method—Treatments 5 to 8—

Bulk planting.

Variety—MTU. 1

Sown—5th May 1951.

Transplanted—22nd July 1951.

Harvested—18th November 1951.

(a) Analysis of variance (for straw).

Due to	Degrees of freedom.	Total sum of squares.	Mean sum of squares.	Value of F observed.	Value of F calculated.	'Z' test satisfied or not (P=0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Blocks	3	237				
Methods	1	56		3.5	4.32	No.
Manures	3	591		12.3	3.07	Yes.
Interaction (methods and manures)	3	24		0.5	3.07	No.
Error	21	343				
Total	31	1,251				

(b) Summary of results for methods.

Particulars.	Japanese method of planting.	Local method of planting.	General mean.	'Z' test satisfied or not (P=0.05).	Standard error.	Critical difference (P=0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Grain yield in lb. per acre.	3,052	2,593	2,823	Yes.	41	121
Percentage on general mean.	108.2	91.8	100		1.46	4.3
Straw yield in lb. per acre.	4,175	4,487	4,304	No.		
Percentage on general mean.	96.9	103.1	100			

Conclusions—Grain yield—Japanese method, Local method.

(c) Summary of results for manures.

Particulars.	No manure.	Green leaf + 45 lb. P ₂ O ₅ .	Green leaf + 45 lb. P ₂ O ₅ + 30 lb. N.	Green leaf + 45 lb. P ₂ O ₅ + 45 lb. N.	General mean.	'Z' test satisfied or not (P=0.05).	Standard error.	Critical difference (P=0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Grain yield in lb. per acre.	2,938	3,057	2,811	2,486	2,823	Yes.	58	170
Percentage on general mean.	104.1	108.3	99.6	88.0	100		2.06	6.1
Straw yield in lb. per acre.	3,896	3,946	4,462	4,915	4,304		143	420
Percentage on general mean.	90.5	91.6	103.7	114.2	100.0		3.31	9.8

Conclusions 5—

Grain yield—2, 1, 3, 4.

Straw yield—4, 3, 2, 1.

(d) Summary of results for interaction between manures and methods.

Particulars.	Japanese method.				Local method.				General mean.	'Z' test satisfied or not (P=0.05).	Standard error.	Critical difference (P=0.05).
	A	B	C	D	E	F	G	H				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Grain yield in lb. per acre.	2,885	3,155	3,121	3,401	2,990	2,953	2,500	1,923	2,823	Yes.	80	235
Percentage on general mean.	102.2	111.8	110.6	108.0	105.9	101.8	88.6	68.1	100		2.83	8.3
Straw yield in lb. per acre.	3,832	3,858	4,311	4,689	3,959	4,033	4,614	5,142	4,304	No.		
Percentage on general mean.	89.0	89.6	100.2	108.9	92.0	93.6	107.2	119.5	100			

Conclusions—

Grain—B, C, D, E, F, A, G, H.

In the case of second crop, the general effect of treatments was significant only for manures both for straw and grain yields.

The results indicated that green leaf at 4,000 lb. in conjunction with super at 45 lb. P₂O₅ per acre gave significantly increased grain yields over the rest. In the case of straw, treatments receiving additional dosage of 'N' at 30 lb. and 45 lb. per acre maintained their superiority over those devoid of 'N'.

TABLE XIII (b).—*Japanese method of Rice culture—Second crop, 1951-52—Variety MTU. 15*

Size of plot—18' x 24'.

Layout—2' x 4' x 4' randomized blocks.

Treatments—

Japanese method—Spacing 9" between lines and 6" within the line, 3 to 4 seedlings for hole.

A. No manure.

B. Green leaf at 4,000 lb. + Super at 45 lb. P₂O₅ per acre.C. Green leaf at 4,000 lb. + Super at 45 lb. P₂O₅ per acre + 20 lb. N. as ammonium sulphate before planting and 10 lb. N. after one month.D. Green leaf at 4,000 lb. + Super at 45 lb. P₂O₅ per acre + 30 lb. N. as ammonium sulphate before planting and 15 lb. N. after one month.

Local method—Bulk planting—

E. No manure.

F. Green leaf at 4,000 lb. + Super 45 lb. P₂O₅ per acre.G. Green leaf at 4,000 lb. + Super 45 lb. P₂O₅ per acre + 30 lb. N. as ammonium sulphate one month after planting.H. Green leaf at 4,000 lb. + Super 45 lb. P₂O₅ per acre + 45 lb. N. as ammonium sulphate one month after planting.

(a) Analysis for variance for grain.

Due to	Degrees of freedom.	Sum of squares.	Mean sum of squares.	Value of F observed.	Value of F calculated.	'Z' test satisfied or not (P=0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Blocks	3	55.25				
Method	1	8.00		8.0	Less than one.	No.
Manures	3	522.75		174.25	8.1	Yes.
Interaction (methods and manures)	3	108.25		36.08	1.8	No.
Error	21	451.75		21.51		
Total	31	1,146.00				

(a) Analysis of variance for straw.

Due to	Degrees of freedom.	Sum of squares.	Mean sum of squares.	Value of 'F' observed.	Value of 'F' calculated.	'Z' test satisfied or not (P=0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Blocks	3	231.84				
Methods	1	9.03	9.03	Less than one.	4.32	No.
Manures	3	1,161.34	387.11	38.9	3.07	Yes.
Interaction (methods and manures) ..	3	91.60	30.53	3.068	3.07	No.
Error	21	208.91	9.95			
Total	31	1752.72				

(b) Summary of results for methods only.

Particulars.	Japanese method.	Local method.	General mean.	'Z' test satisfied or not (P=0.05).	Standard error.	Critical difference (P=0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Grain yield in lb. per acre	2,746	2,797	2,771	No.	..	..
Percentage on general mean	99.1	100.9	100.0	..	..	..
Straw yield in lb. per acre	4,068	4,175	4,121	No.	..	..
Percentage on general mean	98.7	101.3	100.0	..	..	..

(c) Summary of results for manures only.

Particulars.	No manure.	Green leaf + 45 lb. P2O5.	Green leaf + 45 lb. P2O5 + 30 lb. N.	Green leaf + 45 lb. P2O5 + 45 lb. N.	General mean.	'Z' test satisfied or not (P=0.05).	Standard error.	Critical difference (P=0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Grain yield in lb. per acre	2,482	3,054	2,803	2,746	2,771	Yes.	2.98	8.8
Percentage on general mean	89.6	110.2	101.1	99.1	100.0	..	..	..
Straw yield in lb. per acre	3,162	4,056	4,534	4,735	4,121	Yes.	111.7	329
Percentage on general mean	76.7	98.4	110.0	114.9	100.0	..	2.71	8.0

Conclusions—

Grain—2, 3, 4, 1.
Straw—4, 3, 2, 1.

(d) Summary of results for interaction (methods and manures only).

Particulars.	Japanese method.				Local method.				General mean.	'Z' test satisfied or not (P=0.05).	Standard error.	Critical difference (P=0.05).
	A.	B.	C.	D.	E.	F.	G.	H.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Grain yield in lb. per acre	2,431	3,048	2,909	2,595	2,533	3,060	2,696	2,897	2,771	No.	..	..
Percentage on general mean	87.7	110.0	105.0	93.7	91.4	110.4	97.3	104.6	100.0	..	..	..
Straw yield in lb. per acre	3,023	3,779	4,559	4,911	3,300	4,333	4,509	4,559	4,121	No.	..	..
Percentage on general mean	73.4	91.7	110.6	119.2	80.1	105.2	109.4	110.6	100.0	..	..	..

13. Other crops—(1) *Banana*.—The following choicest banana varieties were grown during the year, for demonstration and for supply of suckers to the ryots:—

(1) Karpura; (2) Thella-chakrakeli, (3) Rasathali, (4) Amruthapani, (5) Shaja, (6) Kapur, (7) Red banana, (8) Bontha, (9) Bontha batheesa, (10) Mauritius, (11) Gros Michael, (12) Giant chinese, (13) Sirumalai, (14) Sampangi.

The old gardens were removed. The new varietal gardens were planted in an area of 0.28 acre during this year.

(2) *Sugarcane*.—Co. 419 along with Co. 475, Co. 527 and B. 208 were planted on 18th March 1952 in an area of 10 cents for demonstration.

(3) *Perennial grasses*.—Six varieties of perennial grasses are grown in a few lines on the farm for demonstration and for supply of slips to the ryots. The average acre yields of these varieties are furnished in the Table XIV. To

augment the supply of green fodder to cattle, 30,000 slips of 'Guinea and water grasses were planted along the boundary bund of the farm. (Table XIV).

TABLE XIV.—Perennial grasses.

Variety of grass.	Planted on.	Area planted in square yards.	Number of harvests taken from 1st July 1951 to 30th June 1952.	Plot yield.	Acre yield.
				LB.	LB.
Guinea grass	5th January 1950.	20	6	124	30,008
Elephant grass X Cumbu.	4th July 1948.	30	6	377	60,984
Water grass	30th May and 5th July 1951.	70	6	322	22,218
Buffalo grass	5th January 1950.	20	6	245	59,290
Napier grass	5th January 1950 and 5th July 1951.	220	6	648	14,256
Thin Napier	25th September 1951.	176	3	256	7,040

(4) *Wheat*.—Wheat after main crop paddy was grown in a high-level wet land area to study the possibility of growing it as an alternative food crop. Two varieties P.W. 5 and P.W. 12 received from Hyderabad were grown along with other two varieties Naphad 4 and Jaya received from the Director, Central Tobacco Research Institute, Rajahmundry, in an area of 0.50 acre. Glumed wheat was also grown in an area of 0.25 acre. All these varieties were sown on 14th December 1951. Due to adverse seasonal conditions the yields were very low in P.W. 5, P.W. 12 and Jaya. The other two varieties failed completely.

Variety.	Area in acre.	Plot yield.	Acre yield.
1. P.W. 5	0.12	7 lb.	58 lb.
2. P.W. 12	0.12	5 lb.	42 lb.
3. Jaya	0.12	2 lb.	17 lb.

(5) *Groundnut*—(i) *T.M.V. 2 in paddy stubbles*.—T.M.V. 2 was dibbled on 18th December 1951 in an area of 10 cents in lines in paddy stubbles after the harvest of main crop paddy with the object to advance its harvest so that its cultivation may not interfere with water requirements of second crop paddy. The germination and subsequent progress were good. The stubbles were removed subsequently and plants earthed up. The crop gave an acre yield of 375 lb. which is considered to be very low.

(ii) *On field scale*.—After normal preparatory cultivation after the harvest of main crop rice, variety T.M.V. 2 was sown in plough furrows after a basal dressing of 100 lb. super per acre in an area of 1.20 acres on 19th January 1952. In order to determine the number of intermittent irrigations required, half of the above area was given three irrigations and the other half two irrigations. The crops were harvested on 7th May 1952. Both the areas yielded equally.

Particulars.	Area in acre.	Yield in lb.	Acre yield.
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1. Two intermittent irrigations.	0.60	475 lb.	791 lb.
2. Three intermittent irrigations.	0.60	478 lb.	797 lb.

Even here it should be considered that the yield is below normal for an irrigated crop.

(6) *Gingelly*.—Local variety of gingelly was sown in an area of 1.90 acres after the harvest of paddy. In early stages the crop was subjected to severe attack by grasshoppers. The stand was poor. An acre yield of 157 lb. was recorded as against 115 lb. of previous season.

(7) *Linseed*.—N.P. 68 received from Superintendent, Sugarcane Research Station, Anakapalle, and K-2 strain from Oil Seeds Specialist, Coimbatore, were sown in an area of 2.4 cents. The germination and subsequent growth were satisfactory. Seed was collected for continuing the observation regarding its suitability in this tract for fibre and seed purposes.

(8) *Soya beans on field bunds*.—The available field bunds in 'A' and 'B' blocks to a length of 408 feet were sown with 'Behrum' variety in July. A total quantity of 17 lb. of seed was collected. Tata 5, received from Pulse Specialist, Coimbatore, sown on 20th August 1951, failed to germinate.

(9) *Vegetables*.—In pursuance of the "Grow More Food Campaign" all available high land pieces aggregating to about 40 cents were put under vegetables. All the vegetables except winter vegetables, i.e., Cabbage, Cauliflower, Knolkhol and beet root, have come up well. A quantity of 988 lb. of green vegetables and 28½ lb. of vegetable seeds of different varieties and 1,831 seedlings of various vegetables were obtained for distribution. Vellarimathan sown in pits at 7 feet apart in rice fallows in an area of 30 cents gave very poor yield of 97 lb. only.

(10) *Fruit plants*.—Various varieties of fruit plants Mango, Guava and Malta lemon are coming up well. The two Singapore Jack plants planted in 1947 had very poor growth. A total number of 134 Malta lemon layers were distributed to the public as well as the District staff during the year under review.

(11) *Economic plants*.—Balsa wood trees, Kapok and teak plants are coming up well. Balsa wood trees planted in February 1949 flowered in March and April and one and a half ounce of seed was collected.

(12) *Green manure plants and crops*—(a) *Gliricidia*.—Gliricidia plants along the boundary fence are coming up vigorously and an average yield of 13 lb. of green leaf per plant was obtained. A total quantity of 90 lb. of seed was collected from these plants. In the month of March and April, 2,207 Gliricidia rooted cuttings treated with Hortomone "A" (1 cc. in one pint of water) were planted 3 feet apart on one bund of Irrigation and drainage channels to a length of 6,300 feet in order to augment the production of green leaf on the farm thus releasing the main fields for other commercial crops.

(b) *Sesbania*.—(i) In the main crop season, after the transplantation of rice, a total length of 29,428 feet was planted with Sesbania seedlings aged 30 to 60 days at 6 inch apart from 20th June 1951 to 9th August 1951. The plants had luxuriant growth. The flowering extended from October to December, depending upon the planting period. Collection of pods commenced from middle of November and completed by end of February. A total quantity of 3,263 lb. of seed was obtained from field bunds. An acre field bunds measuring 1,320 feet gave a total quantity of 1,063 lb. of green leaf from 1,512 plants which were 4 months old with an average height of 8 feet 9 inches.

(ii) Sesbania was grown on a field scale after the harvest of sunnhemp, i.e., without interfering with the normal cultivation practices of the tract. It was sown after the harvest of sunnhemp without ploughing and after ploughing. The crop sown without ploughing received three irrigations while that sown after ploughing two irrigations only. The yield of green leaf obtained is furnished below—

Particulars.	Date of sowing.	Date of harvest.	Area harvested.	Quantity obtained.	Estimated acre yield.
(1)	(2)	(3)	(4)	(5)	(6)
			CENTS.	LB.	LB.
1 Sown after harvest without ploughing.	13 Feb. 1952	22 June 1952	10	3,800	38,000
2 Sown after harvest after ploughing.	27 Feb. 1952	22 June 1952	1	246	32,800

In the trial of finding out the optimum time of sowing Sesbania for green manuring main crop rice, the crop was sown at weekly intervals from 3rd April to 17th April. The first batch of sowing received three irrigations while the latter two only two irrigations. The yield data are furnished below :—

Date of sowing.	Date of harvest.	Average height.	Area harvested in cents.	Quantity obtained.	Estimated yield per acre.
(1)	(2)	(3)	(4)	(5)	(6)
		CENT.	LB.	LB.	LB.
1 3 April 1952	22 June 1952	5 feet	1	202	26,800
2 10 April 1952	Do.	3 feet	1	109	14,400
3 17 April 1952	Do.	1 foot	1	59	7,900

The earlier the sowing the higher is the yield of green leaf obtained which can be distributed to greater area depending upon the rate of leaf to be incorporated.

(iii) Sesbania planted on the second crop field bunds in February gave an average yield of 1 lb. green leaf per plant.

(13) *Tobacco*.—To study the effect of growing a cereal crop in the subsequent tobacco crop in the dry land black cotton soils, an area of 32 cents was planted with Virginia tobacco seedlings on 10th November 1951. The growth was uneven and not up to the mark. A total quantity of 402 lb. of green leaf was obtained from which 23 lb. of first grade and 22 lb. of second grade of cured leaf were got.

(14) *Cotton*—(i) *Perennial cottons*.—All the perennial cottons except Moco, the highest yielder, were removed. Fresh seeds of Moca, Caramura-2 were sown in August for further multiplication. Kidney cotton received from Cotton Specialist, Coimbatore, for trial on the station, was sown in June. The plants had satisfactory growth.

(ii) *Trial of cotton in rice fallows*.—In the time of sowing-cum-manurial trials comprising of four batches of sowings at fortnight intervals from middle of November under manured and no manured conditions, from the yield data, it was observed, early sown crops under manured conditions gave maximum yield of 600 lb. of Kapas per acre with variety P-216 F while unmanured crop yielded 520 lb. of Kapas. In the varietal trial, Madras Uganda I topped the list by giving an acre yield of 430 lb. of Kapas. Next in order were 7,682 and P-216 F with an acre yield of 425 lb. and 380 lb. respectively.

14. *Pests and diseases*.—There was no serious outbreak of any pests and disease on the crops on the farm.

Studies on item borer on rice were made in the second crop season, treating the paddy seedlings with B.H.C. P-520 of 0.1 per cent and 0.05 per cent concentration and with D.D.T. 55 of 0.2 per cent and 0.1 per cent concentration against control with no treatment. Periodical sprayings with the above chemicals of different concentrations were done to the crop situated in different blocks. The incidence of infestation was estimated at fortnight intervals from shot blade stage. It was observed, the incidence in general was very low and in the plots treated with D.D.T. 550 of 0.2 per cent concentration the incidence was lower than the other chemicals.

15. *Seed distribution.*—The quantity of seed material of different crops either transferred or sold is given below. (Table XV.)

TABLE XV.—Seed distribution in the year 1951-52 at Agricultural Research Station, Maruteru.

Particulars.	Sales.	Transfers.	Total.
(1)	(2)	(3)	(4)
	LB.	LB.	LB.
Paddy seed	21,997½	48,934½	70,931½
Gliricidia maculata seed	8½	63-1 oz.	71-5 oz.
Sesbania speciosa seed	23-3 oz.	3,083-2 „	3,106-5 „
Sunn hemp seed	..	59	59
Daincha seed	..	11	11
Vegetable seed	21-6½	0-5	21-11½
Wheat seed	..	12	12
Groundnut seed	..	784	784
Soya bean seed	53½	25	78½
Linseed	..	0-8 oz.	0-8 oz.
Banana suckers	111 Nos.	2 Nos.	113
Coconut seedlings	143 „	..	143
Lemon layers	62 „	72 Nos.	134
Green manure seedlings	12,110 „	12,400	24,500
Vegetable seedlings	1,943 „	..	1,943
Paddy seedlings	479½ pogus	..	479½ pogus.
Gliricidia cuttings	150 Nos.	21,00 Nos.	21,150 Nos.
Mint cuttings	25 „	..	25 „

Financial statement is given in Appendix I.

Appendix II relates to the progress of work done and Appendix III the programme of work. Appendix IV deals with steps to increase the revenue of the farm.

AGRICULTURAL RESEARCH STATION,
MARUTERU,
2nd August 1952.

N. H. V. KRISHNAMURTHY,
Superintendent.

LAWLEY ROAD P.O., COIMBATORE,
14th August 1952.

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

APPENDIX I.

FINANCIAL STATEMENT OF THE AGRICULTURAL RESEARCH STATION, MARUTERU,
FOR THE YEAR 1951-52 (FASLI 1361).

Particulars.	Amount.
RS.	A. P.
A. Expenditure—	
18. c. Agriculture—Experimental Farms—A. Agricultural Research Stations—Voted—	
1. Pay of officers	2,831 2 0
2. Pay of establishment	11,103 0 0
3. Dearness allowance of staff	4,242 3 0
4. Travelling allowance of staff	2,517 2 0
5. Petty construction and repairs	3,248 1 3
6. Office contingencies	1,129 7 9
7. Dearness allowance to menials	4,531 3 0
8. Purchase of live and deadstock, etc.	7,318 6 6
9. Working expenses	33,084 6 9
10. Apparatus and materials	306 14 0
Total ..	70,311 14 3
50. d. Civil Works—	
Annual repairs to buildings	784 4 6
Grand total ..	71,096 2 9
B. Receipts—	
XXIX. Agriculture—Agricultural Receipts—	
Agricultural stations	10,175 10 6
Miscellaneous	2,538 7 9
Sales tax	149 13 6
Stationery and printing	6 14 0
Cost of paddy and other seeds transferred outside	7,260 14 8
Total ..	20,131 12 5

APPENDIX II.

SUMMARY OF WORK DONE DURING 1951-52—(FASLI 1361).

1. *Planting.*—Main crop planting which commenced on 12th June 1951 concluded on 31st July 1951. A total area of 39.97 acres comprising of 4,569 units was transplanted. In the second-crop season 1,497 units were planted in an area of 19.75 acres.

2. *Economic work—Rice—(a) Improvement of local varieties by pure line selections.*—The two cultures in Pedda Atragada 4,250 and 4,280 were multiplied for taking up further trials in the districts. Pedda Kusuma culture 4,658 gave 76 per cent increased yield over ryots' bulk.

(b) *Improvement by hybridization.*—Three high-yielding cultures in Kasipichodi and two cultures of Kar and Kuruvai groups were compared against the released strains. In rainfed varieties 31 selections and 34 pure-breeding cultures were carried forward for further study. In addition 23 fresh single plant selections were made for further study. Three cultures of Krishnakatukulu duration and type of grain, five cultures of GEB. 24 duration and type of grain, five cultures suitable for deep-water conditions, three cultures of Sanna Prayaga duration and type of grain, two cultures of Atragada duration, two of Konamani and one of

Kusuma were under yield trials. Out of 124 cultures which were compared with their standards 35 high-yielding cultures were compared with their standards, 35 high-yielding cultures were carried forward for further trial. Out of 628-F-4s studied, 285 further selections were made for further study. Among the cross progenies, of short duration varieties and MTU. 15 and MTU. 15 out of 435F-3s studied in the main crop season, 334 further selections were studied in the second-crop-season. From these 440 further selections were made for further study.

3. *Manurial experiments.*—The results of the compost experiment laid out in single and double crop areas of main crop season and in the second crop season indicated that the general effect of the treatments was not significant in both the single and double-crop areas either for grain or straw yields and in the case of second-crop, the farm-yard manure and compost giving an acre yield of 1,705 lb. and 1,719 lb. of grain, respectively, did not differ significantly among themselves but they gave significantly higher yields than 'no manure' which gave an acre yield of 1,304 lb. of grain. Trial with fused phosphate fertilizer with different combinations of ammonium sulphate and super phosphate with and without green leaf, revealed that the general effect of the treatments was not significant either for grain or straw yields. The results of the experiment to study the effect of phosphatic manures on the succeeding green manure crop when they were applied to the rice crop, indicated that the general effect of the treatments was not significant either for grain or straw yields. The results of the sunnhemp crop sown prior to the harvest of rice crop, indicated that the general effect of the treatments was not significant. But plots receiving super at 30 lb. and 45 lb. P_2O_5 gave from 7.2 to 7.9 per cent increase over no manure plots. From the results of another experiment with two kinds of green manures (sunnhemp and daincha) as main plot treatments and phosphates applied as sub plot treatments it was observed that sunnhemp recorded significantly increased yields over Daincha both for grain and straw. In the case of sub-plot treatments though they have recorded significantly higher yields over no manure, they did not differ significantly among themselves for grain yields. But there is an indication that indirect application of phosphate to rice crop through green manure results in slight increase in yields of grain and straw.

4. *Agronomical and cultural experiments.*—Under soil exhaustion studies by strains over ryot's bulk, the strain gave better yields than the ryots bulk, confirming the results of the previous trials. The results of experiment in the main crop season to find out the efficacy of the Japanese cultural methods on rice over local methods indicated that Japanese method gave significantly increased yield over local method for grain only by 15.7 per cent and green leaf at 4,000 lb. in conjunction with super at 45 lb. P_2O_5 per acre proved superior to the treatments which received additional dosage of 'N' at 30 lb. and 45 lb. per acre. In the case of second crop season the results confirmed the findings obtained in the main crop season, namely, that green leaf at 4,000 lb. in conjunction with super at 45 lb. P_2O_5 per acre gave significantly increased grain yields over the rest. In the case of straw, treatments receiving additional dosage 'N' at 30 lb. and 45 lb. per acre maintained their superiority over those devoid of 'N'.

5. *Other crops.*—The banana gardens, both Karpura and varietal were badly damaged by strong winds prevailed in August-September. An average yield of 20 lb. per plant was obtained. Fresh varietal gardens were planted in an area of 0.28 acre. Sugarcane varieties Co. 419; Co. 475; Co. 527 and B-208, were planted in March in an area of 10 cents for demonstration. Groundnut T.M.V. 2 sown in 1.20 acres, gave an acre yield of 794 lb. of pods. Local gingelly sown in 1.90 acres gave an acre yield of 57 lb. All the summer and winter vegetables were grown in the available high pieces of 40 cents. A quantity of 988 lb. of green vegetables, 28½ lb. of vegetable seeds of different varieties and 1,831 seedlings of various vegetables were obtained for distribution.

6. *Fodder and green manure crops.*—Sunnhemp sown in the standing crop of rice provided green manure for second crop rice at 2,000 lb. per acre and 700 lb. of hay were collected for fodder. Sesbania seedlings were transplanted in the main crop field bunds to a total length of 29,428 feet, from which a total quantity of 3,263 lb. of seed was obtained. Sesbania grown as pure crops in February after the harvest of sunnhemp yielded on average 40,000 lb. of green matter per acre. Glyricidia all along the boundary had luxuriant growth. On an average each plant yielded 13 lb. of green matter. In addition 90 lb. of seed were collected in April. Varieties of perennial grasses were grown in small areas for demonstration and for supply of slips to the ryots. Among these, elephant grass × cumbu topped to list giving the maximum yield of 61,000 lb. of green grass per acre in 6 cuttings in the year and it was closely followed by buffalo grass with 59,000 lb. and guinea grass with 30,000 lb. per acre with the same number of cuttings.

7. *Fruit plants.*—A total number of 134 malta lemon layers were distributed to the public as well as District staff during the year.

8. *Seed distribution.*—Seventy thousand nine hundred and thirty-two lb. of paddy seed, 79 lb. of Soya bean, 3,106 lb. of Sesbania seeds, 71 lb. of Glyricidia seeds, 59 lb. of sunnhemp, 11 lb. of Daincha, 22 lb. of vegetables, 784 lb. of groundnut (T.M.V. 2), 113 banana suckers, 134 malta lemon layers, 21,150 Glyricidia cuttings, 24,510 seedlings of green manure crops, 1043 seedlings of vegetables, and 143 coconut seedlings were supplied during the year under report.

APPENDIX III.

PROGRAMME OF WORK FOR 1952-53.

I. *Improvement of local varieties of rice.*—(a) *Pure line selection.*—(i) Maintenance of purity and multiplication of 21 released Maruturu strains.

(ii) Multiplication of promising cultures isolated in Atragada and Peddakusuma.

(iii) Yield trials of 56 high yielding pure cultures of strains against their respective standards.

(iv) Yield trials of 4 Akkullu cultures and one Kusuma culture against their respective standards.

(b) *Hybridizations.*—(i) Intensive study of F.5s of inter strains and wild paddy crosses, (285 + 114 = 399 cultures).

(ii) Continuation of comparative yield trials of pure breeding cultures of 11 Krishnakatukalu, 4 GEB 24 duration, 5 Konamani duration, 5 Venkasannam duration, 11 Atragada duration and 4 Kusuma duration.

(c) *District trials.*—Five cultures suitable for low-lying badavas (low-lying areas), two cultures of Krishnakatukalu, one culture of Atragada, two cultures of Pedda Atragada and three cultures of Sanna Prayaga, will be tried in representative suitable localities in the Districts of West Godavari, Krishna and Guntur.

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

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

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

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

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

APPENDIX IV.

(a) *Steps to increase the revenue.*—(1) Sale of excess paddy straw of second crop by auction.

(2) Sale of fish from the seed-bed tank.

(3) Increasing the area under commercial crops like groundnut and gingelly.

(4) Sale of vegetable seeds and seedlings, and other economic and fruit plants.

(5) Increasing the area under second crop rice.

(b) *Cost of cultivation of bulk crops (1951-52).*—

Bulk crop of paddy (1951-52).

Cultivation charges—

	Rs.	A.	P.
Main crop paddy 25.17 acres at Rs. 202-2-2 per acre	..	..	..
Second crop paddy 15.21 acres at Rs. 180-9-7 per acre	..	..	..
	7,834	8	7

Receipts—

Grain yield 99,541 lb.			
73,153 lb. of coarse paddy at Rs. 20-10-7/166 lb.	..	..	..
26,388 lb. of fine paddy at Rs. 21-12-8/166 lb.	..	..	..
Straw yield 174,926 lb. at Re. 1 per 100 lb. ..	..	..	..
	12,569	3	2
	1,749	4	0
	14,318	7	2

Profit per acre Rs. 160-9-0.

(ii) Groundnut crop—

(1) Cultivation charges.

1.32 acres at Rs. 92-3-9 per acre RS. A. P.
121 12 0

(2) Receipts.

713 lb. of pods at As. 2 per lb. * 89 2 0

* Low receipts are due to fall in price of groundnut pods.

Loss per acre Rs. 24-11-0.

(iii) Gingelly—

(1) Cultivation charges—

1.90 acres at Rs. 31-13-6 per acre 60 8 0

(2) Receipts—

298 lb. of seed at Rs. 1 per 4 lb. * 74 8 0

* The stand was very poor due to grasshopper attack in the early stage of the gingelly crop.

Profit per acre Rs. 7-6-0.

GLOSSARY

Scientific name.

Dalva (Telugu) Refers to second crop paddy season (January to May).

Pogu (Telugu) Refers to 20 bundles (handful each) of paddy seedlings.

ANNUAL REPORT OF THE AGRICULTURAL RESEARCH STATION,
ADUTHURAI, FOR 1951-52 (FASLI 1362).

Season.—The season was on the whole definitely unfavourable for paddy in Tanjore delta as elsewhere in the southern districts. Not only was the total rainfall, viz., 33.45 inches (vide Table I) in deficit of the preceding ten-year average of 38.41 inches by about 14.8 per cent, but its general distribution was also particularly defective. The south-west monsoon recorded 13.70 inches which was perceptibly higher than the ten-year average, viz., 9.50 inches, whereas the north-east monsoon, the normal contribution of which as well as its proper distribution is of vital importance to the main paddy crop, *samba* and also to the second crop, *thaladi* in the whole of Tanjore delta, was highly in deficit, having recorded only a total of 16.62 inches against the previous ten-year average of 23.27 inches. This heavy deficit of the north-east monsoon and the consequent unavoidable restriction of canal water-supply enforced by the Public Works Department authorities reflected in a poor stand of the paddy crops, particularly *thaladi* and in the incidence of some of the major insect pests of paddy, viz., stem borer, *soorai* (mealy bug) and silver shoot in epidemic forms in both *samba* and *thaladi* crops over the whole delta. It deserves special mention, however, that high average yields of both *samba* and *thaladi* crops could be maintained on this station by resorting to intensive manuring with a judicious combination of bulky organic manures (green leaf) and ammonium sulphate. That the adverse effects of unfavourable seasonal conditions could be offset to a considerable extent by proper manuring in the case of paddy crops in the Cauvery delta were thus clearly demonstrated on this farm to Tanjore ryots who could also very well afford to emulate this practice on their own holdings, particularly in these days of food scarcity when paddy is commanding a decent price even in surplus districts.

Again, the unusually heavy showers in September and January-February at the tail ends of both south-west and north-east monsoons respectively proved to be very unseasonal. The September showers interfered with the early harvests of *kuruvai* and the sowing of *thaladi* nurseries, while the January-February rains did serious damage to the standing important crops on rice fallows, viz., pulses (black and green grams), green manures especially wild indigo and the newly introduced commercial crop Punjab 216 F. cotton, all of which were then in a young stage and could not tolerate prolonged water stagnation. Furthermore, the long spell of drought and the complete absence of the usual summer showers during March to June gave a severe setback to the growth of the pulses and green manure crops. Also the ryots could not carry out the preparatory cultivation of the nursery plots for the 1952 *kuruvai* crop in the absence of hot weather rains.

TABLE I.—Statement of rainfall.

Month.	Week.	1950-51.		1951-52.		Average of ten years.	
		Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
South-west monsoon.							
June	7-13	0.39	1	0.09	..	0.05	0.2
	14-20	..	..	..	..	0.13	0.2
	21-27	0.53	2	..	..	0.17	0.3
June-July	28-4	0.06	..	1.60	1	0.24	0.4
	5-11	..	..	2.67	2	0.66	0.7
	12-18	..	..	..	..	0.19	0.6
	19-25	..	..	..	..	0.27	0.5

Month.	Week.	1950-51.		1951-52.		Average of ten years.	
		Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
South-west monsoon—cont.							
July-August	26-1	1.51	2	0.65	1	0.67	1.1
	2-8	0.07	..	..	..	0.67	0.6
	9-15	..	..	2.10	3	0.54	1.0
	16-22	4.23	3	..	..	1.31	1.4
August-September.	23-29	0.52	2	1.79	3	1.13	1.5
	30-5	0.35	2	4.07	2	0.78	1.1
	6-12	1.32	1	0.41	2	1.00	1.6
	13-19	0.06	..	..	..	0.52	1.0
Total	20-26	1.52	3	0.23	1	1.17	1.5
	..	10.56	16	13.70	15	9.50	13.7
North-east monsoon.							
September-October.	27-3	2.86	2	1.34	3	1.64	1.9
	4-10	0.60	1	1.61	2	1.21	1.7
	11-17	3.97	5	0.87	2	1.53	2.2
	18-24	1.90	2	0.10	..	1.86	2.3
November	25-31	..	..	0.63	3	1.01	1.8
	1-7	4.54	3	1.55	4	2.02	1.9
	8-14	1.42	5	1.86	2	2.52	2.8
	15-21	3.78	2	2.25	4	3.19	3.0
November-December.	22-28	0.20	1	0.40	1	1.96	2.2
	29-5	..	..	2.48	3	2.45	2.2
	6-12	..	..	0.15	1	0.78	1.5
	13-19	2.16	3	0.47	2	1.13	1.5
December-January	20-26	0.07	..	..	..	0.30	0.8
	27-3	0.07	..	0.17	1	0.38	0.8
	4-10	0.36	2	0.11	1	0.57	1.2
	11-17	0.06	..	..	..	0.21	0.4
Total	18-24	0.15	..	..	..	0.31	0.4
	25-31	..	..	2.93	2	0.13	0.4
	..	22.14	26	16.62	31	23.27	29.0
Hot weather.							
February	1-7	..	..	..	..	..	..
	8-14	..	..	..	..	0.02	0.1
	15-21	..	..	1.10	1	0.46	0.5
	22-28	..	..	1.64	1	0.03	0.1
March	1-7	..	..	..	..	0.22	0.4
	8-14	..	..	..	..	0.03	0.1
	15-21	..	..	..	..	0.04	0.2
	22-28	..	..	..	..	0.15	0.4
March-April	29-4	0.14	1	..	..	0.40	0.9
	5-11	0.11	1	..	..	0.20	0.3
	12-18	0.19	1	0.17	1	0.27	0.6
	19-25	0.72	2	..	..	0.43	0.3
April-May	26-2	..	..	..	..	..	..
	3-9	..	..	..	..	0.26	0.4
	10-16	..	..	..	..	0.96	0.8
	17-23	0.35	1	0.22	1	1.11	1.0
May-June	24-30	1.93	4	..	..	0.59	0.8
	31-6	0.06	..	..	..	0.30	0.5
	..	3.50	10	3.13	4	5.47	7.4
	Total	36.20	52	33.45	50	38.24	50.1

2. *Temperature and humidity records.*—The records of temperature and humidity were maintained during the year. The maximum temperature ranged between 105.3° F (19th May 1952) and 76.4° F and the minimum between 63.6° F (21st January 1952) and 86.6° F. The months of November and June recorded the highest and lowest percentages of relative humidity, the average figures being 84.0 and 53.5 respectively.

3. *Paddy—kuruwai (first crop).*—The *kuruwai* nursery plots in A, B, C, D and G blocks were given dry ploughing after the receipt of summer showers in May 1951, and the sowings commenced on 25th May 1951, nearly a month in advance of the receipt of canal water supply, which became available from 27th June 1951. The sowings continued till 30th June 1951. The *kuruwai* transplant fields were ploughed thrice with P.S.G. No. 10 plough incorporating the green manure crops (mostly wild indigo) *in situ* and the final puddling done by working the Burmese *setun*. On an average, 1,000 lb. of green leaf, 300 lb. to 500 lb. of indigo meal and 100 lb. of superphosphate per acre were applied before transplantation and 200 lb. of ammonium sulphate per acre applied as top dressing in two doses. Of the total *kuruwai* area of 30.4 acres, 6.37 acres were under different experiments. The transplantation of *kuruwai* which commenced on 29th June 1951 came to a close on 26th July 1951.

The average yields of *kuruwai* varieties are given in Table II.

TABLE II.—Acre yield for *Kuruwai*.

Strain number.	Area yield in lb. per acre.		Average yield in lb.	
	Acres.	Average.	1950-51.	1949-50.
(1)	(2)	(3)	(4)	(5)
ADT. 3	3.23	3,716	3,350	3,116
ADT. 4	Grown in 'udu' only.	2,869†	3,500	2,851
ADT. 9	0.40	2,975*	3,906	3,862
ADT. 16	0.40	2,962†	2,153	3,361
ADT. 18	0.40	3,596	3,850	4,492
ADT. 19	0.40	3,107*	3,230	4,152
ADT. 20	11.67	2,402†	3,500	3,351
ADT. 23	0.32	..	2,310	3,456

* Heavy incidence of *Sclerotium oryzae*.
† Premature lodging before panicle emergence.

It deserves special mention here that but for the incidence of the stem-rot disease (*Sclerotium oryzae*) in a fairly severe form in most of the fields, irrespective of varieties, the total production of *kuruwai* would have been considerably higher.

4. *Improvement of local varieties by pure-line selection*—(i) *Cultures under yield test—Maattikuruwai.*—This is a red-riced first crop variety extensively cultivated in the coastal region of Tanjore district and in Chidambaram taluk and corresponds to the white-riced *kuruwai* (ADT. 3) of the same duration covering a larger area in the remaining portions of the delta. No improved strain has so far been evolved from the former variety. Pure-line selections were therefore made from the ryots' unselected seed of this variety during 1949-50 and after a preliminary study of the selections during 1950-51 in observation block, 49 promising cultures were subjected to replicated yield tests in four series during 1951-52. The yield data are furnished below:—

Field No.—F7 ab.
Manured at—500 lb. of Indigo meal, 100 lb. of superphosphate and 200 lb. of ammonium sulphate per acre.
Sown—12th June 1951.
Planted—11th July 1951.
Harvested—Series I and II—25th September 1951;
Series III and IV—28th September 1951.

Summary of results.

(Series I)											
1199.	1198.	1205.	1207.	1209.	1210.	1212.	1213.	1216.	1217.	1218.	1219.
Acres	3.018	2.442	2.989	2.630	2.127	3.132	3.294	2.533	3.208	3.178	2.490
Yield in lb.	95.1	77.0	94.2	83.1	90.2	99.9	103.8	89.3	101.0	100.2	78.5
Percentage standard.	80	30	83	86	85	76	80	88	80	76	76
Flowering duration in days.	..	..	..	..	..	..	..	..	..	..	..

(Series I)—*coat.*

	1224.	1225.	M.K. Standard.	General mean.	Standard error.	'Z' test not satisfied.
Acre yield of grain in lb.	3,092	3,215	3,173	2,972	227.0	..
Percentage on standard.	97.5	101.3	100.0	93.7	178.8	..
Flowering duration in days.	76	80	76	..	..	..

(Series II.)

	1223.	1228.	1229.	1231.	1232.	1234.	1236.	1237.	1239.	1241.
Acre yield of grain in lb.	3,494	3,377	3,147	3,259	3,083	2,949	3,139	3,031	3,112	3,187
Percentage on standard.	107.8	104.2	97.1	100.6	94.6	90.8	96.0	93.6	96.1	98.4
Flowering duration in days.	85	85	76	80	80	88	80	80	76	80

	1243.	1244.	M.K. Standard.	General mean.	Standard error.	'Z' test not satisfied.
Acre yield of grain in lb.	3,947	3,287	3,240	3,248	257.5	..
Percentage on standard.	124.7	101.5	100.0	100.2	8.0	..
Flowering duration in days.	80	80	76	..	..	..

(Series III.)

	1245.	1248.	1249.	1254.	1255.	1256.	1257.	1258.	1260.	1263.
Acre yield of grain in lb.	3,593	3,561	3,516	4,562	3,824	3,465	3,363	3,232	3,181	3,874
Percentage on standard.	110.2	109.1	107.7	133.9	103.1	106.0	103.1	100.3	96.4	118.7
Flowering duration in days.	81	81	77	81	81	81	81	81	81	81

	1264.	1265.	M.K. Standard.	General mean.	Standard error.	'Z' test not satisfied.
Acre yield of grain in lb.	3,802	2,959	3,283	2,796	221.0	..
Percentage on standard.	116.4	90.7	100.0	107.9	1.7	..
Flowering duration in days.	77	84	77	..	..	..

(Series IV.)

	1269.	1270.	1272.	1273.	1277.	1278.	1282.	1283.	1286.	1288.
Acre yield of grain in lb.	3,680	3,881	3,817	3,730	2,422	3,553	3,449	2,826	3,231	3,618
Percentage on standard.	111.1	120.5	118.4	118.2	75.2	110.3	104.7	87.3	100.3	112.3
Flowering duration in days.	81	81	81	77	77	77	81	77	77	77

	1291.	1293.	M.K. Standard.	General mean.	Standard error.	'Z' test not satisfied.	Critical difference (P=0.05).
Acre yield of grain in lb.	3,753	3,415	3,222	3,423	127.0	..	352.0
Percentage on standard.	116.5	108.0	100.0	108.2	1.0	..	2.7
Flowering duration in days.	81	77	76	..	..	..	..

Conclusion—

1270, 1272, 1291, 1273, 1283, 1269, 1278, 1282, 1293, 1286, M.K. Standard, 1283, 1277

Out of the above 49 cultures, 29 have been carried forward for further yield tests.

(ii) *Cultures in observation block—Tiruturaipundi kar.*—This is a flood resistant short-duration variety cultivated under submerged conditions in Tiruturaipundi and Mannargudi taluks. A total number of 202 individual selections isolated from ryots' unselected seed during the previous year was under preliminary study and based on eye judgment 41 cultures have been carried forward for future yield tests.

(iii) *Fresh selection—Mattaikuruvai.*—In order to reinforce the selections already made from this variety—vide 4 (1) representative samples of ryots' unselected seed were again collected and a sufficiently large population of plants raised from the same and 240 individual plants selected therefrom for future progeny tests.

5. *Hybridization for crop improvement.*—(i) *To evolve short and medium-duration strains resistant to 'blast'.*—The only one outstanding 'blast' resistant hybrid strain, viz., Co. 25, released by the department so far, is a long-duration one. As there is however a crying need for 'blast' resistant strains of also short and medium durations, intensive work in this direction has been in progress in recent years. F1 and F2 progenies of a number of crosses effected for the purpose between the resistant strain Co. 4 and a few short-duration strains like ADT. 3, ADT. 18 and ADT. 20, etc., were studied and desirable plants individually selected.

(ii) *To induce seed-dormancy in short-duration strains.*—None of the existing short-duration strains released so far by the department would appear to possess the desirable quality which, however, is possessed by most of the long and medium-duration strains. A number of F1 and F2 progenies of crosses effected between suitable parents for the abovementioned purpose was studied and 309 single plants possessing a desirable combination of agronomic characters including earliness and seed-dormancy were selected for future progeny test.

(iii) *To evolve saline resistant strains of different durations.*—The enormous magnitude of underproduction of paddy due to alkalinity and salinity of soils on extensive areas in our State is too well-known. Luckily there are a few existing paddy varieties like Thella Thoka Vadlu of Chittoor district and S.R. 26B of Orissa which are reputed to tolerate alkalinity and salinity to a marked extent. A number of crosses have been effected between these two varieties and some of the most popular departmental strains. In the absence of saline or alkaline soil conditions on this station, the cross progenies are being carried forward in bulk (Svalof method of cross-breeding) for growing them in due course on typical saline soils and selecting desirable plants thereof, as they would have attained a certain state of genetic purity by then.

(iv) *Cross progenies of time and season-bound varieties.*—Only 12 out of 30 cultures under study were found to possess the desired combination of earliness and fine grain. Nine of these promising cultures were carried forward for yield test, while secondary selections were made from the remaining three as they were still lacking in genetic purity.

6. *Inter-variety trial*—(i) *Departmental strains.*—This trial started in 1950-51 with the object of assessing the relative merits of the existing numerous strains of similar duration and eliminating the obviously inferior ones, thereby helping to reduce the multiplicity of allied strains to some extent, was continued. The yield data as furnished below have given some indications of the comparative merits of the strains within different age groups, but the trial will have to be repeated for a few more seasons, before a definite conclusion on the subject could be arrived at:—

Field number—F. 4-b.
Manured at—900 lb. of kolinzi, 300 lb. of Indigo meal,
100 lb. of super and 200 lb. of ammonium sulphate
per acre.
Sown—16th June 1951.
Planted—13th July 1951.
Harvested—
Series I.—1st October 1951, Series II 4th October
1951.
Series III.—7th October 1951.

Number of variants—Series I:—3.
Series II and III:—4.
Layout—Randomised blocks Series I: 3 × 6.
Series II and III: 4 × 6.
Size of plot—14' × 4' Net.
Spacing—4' × 4' two seedlings per hole.]

Summary of results.

(Series I.)						
Particulars.	ADT. 3.	ADT. 4.	ADT. 20.	General mean.	Standard error.	"Z" test.
Acre yield of grain in lb. . .	4,130	4,282	4,022	4,143	122.9	Not satisfied.
Percentage on general mean.	99.7	103.3	97.2	100.0	3.0	..
Flowering duration in days..	66	70	71			

(Series II.)							
Particulars.	ADT. 19.	ASD. 1.	ASD. 2.	Co. 13.	General mean.	Standard error.	"Z" test.
Acre yield of grain in lb. . .	4,144	3,877	4,221	3,874	4,042	209.3	Not Satisfied.
Percentage on general mean.	102.5	96.2	104.4	95.8	100.0	5.2	..
Flowering duration in days.	84	85	84	85			

(Series III.)								
Particulars.		ADT. 14.	ADT. 15.	ADT. 16.	General mean.	Standard error.	"Z" test.	Critical difference (P=0.05).
Acre yield of grain in lb. . .	..	4,140	4,866	3,716	3,021	3,981	201.4	606.1
Percentage on general mean. . .	..	104.0	122.3	97.8	71.8	100.0	5.1	15.2
Flowering duration in days . .	..	87	87	85	89			

Conclusion—ADT. 14, ADT. 12, ADT. 15, ADT. 16.

'Z' test has been satisfied only in Series III in which ADT 14 has out beaten the other strains by a clear margin.

(ii) *Exotic varieties*.—Four short duration Chinese cultures, viz., CH. 45, CH. 47, N 136 and Benibhog received from the Director of Central Rice Research Institute, Cuttaok, were tried against the local varieties ADT 3 and ADT 20. The yield data as furnished below have revealed that the treatment differences are not statistically significant. All of them however possess the desirable quality of not being susceptible to premature lodging unlike ADT 3 and ADT 20.

Field number—F 7-b.
Manured at—500 lb. of Indigo meal, 100 lb. of super and 200 lb. of ammonium sulphate per acre.
Sown—16th June 1951.
Planted—12th July 1951.

Harvested—CH. 45, ADT 3 and 20—28th September 1951. Rest 8th October 1951.
Number of variants—6.
Layout—Randomized blocks—6 x 4.
Size of plot—20' x 4' Net.
Spacing—4" x 4" two seedlings per hole.

Summary of results.

Particulars.	CH. 45.	CH. 47.	Benibhog.	N. 136.	ADT. 3.	ADT. 20.	General mean.	Standard error.	'Z' test. Not satisfied.
Acre yield of grain in lb.	2,352	2,259	2,153	2,446	2,569	2,285	2,345	105.2	..
Percentage on ADT 3.	91.6	87.9	83.8	95.2	100.0	88.9	91.3	4.1	..
Percentage on ADT 20.	103.0	98.9	94.2	107.1	112.4	100.0	102.6	4.6	..
Percentage on general mean.	100.3	96.4	91.8	104.3	109.6	97.5	100.0	4.5	..
Flowering during in days.	78	83	87	80	71	77			

7. *Samba (main single crop)*.—Samba nurseries were raised in A, C, D and G blocks. The sowings which commenced on 17th July 1951 were completed on 3rd August 1951. The transplant fields were given three courses of ploughings with P.S.G. No. 10 plough followed by Burmese *sethun*. The green manure crop (mainly wild indigo) estimated at about 3,000 lb. per acre was incorporated *in situ*. The other manures applied were 300 lb. of indigo seed meal, and 100 lb. of super-phosphate per acre before transplantation and 200 lb. of ammonium sulphate applied in two equal doses as top dressing. *Samba* planting commenced on 20th August 1951 and came to a finish on 19th September 1951. The average acre yields are presented in Table III.

TABLE—III.—Acre yield for samba (1951-52).

Strain Number.	Area (acres).	Average yield in lb. per acre.	Average yield in lb. per acre.	
			1950-51.	1949-50.
(1)	(2)	(3)	(4)	(5)
Co. 19	0.42	3,198	3,972	..
Co. 25	1.50	3,885	4,499	4,471
ADT. 21	0.44	2,520	2,890	2,138
ADT. 22	0.30	2,344	3,070	1,877

Due to the incidence of 'soorai' and stem borer the yield of Co. 25 was a little below the average of the previous years.

8. *Improvement of local varieties by pure-line selection*.—(i) *Kattuvanam*.—This is a long-duration flood resistant variety grown in Thiruthuraipoondi and Chidambaram taluks under the deep-water conditions. A total number of 212 single-plant selections of this variety was in observation block and based on eye judgment 41 promising ones were carried forward for replicated yield tests in the coming seasons.

(ii) *Kattavellai, kodaivellai and kaivari samba*.—These are rain-fed varieties of the non-deltaic Arantangi taluk of Tanjore district. Six cultures of the above-mentioned three varieties were under comparative yield tests for the third time

against the ryots' unselected seeds of the respective varieties as controls. The results are furnished below:—

Field No.—E. 2a.
Manured at—2,000 lb. of Kolling leaf 300 lb. of Indigo meal, 100 lb. of super and 200 lb. of ammonium sulphate per acre.
Sown—18th July 1951.
Planted—25th August 1951.

Harvested—18th January 1952.
Number of variants—7.
Layout—Randomized blocks 7 x 4.
Size of plot—20' x 6' Net.
Spacing—6" x 6" two seedlings per hole.

Summary of results.

Kattavellai.										
	398.	413.	418.	424.	454.	470.	Kattavellai standard.	General mean.	Standard error.	'Z' test.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Acre yield of grain in lb.	3,286	3,263	3,364	3,370	2,452	3,631	3,237	3,229	29.41	Not satisfied.
Percentage on standard.	98.5	99.3	102.3	102.6	74.6	110.5	100.0	98.9	4.5	..
Flowering duration in days.	134	134	133	138	138	133	133	..	..	..

Kodaivellai.											
	655.	701.	718.	757.	762.	790.	Kodalvelli standard.	General mean.	Standard error.	'Z' test.	Critical difference. (P=0.05)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Acre yield of grain in lb.	3,301	2,843	2,910	2,887	3,166	2,902	2,436	2,917	150.5	Satisfied.	447.1
Percentage on standard.	135.5	116.7	119.5	118.5	129.9	119.1	100.0	119.8	6.2	..	18.4
Flowering duration in days.	152	154	154	154	156	154	156	..	..	..	..

Conclusion:—655, 762, 718, 790, 757, 701, Kodaivellai.

Kaivari samba.											
	898.	936.	948.	977.	1057.	1130.	Kaivari samba standard.	General mean.	Standard error.	'Z' test.	Critical difference. (P=0.05)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Acre yield of grain in lb.	3,236	2,363	2,611	3,205	2,720	2,543	2,543	2,746	185.7	Satisfied	551.6
Percentage on standard.	127.3	93.0	102.7	126.0	107.0	100.0	100.0	103.8	7.3	..	21.7
Flowering duration in days.	148	148	149	148	150	148	146	..	..	..	..

Conclusion—898, 977, 1057, 948, 1130, Kaivari samba standard, 936.

9. *Hybridisation for crop improvement*.—(i) *To evolve long and medium-duration strains resistant to 'blast'*.—Although the hybrid strain Co. 25 has satisfactorily fulfilled, the expectations in respect of its high productive capacity as well as immunity to 'blast', its commercial rice quality cannot match with that of a few other popular samba strains of Tanjore delta. With a view, therefore, to breed other 'blast' resistant strains of better quality rice than Co. 25, a number of crosses had been effected between Co. 4 and other strains of reputed rice quality, e.g., Co. 19, ADT. 1 and ADT. 8. Different generations of the abovementioned crosses ranging from F1 to F3 were intensively studied and suitable plants individually selected for future progeny tests.

(ii) *To evolve saline-resistant strains*.—F2 and F3 generations of crosses using S.R. 26B and Thella thoka vadlu as saline-resistant parents and ADT 1, ADT 8 and Co. 19 as the other parents of commercial repute were grown and the produces carried over in bulks in Svalof fashion for the same reason as stated under *kuruvai*.

(iii) *Cross progenies of ADT 2 x Co. 4*.—Five cultures of this cross were under yield test. The yield data are furnished below:—

Field No.—H-1-b.
Manured at—2,000 lb. of Kolling land 100 lb. Ammonium sulphate per acre.
Sown—30th July 1951.
Planted—5th September 1951.

Harvested—1st February 1952.
Number of variants—7.
Layout—Randomized blocks 7 x 4.
Size of plot—14' x 4' net.
Spacing—6" x 6" two seedlings per hole.

Summary of results.

	1947.	1950.	1951.	1560/1.	1560/2.	ADT. 2.	Co. 25.	General mean.	Standard error.	'Z' test.	Critical difference. (P=0.05)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Acre yield of grain in lb.	2,323	2,117	2,530	2,457	2,203	1,871	3,680	2,456	196.5	..	538.3
Percentage on ADT. 2.	124.2	113.2	135.3	131.3	118.0	100.0	196.7	131.3	10.51	..	31.19
Flowering duration in days.	142	143	142	141	139	141	145	..	..	..	..

Conclusion—Co. 25, 1951, 1560/1, 1947, 1560/2, 1950, ADT. 2.

Although Co. 25 is found to be by far superior to all the rest in respect of productivity the hybrid cultures have yielded significantly better than ADT. 2 (white sirumani) which is intended to be replaced in this delta by the best of the above cultures. In a rigorous disease-bombardment test conducted in a separate field, the highly 'blast' resistant capacity of all the hybrid cultures was definitely confirmed.

10. *Inter-strain trial*—(Samba).—The strains, viz., ADT. 10, Co. 19 and Co. 25 which are the prevailing most popular *samba* strains of this district were subjected to comparative yield tests. A severe incidence of 'soorai' on all the three strains vitiated the yield data.

11. *Thaladi* (second crop).—After *kuruwai* harvests the fields were ploughed thrice with P.S.G. No. 10 plough. Three thousand pounds of leaf (*Sesbania speciosa* or miscellaneous kinds of green leaf obtained from lopping of trees), 300 lb. of indigo meal, 100 lb. of each of superphosphate and ammonium sulphate per acre applied before transplantation of paddy followed by a top dressing of ammonium sulphate about a month and a half later constituted the general manurial regimen for the entire second-crop area. The average *thaladi* acre yields on the farm are presented in Table IV. The nursery sowings commenced on 31st August 1951 and were completed on 10th October 1951. Transplantation was started on 1st October 1951 and finished on 10th November 1951.

TABLE IV—Acre yield for *thaladi* (1951–52).

Strain Number.	Area (acres.)	Average Yield in lb. per acre.	Average yield in lb. per acre.	
			1950–51.	1949–50.
(1)	(2)	(3)	(4)	(5)
ADT. 8	..	5.67	2,825	2,554
CO. 25	..	20.00	3,052	..

In spite of a wide-spread attack of 'soorai' and stem borer due to failure of rains, *thaladi* yields were maintained at the maximum mainly on account of intensive manuring.

12. *Inter-strain trial*—(Thaladi).—The same three strains, viz., ADT. 10, Co. 19 and Co. 25 as were tried in *samba* season were subjected to yield tests in *thaladi* also. The yield data are set out below :—

Field No.—G-4 b.
Manuring—3,000 lb. of leaf and 50 lb. of superphosphate and 200 lb. of ammonium sulphate per acre.
Sown—7th September 1951.
Planted—10th October 1951.

Harvested—7th March 1952.
Number of variants—3.
Layout—Randomized blocks—3 × 4.
Size of plot—20' × 6' Net.
Spacing—6" × 6" Two seedlings per hole.

Summary of results.

Particulars.	Co. 25.	Co. 19.	ADT. 10.	General mean.	Standard error.	'Z' test.	Critical difference (P=0.05)
Acre yield of grain in lb.	3,621	2,068	2,536	3,042	171.1	Satisfied.	590.7
Percentage on general mean.	119.1	97.6	83.4	100.0	5.6	..	19.5
Flowering duration in days	149	151	142	..	..	..	..

Conclusion—CO. 25. CO. 19. ADT. 10.

The distinct superiority of Co. 25 to the standard strain ADT. 10 (Korangu-samba) in respect of its productive capacity besides its well-established immunity to paddy 'blast' was clearly brought out by this trial.

13. *Manurial experiments*—(i) *Cattle manure v. Farm-waste compost on equal nitrogen basis*.—This was the third year of the experiment and the results are given below :—

	Samba.			Thaladi.		
Field number	..	..	..	E 1a	..	G 6b.
Sown	..	..	..	18th July 1951	..	17th September 1951.
Planted	..	..	..	28th August 1951	..	24th October 1951.
Flowered	..	..	..	22nd December 1951	..	3rd January 1952.
Harvested	..	..	..	7th February 1952	..	17th March 1952.
Number of variants	..	..	..	3	..	3.
Layout	..	..	..	Randomized blocks 3 × 6	..	Randomized blocks 3 × 6.
Size of plot	..	..	..	27' × 25' Net	..	27' × 25' net.
Spacing	..	..	..	6" × 6"—two seedlings per hole.	..	6" × 6"—two seedlings per hole.
Variety	..	..	..	Co. 25	..	Co. 25.
Manure as per treatments—						
	1 No manure.					
	2 Cattle manure at 60 lb. nitrogen per acre.					
	3 Farm-waste compost at 60 lb. nitrogen per acre.					

Summary of results.

	Samba.			General mean.	Standard error.	'Z' test.	Critical difference. (P=0.05)
	1.	2.	3.				
Acre yield of grain in lb.	4,133	4,520	4,547	4,401	80.46	Not satisfied.	..
Percentage on no manure (control).	100.0	109.0	109.7	106.3	0.6	..	..
Acre yield of grain in lb.	2,031	2,485	Thaladi. 2,341	2,237	87.86	Satisfied.	276.26
Percentage on no manure (control).	100.0	122.1	115.0	112.4	4.3	..	13.6

Conclusion—2, 3, 1.

The second-crop *thaladi* has shown a distinctly better response to the bulky organic manures than the single-crop (*samba*). In 1949–50 the results showed no significant differences between treatments. In 1950–51 both the organic manures were on a par, but gave significantly higher yields than the 'control' (no manure) in *samba* whereas in *thaladi* cattle manure gave significantly higher yield than farm-waste compost and both of them significantly out-yielded the 'control'.

(ii) *Municipal compost v. farm-waste compost and cattle manure on the basis of equal bulk weight (thazadi)*.—This experiment was also running for the third year and the following were the results :—

Field number—C. 1.
Sown—17th September 1951.
Planted—24th October 1951.
Flowered—3rd January 1952.
Harvested—17th March 1952.
Number of variants—4.
Layout—Randomized blocks 4 × 4.
Size of plot—20' × 20' net.

Spacing—6" × 6"—two seedlings per hole.
Variety—Co. 25.

Manure as per treatments—

- 1 No manure.
- 2 Cattle manure at 10 tons per acre.
- 3 Farm-waste compost at 10 tons per acre.
- 4 Municipal compost (nightsoil) at 10 tons per acre.

Summary of results.

	1.	2.	3.	4.	General mean.	Standard error.	'Z' test.	Critical difference. (P=0.05)
Acre yield of grain in lb.	2,954	3,032	3,032	2,981	3,000	78.4	satisfied.	..
Percentage on no manure (control)	..	..	..	..	101.5	2.5	..	..

The absence of crop response to any of these bulky organic manures is not easily explicable. In 1949–50 all the three organic manures were on a par but gave significantly higher yields than the 'control' (no manure). In 1950–51 cattle manure and farm-waste compost were on a par, but gave significantly higher yields than municipal compost which was only on a par with the 'control.'

(iii) 'Fused' phosphate v. ordinary superphosphate (samba).—This was the second year of the experiment and the results are furnished below. "Z" test was not satisfied as before but the trend was just as in the previous year, namely, that the two phosphatic fertilizers were similar in their manurial effects on *samba* paddy.

Field number—E. 3 (a).
Sown—27th July 1951.
Planted—28th August 1951.
Flowered—
Harvested—11th February 1952.
Number of variants—9.
Layout—Randomized blocks 9' x 4'.
Size of plot—15' x 22' Net.
Spacing—6" x 6"—Two seedlings per hole.
Variety—Co. 26.

Manure as per treatment—cont.
2 Ammonium sulphate to supply at 30 lb. nitrogen per acre.
3 Leaf at 2,500 lb. and super at 20 lb. P2O5 per acre.
4 Leaf at 2,500 lb. and fused phosphate. "
5 Ammonium sulphate at 30 lb. nitrogen and super per acre.
6 Ammonium sulphate at 30 lb. nitrogen and fused phosphate per acre.
7 Leaf at 2,500 lb. + ammonium sulphate a 30 lb. nitrogen per acre.
8 Treatment (7) + super at 30 lb. P2O5 per acre.
9 Treatment (7) + fused phosphate do.

Manure as per treatments—
1 Leaf alone at 2,500 lb. per acre.

Summary of results.

Particulars.	1.	2.	3.	4.	5.	6.	7.	8.	9.	General mean.	Standard error.	"Z" test.
Acre yield of grain in lb.	3,542	3,809	3,542	3,511	3,511	3,614	3,497	3,637	3,598	3,529	93.1	Not satisfied.
Percentage on control.	100.0	93.4	100.0	99.1	99.1	102.0	98.7	102.6	101.5	99.6	00.3	..
Flowering duration in days.	156	158	157	156	156	156	156	156	156			

(iv) Direct v. indirect application of superphosphate to paddy (samba).—This was a new experiment designed to find out if superphosphate gives better results in this delta if applied indirectly by manuring the preceding green manure crop than directly to paddy. The different treatments and the results are set out below :—

Field number—H-5b, 6-b.

Sown—
Green manure—10th July 1951.
Paddy—3rd August 1951.
Planted—9th and 10th September 1951.
Flowered—
Harvested—
Green manure—5th September 1951.
Paddy—20th February 1952.
Number of variants—3 x 8.
Layout—Split plot design 3 x 8 x 4'.
Size of plot—44' x 54' net.
Spacing—6" x 6"—two seedlings per hole.
Variety—Co. 25.
Manure—As per treatments.

Main treatments—Green manures—

1. Sunnhemp.
2. *Sesbania speciosa*.
3. Daincha.
Sub-treatments—
(A) No manure.
(B) Green manure alone.
(C) Thirty lb. of P 205 applied to green manure (indirect).
(D) Thirty lb. of P 205 applied so paddy (direct).
(E) Forty-five lb. of P 205 applied to green manure (indirect).
(F) Forty-five lb. of P 205 applied to paddy (direct).
(G) Sixty lb. of P 205 applied to green manure (indirect).
(H) Sixty lb. of P 205 applied to paddy (direct).

Mean yields of green manure in lb. per acre at the time of incorporation—

Treatments.	Sunn hemp.	<i>Sesbania speciosa</i> .	Daincha.
A	..	..	..
B	15,967	15,833	4,359
C	13,699	26,082	13,521
D	18,007	14,988	5,604
E	17,918	23,439	10,858
F	16,323	17,446	4,003
G	22,060	23,265	14,944
H	13,059	15,349	4,581

Summary of results.

Particulars.	<i>Sesbania speciosa</i> .	Sunn hemp.	Daincha.	General mean.	Standard error.	'Z' test.	Critical difference (P=0.05).
Acre yield of green manure in lb.	4,293	4,504	3,913	4,236	305.6	Satisfied.	105.7
Percentage on general mean.	101.4	106.2	92.4	100.0	7.2	..	25.0

Conclusion—Sunn hemp, *Sesbania speciosa*, Daincha.

(2) Sub-treatments.

	A.	B.	C.	D.	E.	F.
Acre yield of grain in lb. ..	3,259	3,983	4,270	4,181	4,381	4,136
Percentage on control ..	100.0	122.1	130.6	127.9	134.1	126.3
	G.	H.	General mean.	Standard error.	'Z' test.	Critical difference (P=0.05).
Acre yield of grain in lb. ..	4,481	4,192	4,236	171.4	Satisfied.	484.8
Percentage on control ..	137.1	128.2	129.6	5.4	..	14.8

Conclusion—G. E. C. H. D. F. B. A.

(3) Interaction.

	Sunn hemp							
	A.	B.	C.	D.	E.	F.	G.	H.
Acre yield of grain in lb. ..	3,402	4,505	4,270	4,335	4,771	4,392	4,636	4,604
Percentage on control ..	100.0	132.3	125.3	127.2	140.3	129.1	136.2	135.3
Flowering duration in days ..	151	149	150	150	150	149	149	149

	<i>Sesbania speciosa</i> .							
	A.	B.	C.	D.	E.	F.	G.	H.
Acre yield of grain in lb. ..	3,292	3,970	4,537	4,370	4,348	4,165	4,537	4,144
Percentage on control ..	100.0	120.6	137.8	132.7	132.1	126.6	137.8	125.0
Flowering duration in days ..	151	151	149	149	149	149	149	149

	Daincha.							
	A.	B.	C.	D.	E.	F.	G.	H.
Acre yield of grain in lb. ..	..	3,114	3,491	4,003	3,859	4,015	3,848	..
Percentage on control ..	..	100.0	112.1	128.5	123.9	128.9	123.6	..
Flowering duration in days ..	..	150	150	149	149	149	148	..

	G.	H.	General mean.	Standard error.	'Z' test.
Acre yield of grain in lb. ..	4,283	3,917	4,236	171.4	Not satisfied.
Percentage on control ..	137.5	125.8	129.6	5.2	..
Flowering duration in days ..	148	148	..	..	..

The broad conclusions from the above results are—(i) that all the three green manures responded equally well to superphosphate in direct proportion to the different levels of phosphoric acid as reflected in their respective tonnages; (ii) that in respect of their influence on the final grain yield of paddy, all the three green manures stood on a par and (iii) that although the differences in paddy production due to the direct and indirect application of superphosphate are not statistically significant, the trend is consistently in favour of indirect application through the preceding green manure crop.

14. Cultural experiments—(i) *Kuruvai-thaladi* combination experiment.—This experiment, designed to find out the best combination of *kuruvai* and *thaladi* strains so as to ensure the maximum total yield for the two crops together comprised four first-crop strains, viz., ADT. 3, 4, 9 and 20 each followed by five second-crop strains, viz., ADT. 1, 2 and 8, Co. 19 and Co. 25. The results as furnished below revealed that most of the important combinations were on a par :—

	Kuruvai.				Thaladi.			
Field number	..	..	..	..	F 6-a.	500 lb. of Indigo meal, 100 lb. of super and 200 lb. of ammonium sulphate per acre.	F 6-a.	500 lb. of Indigo meal, 50 lb. of super and 200 lb. of ammonium sulphate per acre.
Manured at	..	..	..	..	22nd June 1951.	16th July 1951.	12th and 28th September 1951.	12th and 24th October 1951.
Sown	..	..	..	..	ADT. 3—26th August 1951.	ADT. 4—28th August 1951.	ADT. 20—28th August 1951.	ADT. 9—16th September 1951.
Planted	..	..	..	..	ADT. 3, 4 and 20—5th October 1951.	28th February 1952 and 21st March 1952.	ADT. 1, 2, 8, Co. 19 and Co. 25 after ADT. 3, 4, and 20.	Do.
Flowered	..	..	..	..	ADT. 9—21st October 1951.	20 x 4.	20 x 8 net.	6" x 6" two seedlings per hole.
Harvested	..	..	..	..	..	..	..	..
Number of variants	..	..	..	..	..	..	..	..
Layout	..	..	..	..	..	..	..	..
Size of plot	..	..	..	..	..	..	..	..
Spacing	..	..	..	..	..	..	..	..

Summary of results.

(1)	ADT. 3 +					ADT. 4 +				
	ADT. 1.	ADT. 2.	ADT. 8.	Co. 19.	Co. 25.	ADT. 1.	ADT. 2.	ADT. 8.	Co. 19.	Co. 25.
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Acre yield of grain in lb.	5,360	4,485	4,407	4,797	5,063	3,000	4,594	4,085	4,580	4,626
Percentage on general mean.	112.8	94.5	92.8	100.9	108.2	105.3	96.7	86.4	96.6	97.4
*Flowering duration in days.	132	125	108	136	133	132	124	108	136	133

(1)	ADT. 9 +					ADT. 20 +				
	ADT. 1.	ADT. 2.	ADT. 8.	Co. 19.	Co. 25.	ADT. 1.	ADT. 2.	ADT. 8.	Co. 19.	Co. 25.
	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Acre yield of grain in lb.	5,017	5,344	5,330	5,344	5,845	4,236	4,126	3,547	4,516	4,594
Percentage on general mean.	105.3	112.4	112.2	112.4	123.1	89.3	86.9	74.8	95.0	96.7
*Flowering duration in days.	130	125	106	134	131	132	125	108	135	133

						Standard error.	'Z' test.	Critical difference (P=0.05).
Acre yield of grain in lb.	..	..	..	..	..	(22)	(23)	(24)
Percentage on general mean	..	..	..	..	..	228.7	Satisfied.	503.4
Conclusions—						4.9	..	10.6

ADT. 9, ADT. 8, ADT. 9, ADT. 9, ADT. 9, ADT. 3, ADT. 9, ADT. 4, ADT. 3, ADT. 4, ADT. 4,	ADT. 9, ADT. 9, ADT. 9, ADT. 9, ADT. 9, ADT. 3, ADT. 9, ADT. 4, ADT. 3, ADT. 4, ADT. 4,	ADT. 9, ADT. 9, ADT. 9, ADT. 9, ADT. 9, ADT. 3, ADT. 9, ADT. 4, ADT. 3, ADT. 4, ADT. 4,	ADT. 9, ADT. 9, ADT. 9, ADT. 9, ADT. 9, ADT. 3, ADT. 9, ADT. 4, ADT. 3, ADT. 4, ADT. 4,	ADT. 9, ADT. 9, ADT. 9, ADT. 9, ADT. 9, ADT. 3, ADT. 9, ADT. 4, ADT. 3, ADT. 4, ADT. 4,	ADT. 9, ADT. 9, ADT. 9, ADT. 9, ADT. 9, ADT. 3, ADT. 9, ADT. 4, ADT. 3, ADT. 4, ADT. 4,	ADT. 9, ADT. 9, ADT. 9, ADT. 9, ADT. 9, ADT. 3, ADT. 9, ADT. 4, ADT. 3, ADT. 4, ADT. 4,	ADT. 9, ADT. 9, ADT. 9, ADT. 9, ADT. 9, ADT. 3, ADT. 9, ADT. 4, ADT. 3, ADT. 4, ADT. 4,	ADT. 9, ADT. 9, ADT. 9, ADT. 9, ADT. 9, ADT. 3, ADT. 9, ADT. 4, ADT. 3, ADT. 4, ADT. 4,	ADT. 9, ADT. 9, ADT. 9, ADT. 9, ADT. 9, ADT. 3, ADT. 9, ADT. 4, ADT. 3, ADT. 4, ADT. 4,	ADT. 9, ADT. 9, ADT. 9, ADT. 9, ADT. 9, ADT. 3, ADT. 9, ADT. 4, ADT. 3, ADT. 4, ADT. 4,
Co. 25, ADT. 1, ADT. 2, Co. 19, ADT. 8, Co. 25, ADT. 1, ADT. 1, Co. 19, Co. 25, ADT. 2.	Co. 25, ADT. 1, ADT. 2, Co. 19, ADT. 8, Co. 25, ADT. 1, ADT. 1, Co. 19, Co. 25, ADT. 2.	Co. 25, ADT. 1, ADT. 2, Co. 19, ADT. 8, Co. 25, ADT. 1, ADT. 1, Co. 19, Co. 25, ADT. 2.	Co. 25, ADT. 1, ADT. 2, Co. 19, ADT. 8, Co. 25, ADT. 1, ADT. 1, Co. 19, Co. 25, ADT. 2.	Co. 25, ADT. 1, ADT. 2, Co. 19, ADT. 8, Co. 25, ADT. 1, ADT. 1, Co. 19, Co. 25, ADT. 2.	Co. 25, ADT. 1, ADT. 2, Co. 19, ADT. 8, Co. 25, ADT. 1, ADT. 1, Co. 19, Co. 25, ADT. 2.	Co. 25, ADT. 1, ADT. 2, Co. 19, ADT. 8, Co. 25, ADT. 1, ADT. 1, Co. 19, Co. 25, ADT. 2.	Co. 25, ADT. 1, ADT. 2, Co. 19, ADT. 8, Co. 25, ADT. 1, ADT. 1, Co. 19, Co. 25, ADT. 2.	Co. 25, ADT. 1, ADT. 2, Co. 19, ADT. 8, Co. 25, ADT. 1, ADT. 1, Co. 19, Co. 25, ADT. 2.	Co. 25, ADT. 1, ADT. 2, Co. 19, ADT. 8, Co. 25, ADT. 1, ADT. 1, Co. 19, Co. 25, ADT. 2.	Co. 25, ADT. 1, ADT. 2, Co. 19, ADT. 8, Co. 25, ADT. 1, ADT. 1, Co. 19, Co. 25, ADT. 2.

(ii) *Optimum age of seedlings at transplantation.*—The results of the previous trials conducted for four years from 1933-34, for some of the then more important *samba* strains as ADT. 1, 2, 8 and 11 proved that a sound practice would be to reckon the nursery period as one week for every month of the age of the strain from sowing to harvest. Definite information on this important question is yet wanting for the *kuruvai* as well as the present most popular strains of *samba* of this delta. ADT. 3 and ADT. 20 for *kuruvai* and Co. 25 for both *samba* and *thaladi* seasons were chosen for the experiment. Due to severe incidence of paddy stem rot (*Sclerotium oryzae*) the *kuruvai* results were vitiated. The results of *samba* and *thaladi* crops are given below:—

Kuruvai.—Results vitiated due to a severe incidence of *sclerotium oryzae*.

Field No.—E. 4a.	Samba.			Thaladi.		
	Manure at ..	..	..	Manure at ..	..	..
Sown ..	..	..	..	..	..	..
Planted ..	..	..	..	..	..	..
Flowered ..	..	..	..	..	..	..
Harvested ..	..	..	..	..	..	..
Number of variants	..	..	..	..	..	..
Layout	..	..	..	..	..	..
Size of plot	..	..	..	..	..	..
Spacing	..	..	..	..	..	..
Variety	..	..	..	..	..	..

Summary of results.

Age of seedlings in the nursery (days).	(Samba.)				General mean.	Standard error.	'Z' test.
	60	50	40	30			
Acre yield of grain in lb.	2,543	2,564	2,604	2,877	2,646	195.0	Not satisfied.
Percentage on general mean	96.1	96.9	98.3	108.6	100.0	0.2	..
*Flowering duration in (days).	154	148	142	139	..	..	..

Age of seedlings in the nursery (days).	(Thaladi.)				General mean.	Standard error.	'Z' test.
	60	50	40	30			
Acre yield of grain in lb.	3,060	2,978	3,092	2,897	2,944	168.9	Not satisfied.
Percentage on general mean.	104.2	101.1	105.1	98.4	100.0	45.4	..
*Flowering duration in days.	139	134	129	128	..	..	..

Although the 'Z' tests are not satisfied in both the cases the trend of the yield data seems to be in favour of younger seedlings in the case of *samba* whereas in *thaladi* this factor does not seem to have exerted any appreciable influence.

(iii) '*Udu*' experiments.—To find out the optimum ratio of *kuruvai*, *ottadan* seed rates under ordinary and intensive manuring. The results are given below:—

Field number	Kuruvai.		Ottadan.	
	F 1a.	F1-a.		
Sown ..	..	..	21st June 1951.	..
Planted ..	..	..	15 July 1951.	..
Flowered ..	..	..	All treatments on 5th January 1952.	..
Harvested ..	..	..	3rd October 1951.	16th February 1952.
Layout ..	..	..	Split plot design 3 x 3 x 4.	..
Size of plot ..	..	..	Main plot 20' x 20'.	Sub-plot 6' x 20'.
Spacing ..	..	..	4" x 4" bunch planting.	..
Manured at ..	..	..	4,000 lb. of kolligil, 300 lb. of Indigo meal, 100 lb. of super and 200 lb. of ammonium sulphate per acre.	..
Main treatments ..	..	..	A. No manure to ottadan. B. Manuring ottadan at 30 lb. nitrogen and 30 lb. PTO 5 per acre. C. Manuring ottadan at 45 lb. nitrogen and 30 lb. PTO 5 per acre.	..
Sub-treatments—4: 1, 3: 1, 2: 1 (Kuruvai, ottadan proportion).				

Summary of results.

Note.—The results were analysed on the combined yields of *kuruvai* and *ottadan*.

Treatments.	Main treatment.			Standard error.	'Z' test.
	A.	B.	C.		
Acre yield of grain in lb.	5,293	5,590	5,411	326.4	Not satisfied.
Percentage on control	100.0	105.6	102.2	4.0	..

Treatments.	Sub-treatments.			General mean.	Standard error.	'Z' test.	Critical difference (P=0.05)
	2:1	3:1	4:1				
Acre yield of grain in lb.	5,177	5,631	5,571	5,442	132.7	Satisfied.	390.3
Percentage on general mean.	95.1	103.5	101.3	100.0	2.4	..	7.2
Conclusion—3:1 4:1, 2:1.							

Particulars.	Interactions.			General mean.	Standard error.	'Z' test.	Critical difference (P=0.05)
	A.	B.	C.				
(1)	2:1	3:1	4:1	2:1	3:1	4:1	
	(2)	(3)	(4)	(5)	(6)	(7)	
Acre yield of grain in lb.	4,909	5,626	5,421	5,277	5,766	5,733	
Percentage on general mean	90.4	103.6	99.6	96.9	105.6	105.4	

Particulars.	C.			General mean.	Standard error.	'Z' test.
	2:1	3:1	4:1			
(1)	(8)	(9)	(10)	(11)	(12)	(13)
	(2)	(3)	(4)	(5)	(6)	(7)
Acre yield of grain in lb.	5,335	5,496	5,379	5,442	132.7	Not satisfied.
Percentage on general mean	98.1	101.0	98.9	100.0	2.4	..

'Z' test is not satisfied in respect of the main treatments as well as the interactions between the main and sub-treatments, whereas in the case of the sub-treatments the treatment differences are significant and the two higher proportion of *kuruvai*, viz., three and four to one of *ottadan* have both given significantly higher yields than the other treatment, viz., 2:1 of *kuruvai*:*ottadan*.

(iv) *Control of Soorai (mealy bug)*.—Scorching of nursery field bunds versus the usual method (with unscorched field bunds). In the absence of the pest on an appreciable scale in the experimental plot no valid conclusions could be drawn.

(v) *Control of stem-borer—Insecticidal trials*.—*Samba* and *thaladi* nurseries as well as the planted crops were sprayed with the following insecticides, viz., (1) BHC. 0.05 per cent, (2) BHC. 0 per cent, (3) DDT 0.05 per cent, (4) DDT. 0.1 per cent, (5) Parathion, (6) HETP and compared against unsprayed controls. Although the results could not be considered as conclusive the indications were in conformity with the findings of last year, namely, that BHC. 0.1 per cent proved to be more effective than the rest of the treatments.

15. *Disease bombardment test*.—Two sets of cultures received from the Paddy Specialist and Government Mycologist, Coimbatore, numbering 69 were subjected to a rigorous test for their reaction to paddy 'blast'. The susceptible variety ADT. 10 purposely grown in contiguous rows for affording chances of infection developed the disease in a very virulent form thus facilitating a reliable assessment of the comparative merits of the various cultures in respect of their resistance to 'blast'. Twenty-four cultures out of 30 supplied by the Government Mycologist and 16 out of 39 supplied by the Paddy Specialist were found to be highly resistant. These were carried over for further tests during the coming season.

16. *All-India Co-ordinated Crop-weather Scheme*.—This scheme, running for the fourth year, was worked under the guidance of the Director-General of Agricultural Meteorology, Poona. The micro-climatic observations both in the open and in the crop during its growth-phases and the other general micro-climatic data that are expected to bring into light the influence of meteorological phenomena on crop growth and yield were recorded and sent to the Director-General of Agricultural Meteorology, Poona, for analysis and interpretation. ADT. 3 and ADT. 20 were the strains under observation in *kuruvai* and ADT. 1 and Co. 25 in *Samba*. The crops were normal.

17. *Pest and diseases*.—The field rats, the worst menace to paddy crop in this tract damaging the crop at all stages of its growth were successfully controlled by adopting all the three methods advocated, viz., digging up of rat burrows on field bunds, setting up of bamboo bow traps and baiting with zinc phosphide. A total number of 5,182 rats thus actually was killed during the season and 1,605 ryots were supplied with zinc phosphide mixed with puffed rice for controlling the pest in their holdings. 'Soorai' (mealy bug) attack was rather widespread especially in *samba* crop. Stem borer and silver shoot were particularly severe on the *thaladi* crop, presumably due to the failure of the north-east monsoon. *Thaladi* and late *samba* nurseries were affected by thrips. Suitable control measures were adopted to check these pests to the maximum possible extent.

The fungus disease, viz., paddy stem rot (*Sclerotium cryzae*) occurred in a severe form and heavy toll was taken of the *kuruvai* crop, as no remedial measure is so far known to control this disease effectively.

18. *Other crops—A. Fibres*—(1) *Cotton in rise fallon*—(a) *Experiments*.—In continuation of the previous two years' trials, cultural, manurial and varietal trials were conducted in collaboration with the Cotton Specialist, Coimbatore.

(i) *Time of sowing-cum-manurial experiment*.—The number of sowings comprised four at fortnightly intervals and the manurial treatments consisted

of top dressing with ammonium sulphate at 100 lb. per acre against no manuring. The yield data are furnished below:—

Summary of results of time of sowing cum manurial experiments—1952—Summer.

Method of layout—Split plot—Replicated 4 times.		Time of sowing—Fortnightly intervals.		Area of each plot—9.50 cents.		Mean germination per cent.		Main yield of kapas in lb. per acre.	
Variants—T1, T2, T3, T4, (Major) M0, M1 (Minor).		Date of sowing of cotton.		Date of manuring.		Field condition at sowing.		M.O. M.I. Mean.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1. Aduthurai..	29th December 1951.	T1 30th December 1951.	3rd March 1952.	31st March 1952.	Stubbles.	87*	829	1,353	1,091
..	..	T2 12th January 1952.	Do.	Do.	..	88*	841	1,206	1,021
..	..	T3 27th January 1952.	12th March 1952.	9th April 1952.	..	91*	966	1,593	1,255
..	..	T4 10th February 1952.	Do.	Do.	..	83*	812	1,352	1,082
Mean							862	1363	

Number and station.	Significance in 'Z' test.		Conclusions on treatment.		Number of irrigations.	Rainfall during crop growth.
	Major. (11)	Minor. (12)	Major. (13)	Minor. (14)		
1. Aduthurai..	No.	Yes.	..	M. 1	16	12.77*
..	..	..	..	M. 0	16	..
..	..	..	..	..	16	..
..	..	..	..	..	16	..

* Percentage of holes germinated.

The germination obtained by sowing in paddy stubbles taking advantage of the initial moisture in the field was for a second year found to be consistent and good. The difference in yield between results of the sowing dates was not significant at this station. The lower yields of the first two dates of sowing is attributed mainly to the large scale nipping operation of the terminal shoots of the cotton plants. Manuring with ammonium sulphate has brought out statistically significant increased yields over the no manure plots. Unless manuring is advocated the maximum outturn of cotton in rice fallows cannot be obtained at the same time safeguarding the interest of the succeeding main crop of paddy and fertility status of the field. Sowing immediately after the harvest of paddy should also be recommended not only with the object of getting maximum outturn of cotton, but also to facilitate to give timely preparatory cultivation for the succeeding paddy crop.

Time of sowing experiments—1951—Summer.

Layout—Non-replicated observation plots.
Area of each plot—0.63 cents.
Number of variants—Three American and two desi varieties.
Date of sowing—Five at fortnightly intervals (I—3rd January 1951; II—17th January 1951; III—31st January 1951; IV—14th February 1951 and V—28th February 1951).
Manures applied—Mixture of groundnut cake, Ammonium sulphate and superphosphate to supply 28 lb. Nitrogen and 30 lb. P2 O5 acre as first dose and Ammonium sulphate to supply 18 lb. Nitrogen per acre as a second dose.
Number of irrigation—Six.

Final yield (up to 24th July 1951).

Serial number and variety.	I	II	III	IV	V	Mean.
1 P. 216 F	701	1,382	830	1,367	654	1,005
2 Coker	1,050	1,489	840	1,230	763	1,062
3 Sealand	757	1,274	737	894	703	873
4 Madras Uganda-1	845	1,035	356	601	207	633
5 881 F	322	669	361	635	233	454
6 C. 35/8	781	1,123	493	1,045	767	842
Mean	758	1,162	603	962	553	..

(ii) *Varietal trial*.—The number of varieties under comparison was reduced to eight. The results of analysis as furnished by the Cotton Specialist, Coimbatore, are given below:—

Varietal trials (A)—1952—Summer.

Method of layout—Randomized and replicated 4 times.
Variants—8.
Area of each plot—0.71 cent.
Date of sowing—29th December 1951.
Date of harvests—4th June 1952 to 12th July 1952.

Rainfall during crop growth—12.77".
Number of irrigations—16.
Manure applied—First dose 20 lb. of Nitrogen and Ammonium sulphate. Second dose 20 lb. of Nitrogen and Ammonium sulphate.

Serial number and variety.	Summary of results.		Mean halo length in m.m.	Mean ginning per cent.
	Mean stand.	Adjusted yield of kapas in lb./acre.		
1 Busoga	248	705	24.0	27.0
2 Kamabala	235	555	Not tested.	Not tested.
3 Sealand	236	460	25.0	32.3
4 Coker	232	761	Not tested.	Not tested.
5 M.U. 1	253	425	24.3	31.3
6 M.U. 2	235	550	23.8	31.00
7 P 216 F	235	735	21.5	35.0
8 P 23 F	209	657	Yes.	Yes.
Significance by "Z" test	Yes	Yes	1.2	1.5
Critical difference	28.4	75		

Conclusions—

Stand—5, 1, 3, 6, 2, 4, 8, 7

Yield—4, 7, 1, 8, 2, 6, 3, 5

Halo length—4, 6, 1, 7, 8

Ginning percent—8, 4, 6, 7, 1

In the adjusted yield, Coker is found to be equal to P 216F (control). P 23 F which is earlier than P 216 F has not indicated its real level of yield in this trial which is observed in other trials in the same station. Coker and Sealand which were susceptible to severe Redleaf were observed to exhibit the same to a less extent in the present year more due to the precautionary insecticidal measures taken to protect the crop against jassid. Madras Uganda 1, Madras Uganda 2, Busoga and Kampala were found to be late for Aduthurai conditions. P 23F is a definite improvement in virtue of its earliness and higher ginning. Its fibre properties are almost the same as that of the P 216F.

(iii) *Bulk cultivation of P 216F*.—For the first time during this season, large-scale cultivation of P 216F cotton on 17 acres of rice fallows was done on this station both on single and double-crop fields and the result was very encouraging. The sowings were done from the beginning of January to the end of February as and when the fields were got ready after the harvests of the *samba* and *thaladi* paddy crops. This extension of area under cotton was rendered possible by the additional lift irrigation facilities provided on the station during the season in the shape of bore and filter-point tube wells. Despite very unfavourable seasonal conditions such as unseasonal excessive showers in the end of January and February, subsequent long spell of droughty weather from March to June, and lack of adequate irrigation due to the break down of one of the important sources of irrigation, viz., the 5 inches bore-well in G-block, the performance of the crop was on the whole quite satisfactory. The acre yields of kapas ranged from 300 to 1,400 lb. and the average on the entire area of 17 acres worked out at 645 lb. per acre. The total cost of cultivation worked out at Rs. 185 per acre and the net margin of profit at Rs. 97 per acre, calculating the sale price of kapas at the prevailing rate of 7 annas per pound. The crop was free from any serious pests or diseases, the boll-setting and bursting were normal and the quality of kapas was excellent. The above mentioned encouraging results should make one feel confident that if the seasonal factors are not unfavourable, an average productivity of not less than 1,000 lb. of kapas per acre is a perfectly practicable proposition with the resultant considerably higher margin of profit.

A few facts of practical importance in respect of cotton cultivation in the rice fallows of this delta in relation to its after-effects on the succeeding paddy crop are worthy of special mention in this connection. There has been

prevalent among Tanjore mirasdars in general a strong apprehension that the cotton crop may have a deleterious effect on the yield of the succeeding paddy crop. The actual results on this station, however, served to dispel this wrong notion from the minds of the concerned mirasdars. On the other hand it was convincingly proved that the cotton crop residue, the average tonnage of which worked out at about 8,000 lb. per acre makes as good a green manure as any other green or green-leaf manures. Another indisputable advantage is that due to the thorough inter-cultivation necessarily given to the cotton crop, the preparatory cultivation necessary for the succeeding paddy crop is rendered much easier as well as economic than otherwise, which in its turn renders it possible to transplant paddy in such fields much more expeditiously than in the other fields.

All the abovementioned benefits accruing to the Tanjore ryots from the cultivation of a short-duration cotton crop in these rice fallows were clearly demonstrated to the numerous interested ryots who visited this station during the crop period.

(2) *Kapok*.—A total number of 6,191 pods yielding 43 lb. of lint was obtained from 28 trees. Three hundred and ninety-seven seedlings raised on the station were sold.

B. Green manure crops—Sesbania speciosa.—Planted along field margins of the entire paddy area on this station, this remarkable green manure crop made a magnificent growth in all the three crops, viz., *kuruvai*, *samba* and *thaladi*. In double-crop land, grown on the margins of the first crop of paddy, it gave an average yield of nearly 5,000 lb. of green manure per acre which practically solved the erstwhile knotty problem of providing adequate green manure for the second crop thus contributing to considerably enhance the overall production of *thaladi* crop, the average yield of which is as a rule deplorably low in the whole of this delta, in spite of plentiful water-supply, due entirely to lack of organic manure. The crop grown on the fringes of *samba* and *thaladi* at a wider spacing grew luxuriantly and produced plenty of seed. A total quantity of 3,109 lb. of seed was obtained during the season most of which was distributed to different Agricultural Demonstrators as per the orders of the Director of Agriculture, Madras. The dried up stalks of this crop after collection of seed were sold for fuel and a total amount of nearly Rs. 170 was realized on this account.

C. Coconut.—The coconut trees totalling 154 were given periodical digging, and were manured with compost, wood ash and ammonium sulphate. Six thousand six hundred and one coconuts were harvested during the period under report, the average yield working out at 43 nuts per tree as against 60 nuts during the previous year.

D. Fodder.—Three thousand eight hundred and fifty slips of Guinea grass, 1,800 of Napier grass and 3,600 of Buffalo grass were sold to ryots. A total quantity of 1,882 lb. of the Buffalo grass from a 12 cent plot and 48,497 lb. of other kinds of grasses obtained from field bunds was fed to cattle.

E. Live fence—Kiluvai (Ordinary).—Cuttings were planted along the western and southern boundaries of the farm which were hitherto unprotected. They have established themselves well and are growing satisfactorily. This improvement of the farm in respect of protection of the crops from the village cattle and goats was long overdue. The kiluvai fence referred to above is expected to solve this problem effectively in the course of a year or two and thus to ensure the safety of cotton and other money crops, the cultivation of which in the rice fallow will be a routine feature on this station in future under the improved lift irrigation facilities.

Prosopis juliflora.—As a live fence is gaining wide popularity in this district and there is therefore a keen demand for its seeds and seedlings. A total quantity of 25 lb. of the seed was collected from the few trees available in K block, of which 15 lb. was sold as such and the rest utilized for raising seedlings. A total number of 60,400 seedlings was disposed of.

F. Fruit-trees and plants.—A consolidated statement of seeds, seedlings, etc., distributed during the year is given in Table VI.

(i) *Banana*.—From the few plants growing on the high piece around the Farm office building a total number of 70 bunches was obtained and disposed of.

(ii) *Mango*.—Fruit production was far below average during the season in the whole tract. A total quantity of only 1,306 lb. of fruits was obtained from 19 trees that bore fruit out of the 26 trees available on the farm.

The variety-war yields are given below :—

Variety.	Weight of fruit in lb.	Number of trees in bearing.	Total number of trees.
Baneshan	48-0	2	2
Neelum	798-0	5	6
Malgoa	51-8	4	5
Rumani	332-8	4	4
Peter	8-8	2	2
Padiri	50-0	1	1
Kudadad	18-0	1	1

A total number of of 55 grafts was produced and sold to the public.

(iii) *Citrus*.—One hundred and seventeen pounds of pumello from two trees, 185 lb. of sour orange (three trees) 43 lb. of Sathugudi (five trees) and 30 lb. of Malta lemon fruits (12 plants) were harvested and sold, besides, 412 seedlings of acid lime, 34 seedlings of sour orange and 202 rooted cuttings of Malta lemon.

(iv) *Jack*.—In view of the keen demand for jack seedlings from the public, fruits of selected trees were obtained from reputed localities as Pattukkottai, Panruti, Tanjore and Orathanad and a large number of seedlings raised therefrom. A total number of 702 seedlings was distributed.

(v) *Papaya*.—A total quantity of 72 lb. of papaya fruits was harvested from 26 trees and disposed of.

G. Vegetables.—A number of popular vegetable crops like tomato, brinjal, chilly, bendai, snakegourd, bittergourd, pumpkin, ash gourd, lab-lab, etc., was intensively cultivated in the vegetable area in K block and in about 30 cents of rice fallow in A block. A total quantity of 338 lb. of vegetable seeds was produced during the year. A large number of seedlings mainly of tomato, brinjal and chilly was raised and sold to the public.

19. Livestock—(i) *Work animals*.—There was an opening balance of 18 animals. Two old animals were sold in public auction and two new ones purchased, bringing the closing balance to 18.

(ii) *Breeding bulls*.—Two *Scindhi* breeding bulls (No. 472 obtained from the Livestock Research Station, Hosur and ADT. 1, born and bred up on this station) and one *Murrah* buffalo bull also received from Hosur, were at stud during the year and performed 56, 66 and 29 services, respectively.

(iii) *Cows*.—*Scindhi* cows were continued to be maintained during the year. One was transferred to Agricultural Research Station, Pattukkottai, and another auctioned leaving a closing balance of six cows. The total quantity of 13,767 lb. of milk obtained during the year was sold to the Farm staff.

(iv) *Calves*.—There were six heifers and three bull calves at the beginning of the year to which two heifer calves were added by new births. One heifer and one bull-calf were transferred to the Agricultural Research Station, Pattukkottai, while one heifer died, thus leaving the closing balance of six heifers and two bull calves at the end of the fasli year.

20. Poultry.—Only one breed of poultry, viz., Rhode Island Red, was maintained. There was an opening balance of 55 birds of which 26 were *Rhode Island Red* hens, 10 desi hens, 3 cocks, 5 cockerels and 11 chicks. One hundred and thirty *Rhode Island Red* chicks were hatched out. Twelve desi hens

were purchased locally to serve as brood hens. A total number of 100 birds died and 32 were sold leaving a closing balance of 65 birds consisting of 11 *Rhode Island Red* hens, 3 cocks, 2 pullets, 1 cockerel, 42 chicks and 6 desi hens. To the opening balances of 13 *Rhode Island Red* and 5 desi eggs, 1,276 *Rhode Island Red* and 552 desi eggs were added. Of these, 195 were set for farm hatch, 752 sold as hatch eggs to the public, 88 fed to chicks, and 800 for table, leaving the closing balances of 9 *Rhode Island Red* and 2 desi eggs.

21. Apiculture.—There were 12 colonies at the beginning of the year. Nine of them swarmed during the period but all of them were replaced without delay. Thirty-eight and a half pounds of honey were extracted during the year.

22. Pisciculture.—Local varieties of fish obtaining in irrigation canals were reared in the two fish ponds on this station and a total quantity of 241 lb. of fish was caught and sold.

23. Miscellaneous—Provision of additional lift-irrigation facilities.—The electrification of the farm for working motor pump sets and the installation of one 6-inch bore-well and two filter-point tube-wells, all of which materialized during the year under report, were real landmarks in the history of this station. It was only due to these improved irrigation facilities that a large-scale cultivation of cotton and vegetables during the off-season was rendered feasible. The 6-inch bore-well was sunk by means of a power drill manufactured by Messrs. Farm Equipment Company, Limited, Coimbatore, which has since been purchased by the department. The water table was struck at 97 feet and a profuse discharge of 14,000 gallons of water-supply per hour was obtained with a 5 horse-power, 4" × 3" motor pump set. This bore-well had to be worked almost continuously throughout night and day so as to cope with the irrigation of about 12 acres of P. 216 F. cotton crop. Unfortunately, however, there was a complete break down of this bore-well all on a sudden, after it had worked satisfactorily for about four months, apparently due to the phenomenon of 'caving in' at the bottom of the bore-hole. As this could not be rectified in spite of strenuous efforts, it was decided to abandon it and sink another 6-inch bore-well in a separate site nearby. This work is now in progress. Both the aforesaid filter point tube wells were installed with the help of the Assistant Agricultural Engineer (Tube Well Scheme), Mayuram. This was necessitated due to the retaining walls of two of the old irrigation wells, one near the farm office and the other in K block (vegetable area, having shown dangerous signs of cracking on working of 5 horse-power motor pump sets. With the installation of a 4-inch filter-point tube-well in the former well and a 3-inch one in the latter, discharging 10,000 gallons and 8,000 gallons of water, respectively, per hour, the problem of power pumping in these two wells has since been satisfactorily solved.

TABLE V (a).—Financial statement for bulk crops raised on non-experimental area during 1951-52.

Paddy.	Cost of cultivation.		
	Kuruvai. (20.49 acres) RS. A. P.	Samba. (7.33 acres) RS. A. P.	Thaladi. (26.49 acres) RS. A. P.
1 Preparatory cultivation	692 7 0	215 0 0	893 15 0
2 Manures and manuring	1,385 7 6	486 4 8	2,031 0 6
3 Seeds and sowing	1,030 11 9	260 6 8	991 0 2
4 After cultivation	114 3 0	160 12 0	158 0 0
5 Irrigation	197 6 11	70 10 8	254 12 1
6 Harvesting, threshing and cleaning, etc.	418 8 0	239 8 0	616 9 6
Total	3,838 12 2	1,432 10 0	4,945 5 3
Cost of cultivation per acre	187 7 0	195 7 2	186 11 0

Produce.	Receipts (Value).			Thaladi.		
	Kuruval.	Samba.		RS. A. P.		
	RS. A. P.	RS. A. P.		RS. A. P.		
Grain—		Grain—		Grain—		
I sort 43,938 lb.	5,735 5 6	I sort 16,056 lb.	2,096 0 4	I sort 78,450 lb.	9,930 1 0	
at Rs. 16-3-0		at Rs. 16-3-0		at Rs. 16-3-0		
per 124 lb.		per 124 lb.		per 124 lb.		
II sort 16,459 lb.	1,382 15 4	II sort 1,798 lb.	216 9 6	Straw—		
at Rs. 14-15-0		at Rs. 14-15-0		76,540 lb. at	1,275 12 0	
per 124 lb.		per 124 lb.		rupee 1 per 60		
Straw—		Straw—		lb.		
44,580 lb. at	748 0 0	13,920 lb. at	232 0 0			
rupee 1 per 60		rupee 1 per 60				
lb.		lb.				
Total, Receipts ..	8,461 4 10	2,544 9 10		11,255 13 0		
Receipts per acre.	413 2 5	347 2 5		424 14 7		
		Kuruval.	Samba.	Thaladi.		
		RS. A. P.	RS. A. P.	RS. A. P.		
Total value of produce ..	..	8,461 4 10	2,544 9 10	11,255 13 10		
Less cost of cultivation ..	..	3,838 12 2	1,432 10 0	4,945 5 3		
Balance, Profit ..	..	4,622 8 8	1,111 15 10	6,310 8 7		
Profit per acre ..	..	225 11 5	151 11 3	238 3 7		

NOTE.—The margin of profit in Samba (single crop) is comparatively lower because quite a number of varieties—not all of them high yielding—had to be unavoidably grown in the limited area for seed multiplication, as they are needed for certain special localities.

TABLE V (b).—Cost of cultivation.

Cotton.							Cotton in rice fallow (total area 17 acres) (cost per acre).
							RS. A. P.
1 Manures and manuring	..	..	..	..	..	..	45 0 0
2 Seeds and sowing	..	..	..	..	..	..	19 12 0
3 After cultivation	..	..	..	..	..	..	63 0 0
4 Irrigation	..	..	..	..	..	..	24 0 0
5 Harvesting	..	..	..	..	..	..	33 0 0
Total cost ..							184 12 0

Receipts.

	RS.
Average yield of 645 lb. of kapas per acre at 7 annas per pound ..	282
Less cost of cultivation ..	185
Balance, profit per acre ..	97

Cost of cultivation.

Vegetables and Fruits.

Vegetables and fruits.							Vegetables (total area 1.5 acres) (cost per acre).
							RS. A. P.
1 Preparatory cultivation	..	..	..	..	..	..	136 3 4
2 Manures and manuring	..	..	..	..	..	..	107 10 0
3 Seeds and sowing	..	..	..	..	..	..	123 10 8
4 After cultivation	..	..	..	..	..	..	236 7 4
5 Irrigation	..	..	..	..	..	..	320 8 8
6 Harvesting	..	..	..	..	..	..	55 15 4
Total cost							980 7 4

Receipts.

	RS. A. P.
Sale-proceeds of vegetable seeds and seedlings; fruits and fruit plants.	2,022 5 6
Less cost of cultivation ..	980 7 4
Balance profit ..	1,041 14 2

TABLE VI.—Consolidated statement showing the quantity of seeds, seedlings, etc., distributed during 1951-52.

Particulars.	Produce sold as seed.		Seedlings.		Other than seed.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	(2)	(3)	(4)	(5)	(6)	(7)
	LB. OZ.	RS. A. P.	NOS.	RS. A. P.	LB. OZ.	RS. A. P.
1 Paddy ..	145,661 0	18,293 4 6	101½ cents.	213 12 0	..	..
2 Vegetables and fruits.	333 2	1,364 13 0	190,917	1,310 14 9	3,139 0	357 12 6 *
3 Green manures.	3,648 0	592 0 0	..	..	..	.. †
4 Fodder crops ..	..	..	9,250 slps.	11 9 0	..	.. ‡
5 Fibre crops ..	66 0	66 0 0	397	6 3 3	..	.. §
6 Live fence ..	13 8	27 0 0	60,445	151 1 0	..	.. ||
7 Coconut	..	..	..	..	6,601 0	888 11 3

* (Consisting of amaranthus, bendai, gourds, tomato, brinjal, chillies, cowpea, knol-khol, raddish, cabbage, carrot, sweet potato, papaya, mango, sathugudi, sour orange, pumello, lemon, lime, etc.)

† (Consisting of *Sesbania speciosa*.)

‡ (Guinea, Napier and Buffalo grass slps.)

§ (Kapok.)

|| (*Prosopis juliflora*.)

(Including tender coconuts 67.)

AGRICULTURAL RESEARCH STATION,
ADUTHURAI.

K. RAMASWAMY,
Superintendent.

AGRICULTURAL RESEARCH STATION,
ADUTHURAI,
20th March 1953.

K. VARADACHARI,
Deputy Director of Agriculture, Tanjore.

APPENDIX.

STATEMENT OF RECEIPTS AND EXPENDITURE FOR THE YEAR ENDING JUNE 1952.

Budget head.	40-c. Agriculture— Experimental Farms.	40-g. Agricultural Meteorology Section.	40-d. Agriculture (Training for fieldmen).
(1)	(2)	(3)	(4)
<i>I. Expenditure.</i>			
	RS. A. P.	RS. A. P.	RS. A. P.
1 Pay of Officer	3,600 0 0	....	....
Cost of living allowance ..	360 0 0	....	....
2 (a) Pay of Establishment (Permanent).	12,110 6 0	....	....
Dearness allowance ..	3,921 15 0	....	....
(b) Pay of Establishment (Temporary).	595 10 0	1,869 11 0	732 0 0
Dearness allowance ..	478 11 0	589 15 0	176 15 0
3 Travelling allowance ..	997 7 0	....	25 13 0
4 Capital Outlay	2,768 13 3	....	....
5 Working Expenses	26,696 6 10	....	....
Dearness allowance to menials.	5,191 2 6	....	....
6 Other Charges:			
Other Contingencies ..	1,092 11 3	65 2 3	4,895 4 0
Petty Construction and Repairs.	* 9,590 8 3	....	....
Total ..	67,403 11 1	2,524 12 3	5,830 0 0

* High due to bore-well and tube-well installations.

II. Receipts.

	RS. A. P.
1 Station receipts (sale-proceeds of seeds, seedlings, etc.) ..	14,667 11 7
2 Rent on buildings (rest-house rent)	122 8 0
3 Miscellaneous receipts	299 8 0
4 Transfers (value of seeds, seedlings, etc., transferred) ..	18,141 10 4
Total ..	33,161 5 11
5 Value of farm produce received during the year and held as balance of stock at the end of the year	12,382 9 11
Grand total ..	45,543 15 10
	or
	45,544 0 0

GLOSSARY.

<i>Kuruwai</i>	First (short term) paddy crop in double-crop wet lands.
<i>Thaladi</i>	Second (long and medium duration) crop in double-crop wet lands.
<i>Samba</i>	Main (long term) single crop.
<i>Kar</i>	Short-duration paddy crop, slightly longer than <i>Kuruwai</i> .
<i>Udu</i>	Mixture of short and long-term paddy, sown and planted together, but harvested separately.
<i>Burmese seihun</i> —Green manure trampler.	

ANNUAL REPORT OF THE AGRICULTURAL RESEARCH STATION,
PATTAMBI, 1951-52 (FASLI 1361).

Season and rainfall.—The south-west monsoon in 1951 broke out punctually on the 31st of May with great intensity accompanied by strong gale and continued to be so till the second week of June. As a result of the timely onset of the monsoon the 'modan' paddy and the broadcast first crop paddy in the wet lands came up vigorously. But the monsoon weakened from the second week of June till the second week of July for nearly a month. Though there was adequate water for transplanting first-crop paddy in the double-crop wet lands with the heavy precipitation in the first half of June, dearth of water was felt for planting the *palliyal* lands which would get water only if there are sufficient and continuous rains. As a result the ryots experienced great difficulty in transplanting their single crop lands and had to resort to lift irrigation by *picottah* and swing baskets. The ryots of Palghat taluk, especially, suffered much due to the absence of showers during this period and they were not able to transplant all their single crop lands. Those single crop lands which had sufficient water for transplanting also suffered later for want of adequate rains. However with the sporadic light to moderate showers, the paddy crop in the wet lands did not suffer much. This break in the monsoon for about a month synchronizes with the *Makeeram* and *Thiruvathira Nattuvela* (second week of June to first week of July) which is the period during which incessant heavy precipitations are ordinarily experienced. As a result, if rains in the *Makeeram* and *Thiruvathira Nattuvela* fail, the yield of crops in Malabar tends to be poor and the crops are subjected to various kinds of pests and diseases.

After a slackening of about a month, the south-west monsoon intensified in the third week of July with continuous heavy downpour and strong winds. These heavy rains accompanied by gale developed floods in the rivers and uprooted trees and caused obstruction to traffic. The short and medium duration varieties of paddy which were in shot blade were lodged and submerged under water. However, the rains were useful for transplanting the single crop lands. The south-west monsoon again weakened in the second week of August and there were no showers for a period of about three weeks from the third week of August up to the second week of September. The single crop paddy again suffered for want of water. The long-duration varieties which were just entering the reproductive phase also suffered. Lift irrigation by *picottah* was resorted to. Ryots also felt great inconvenience for transplanting the second-crop paddy in such of those double-crop lands from which an early crop of first-crop paddy was taken.

Thus the south-west monsoon though started in time did not fare well. There was a total precipitation of only 50.25 inches of rain over 59 rainy days there being the deficit of 20.03 inches. The distribution was erratic and uneven. The monsoon failed at critical periods of crop development and gained strength at inopportune moments making the condition of the crop to grow from bad to worse.

The north-east monsoon broke out on 22nd October 1951 preceded by thunder and lightning. There was a total amount of 23.76 inches of rain over 28 rainy days. Though the total amount of rain was above normal by 7.12 inches, the distribution was erratic and uneven. The continuous heavy downpour during the last week of November spoiled the gingelly crop getting ready for harvest. Unlike last year the second crop did not suffer for want of water during its fag end.

Hot weather rains.—The pre-monsoon showers in 1952 were quite inadequate. There was a total rainfall of 7.20 inches on 21 rainy days. There was a total rainfall of 2.32 inches on four consecutive days during the last week of February and this was helpful for the preparatory cultivation of wet lands and *modan* lands.

There was little or no rain in the subsequent months up to the third week of May and so the nurseries of first crop were raised under lift irrigation. However with the soaking showers in the third week of May sowing in the *modan* lands and in the wet lands were completed.

The bright weather with intermittent light showers that prevailed after the sowing was congenial to, good germination and healthy growth of the seedlings.

South-west monsoon.—There was a great delay in the onset of the south-west monsoon. It broke on the 10th of June and after being active for two days it weakened. The delay in the commencement of the south-west monsoon was a blessing in disguised for the late sown '*modan*' and the broadcast crop in the wet lands, though the transplanting of the first crop paddy was delayed. The rainfall statement for the fasli is given in Table I.

TABLE I.—Statement of rainfall—1951-52.

Month.	Week.	Rainfall in 1951-52.		Rainfall in 1950-51.		Average for the past ten years.		Average for the past twenty-four years.	
		Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
A. South-west monsoon.									
1951.									
June ..	7-13	9.89	7	16.84	7	7.69	5.7	6.78	6.0
	14-20	6.88	5	17.77	7	5.29	5.0	5.97	5.6
	21-27	4.61	6	1.82	4	7.35	5.6	6.09	5.4
June-July ..	28-4	2.75	4	4.50	5	6.36	6.1	6.90	5.8
	5-11	0.39	2	6.56	7	7.09	6.0	7.21	6.0
	12-18	4.29	6	9.39	7	6.39	5.3	5.77	5.5
	19-25	9.54	7	10.92	7	4.72	5.2	4.69	5.7
July-August ..	26-1	2.44	4	7.56	6	4.63	4.9	4.20	4.8
	2-8	1.87	4	8.90	7	3.69	5.2	4.52	5.2
	9-15	0.71	2	2.09	5	4.11	4.9	3.81	4.0
	16-22	1.48	5	0.54	1	3.75	5.0	2.89	3.9
	23-29	0.09	..	0.99	3	2.34	3.1	2.24	3.0
August-September.	30-5	..	..	2.28	3	1.36	2.3	1.68	2.6
	6-12	0.74	2	4.76	7	1.49	2.5	2.08	2.9
	13-19	0.23	1	1.05	4	0.75	2.1	1.09	2.4
	20-26	4.84	4	0.45	1	1.00	2.7	1.33	2.3
Total ..	..	50.25	59	90.42	81	63.01	71.6	67.25	71.2
B. North-east monsoon.									
September-October ..	27-3	9.89	9	2.52	4	0.77	1.3	1.84	2.5
	4-10	0.66	3	5.56	6	1.40	2.1	1.83	2.6
	11-17	1.18	2	1.34	2	3.03	3.0	2.65	3.0
	18-24	2.04	2	1.62	2	2.30	2.1	2.29	2.7
October ..	25-31	0.31	1	..	..	2.02	2.4	2.91	2.8
November ..	1-7	4.33	4	0.89	1	0.84	1.5	1.20	2.0
	8-14	0.12	..	4.42	5	1.75	1.8	1.51	1.8
	15-21	2.91	3	..	..	1.28	1.6	1.16	1.6
	22-28	1.66	3	0.01	..	1.09	1.6	0.56	0.8
November-December ..	29-5	0.64	1	..	..	0.88	0.7	0.62	0.7
	6-12	..	..	..	..	0.78	0.8	0.40	0.5
	13-19	..	..	..	..	0.11	0.2	0.05	0.1
	20-26	..	..	..	..	0.09	0.3	0.13	0.3
December 1951-January 1952 ..	27-3	..	..	..	..	0.01	0.1	0.03	0.1
	4-10	0.02	..	..	..	0.15	0.2	0.15	0.1
	11-17	..	..	..	..	..	..	..	..
	18-24	..	..	..	..	0.07	0.3	0.03	0.1
	25-31	..	..	..	..	0.04	0.1	0.40	0.1
Total ..	..	23.76	28	16.36	20	16.61	20.1	17.76	21.8

Month.	Week.	Rainfall in 1951-52.		Rainfall in 1950-51.		Average for the past ten years.		Average for the past twenty-four years.	
		Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1952.									
February ..	1-7	..	..	..	..	..	..	0.17	0.3
	8-14	..	..	..	..	..	..	0.05	0.1
	15-21	..	..	..	..	0.54	0.3	0.23	0.2
	22-28	2.32	4	..	..	..	..	0.02	..
March ..	1-7	..	..	..	..	0.05	0.2	0.02	0.1
	8-14	..	..	..	..	0.39	0.5	0.14	0.2
	15-21	..	..	..	..	0.25	0.4	0.27	0.3
	22-28	..	..	..	..	0.53	0.8	0.22	0.4
March-April ..	29-4	0.37	2	1.20	2	0.41	1.3	0.58	0.8
	5-11	0.15	1	3.95	3	0.49	0.9	0.81	1.1
	12-18	..	..	..	..	1.43	1.0	1.09	1.2
	19-25	..	..	..	..	0.71	0.9	0.71	1.0
April-May ..	26-2	0.09	..	1.92	1	0.49	0.9	0.54	0.9
	3-9	0.73	2	..	..	0.71	0.9	0.61	0.8
	10-16	1.11	3	..	..	0.97	1.1	1.08	1.4
	17-23	1.45	3	0.65	2	2.25	2.3	2.20	2.1
	24-30	0.98	3	4.85	4	3.49	2.7	4.22	2.8
May-June ..	31-6	..	..	..	..	5.48	3.9	4.18	4.0
Total ..	..	7.20	21	13.64	14	17.45	17.0	17.14	17.8
Grand Total ..	..	81.21	108	126.42	115	102.07	108.7	102.15	110.7

Temperature.—The monthly mean maximum ranged from 80.0°F. to 102°F. The highest maximum temperature of 102°F was recorded on 29th March 1952 and the lowest minimum of 62.5°F on 17th January 1952. The monthly averages of maximum temperature, minimum temperature, and relative humidity are given in Table II.

TABLE II.—Statement of monthly mean maximum, minimum and humidity.

Month.	Mean maximum of °F	Mean minimum of °F	Mean humidity per cent.	Month.	Mean maximum of °F	Mean minimum of °F	Mean humidity per cent.
1951.				1952.			
July ..	83.7	72.6	95	January ..	93.1	71.6	70
August ..	85.0	73.9	94	February ..	95.6	73.4	75
September ..	87.9	73.2	94	March ..	95.5	74.3	82
October ..	88.5	74.5	94	April ..	96.5	78.0	79
November ..	89.0	74.2	90	May ..	93.9	77.9	84
December ..	90.2	70.1	73	June ..	85.6	73.5	93

2. *Paddy*—(1) *First crop season*—(a) *Broadcast crop*—(i) *Modan*.—In 1951 season it was possible to give a thorough preparatory cultivation as the pre-monsoon showers were well distributed. The season on the whole was favourable. PTB. 30 recorded the maximum yield of 1,375 lb. per acre.

In 1952, the season was not favourable to begin with. Pre-monsoon showers were scanty and belated and sowing of *modan* varieties could be taken up only in the third week of May, almost in the wake of south-west monsoon which caused an initial set back in their growth. The varieties included the bulks of PTB. 28 *Kattamodan*, PTB. 29 *Modan Black* and PTB. 30 *Modan Dirty*, small areas under *Chennellu* and *Soansam* besides a few beds under *Beali* types 1724, 1725, *Vedurusannam* and *Budagalu*, covering on the whole 12.09 acres and 29 experimental beds.

The *modan* area was manured with 10 cart-loads of cattle-manure per acre applied to the preceding gingelly crop and wood ash at 1,000 lb. per acre at the time of sowing paddy.

(ii) *Double crop lands*.—Timely pre-monsoon showers facilitated a thorough preparatory cultivation for the 1951 crop. The yields were fair.

In 1952, a thorough preparation was not possible as was in the case of *modan*. Sowing was however done in the month of May, covering 12.40 acres inclusive of 24 experimental beds. The varieties were PTB. 22 *Velutha vattan*, PTB. 23 *Cheria Aryan*, PTB. 24 *Chuvanna vattan*, PTB. 25 *Thonmooran*, Co. 13 and PTB. 10 *Thekkan Cheera*.

(b) *Transplant crop*.—(1) *First crop 1951*.—The transplanting of paddy which commenced on 11th June 1951 was completed by 30th July 1952 covering 54.09 acres including 1,071 experimental beds. The south-west monsoon which started in time weakened towards the middle and gained unusual strength towards

Field No.—B. 3-c.		Date of sowing—26th June 1951.		Date of planting—7th July 1951.		Date of harvest—16th October 1951.	
Size of plot—4' × 15'.							
Layout—In two series, each in 7 × 4 randomized block.							
I Series.							
Particulars.	8817.	8820.	8821.	8914.	8915.	8916.	8917.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Acre yield in lb.	3,145	2,640	2,524	3,293	2,419	3,270	3,026
Percentage on general mean ..	108.1	90.7	86.8	113.2	83.1	112.6	103.9
Particulars.	8918.	8919.	8920.	General mean.	Standard error.	'Z' test satisfied or not (P=0.05).	Critical difference (P=0.05).
(9)	(10)	(11)	(12)	(13)	(14)	(15)	
Acre yield in lb.	2,751	3,066	2,960	2,909	293.8	Satisfied.	{ 602
Percentage on general mean ..	94.5	105.3	101.8	100.0	10.1		{ 20.7
Conclusion—8914, 8916, 8817, 8919, 8917, 8920, 8918, 8820, 8821, 8915.							

II Series.

Particulars.	8817.	8820.	8821.	8821.	8822.	8823.	8824.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Acre yield in lb.	2,152	2,777	3,040	3,230	2,320	2,169	2,567
Percentage on general mean ..	85.5	112.5	120.7	128.3	92.1	86.1	101.9

Particulars.	8925.	8926.	8927.	General mean.	Standard error.	'Z' test satisfied or not (P=0.05).	Critical difference (P=0.05).
(9)	(10)	(11)	(12)	(13)	(14)	(15)	
Acre yield in lb.	2,794	1,818	2,260	2,512	364.2	Satisfied.	{ 747 29.7
Percentage on general mean ..	110.9	72.2	89.8	100.0	14.5		

Conclusion—8921, 8821, 8820, 8925, 8924, 8922, 8927, 8923, 8817, 8926.

(b) *Second crop*.—Seven cultures of *Chuvanna vellakoli* selected on the basis of yield out of the fourteen cultures under trial last year were put under yield trial, against PTB. 4 and ryots' bulk. Two cultures recorded 27 and 37 per cent increased yield (vide Table VI). One of these cultures recorded 16 per cent increased yield during the previous year.

TABLE VI.—*Vellakoli cultures—Comparative yield trial, 1951–52.*

Field No.—B-8 a. Date of sowing—22nd September 1951.
 Size of plot—30' x 4'. Date of planting—31st October 1951.
 Layout—9 x 4 randomized blocks. Date of harvest—28th February 1952.

Cultures.

(1) 8880.	(5) 8878.
(2) 8875.	(6) 8853.
(3) PTB. 4.	(7) 8860.
(4) 8889.	(8) Standard (Vellakoli Bulk).
(9) 4916.	

Summary of results.

Particulars.	8880.	8875.	PTB. 4.	8889.	8878.	8853.	8860.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Acre yield in lb. ..	3,222	2,859	2,723	3,449	3,131	2,586	2,450
Percentage on standard (control).	126.8	112.5	107.2	135.7	123.2	101.8	96.4

Particulars	Standard.	4916.	General mean.	Standard error.	'Z' test satisfied or not (P=0.05).	Critical difference (P=0.05).
	(9)	(10)	(11)	(12)	(13)	(14)
Acre yield in lb.	2,541	2,541	2,833	262.9	Yes.	{ 613 24.13
Percentage on standard (control).	100.0	100.0	111.5	10.34		

Conclusion—4, 1, 5, 2, 3, 6, 8, 9, 7.

4. *Intervarietal trials—Third crop season*.—Varieties PTB. 10, ADT. 3, *Thekkan cheera* (Manjeri) TKM. 3 and Co. 13 were under yield trial with normal manuring and heavy manuring. Co. 13 and TKM. 3 flowered a week later than ADT. 3 and PTB. 10. The results satisfied the 'Z' test for main plot treatments and sub-plots treatments and not for interaction. An increased yield of 20 per cent is recorded by heavy manuring. PTB. 10 was the best yielder among the early varieties. The results are set out in Table VII.

TABLE VII.—*Comparative yield trial—Third crop season.*

Varieties—	Sown—13th February 1952.
1 ADT. 3.	Planted—11th March 1952.
2 PTB. 10.	Harvested—24th May 1952 and 7th June 1952.
3 TKM. 3.	Normal manure—
4 Co. 13.	Cattle manure at 10 cart load per acre, dry leaves 1,000 lb.
5 <i>Thekkancheera</i> Manjeri.	Heavy manure—
Field No.—V Plot 15.	Cattle manure 10 cart load, dry leaves 1,000 lb. and groundnut cake 500 lb.
Size of plot—5' x 25'.	
Layout—5 x 4 split plot design.	

Summary of results for main plot treatments.

Particular.	Heavy manure.	Normal manure.	General mean.	Standard error.	'Z' test.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Acre yield in lb. ..	2,032	1,663	1,848	86.30	Satisfied.	274
Percentage on control ..	122.2	100.0	111.1	5.19		16.5

Conclusion—Heavy manuring, Normal manuring.

Summary of results for sub-plot treatments.

Particular.	1.	2.	3.	4.	5.	General mean.	Standard error.	'Z' test.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Acre yield in lb. ..	1,325	1,782	2,211	2,168	1,744	1,848	70.22	Satisfied.	195
Percentage on standard (PTB. 10) (control).	74.4	100.0	124.1	121.1	97.9	103.5	3.93		10.93

Conclusion—3, 4, 2, 5, 1.

Summary of results for interaction.

Particular,	Heavy manure.					Normal manure.	
	1.	2.	3.	4.	5.	1.	2.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Acre yield in lb.	1,530	2,085	2,407	2,303	1,835	1,122	1,481
Percentage on control	103.3	140.8	162.5	155.5	123.9	75.8	100.0

Particulars,	Normal manure—cont.			General mean.	Standard error.	'Z' test.
	3.	4.	5.			
(9)	(10)	(11)	(12)	(13)	(14)	
Acre yield in lb.	2,020	2,036	1,655	1,848	140.82	Not satisfied.
Percentage on control	136.4	137.5	111.7	124.7	9.5	..

5. *Types*.—A live collection of 65 types in the first and second crop seasons was maintained.

6. *Hybridization*.—(a) *First crop*.—Twelve progenies selected from inter-strain crosses between PTB. 1, PTB. 5, PTB. 14, PTB. 7 and MTU. 9, were under preliminary yield trial against the parents. Six progenies are found to be promising and recorded 1 to 18 per cent increased yields. These were carried forward for further trial.

(b) *Second crop*.—Three cultures selected from a cross between Co. 3 and PTB. 19 were under yield trial against Co. 3. Culture 8,899 recorded an increased yield of 12.8 per cent over Co. 3. (Table VIII).

TABLE VIII.—*Co. 3 x PT B progenies—Comparative yield trial.*

Treatments—									
Culture ..	..	..	..	..	..	..	..	..	8,895
" ..	..	..	..	..	..	..	..	..	8,896
" ..	..	..	..	..	..	..	..	..	8,899
Co. 3 ..	..	..	..	..	..	..	..	..	..

Field No.—B-7-b. Sown—22nd September 1951.
 Plot size—4' x 20'. Planted—31st October 1951.
 Layout—4 x 6 Randomised blocks. Harvested—23rd February 1952.

Summary of results for grain yield.

Particular.	Co. 3.	8,895	8,896	8,899	General mean.	Standard error.	'Z' test.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Acre yield in lb. ..	3,013	3,606	3,214	3,438	3,318	82.62	Satisfied.	176
Percentage on control.	100.0	119.6	106.7	114.1	110.1	2.74		5.85

Conclusion—8895, 8899, 8896, Co. 3.

Selections numbering 466 from 100 progenies of inter-strain crosses between second crop strains were grown in strips along side parents and on the basis of visual judgment and weight of grain, 47 progenies were selected for further trial.

7. *Manurial experiments*—(a) *Combined organic and inorganic nitrogen experiment*.—The experiment designed to find out the best proportion of green leaf, groundnut cake and ammonium sulphate was continued in both first and second crop seasons with eleven treatments as in the second crop season last year. As will be seen from the results, a combination of two-thirds ammonium sulphate and one-third green leaf have the maximum during the second-crop seasons (Table IX). During the previous year, plots receiving only ammonium sulphate secured the best yield.

TABLE IX.—Combined organic—inorganic nitrogen experiment.

First crop.											
Field No.—A-21 a.				Date of sowing—2nd June 1951.							
Plot size—10' x 14'.				Date of planting—4th July 1951.							
Layout—11 x 6 randomized blocks.				Date of harvest—25th October 1951.							
Variety—PTB. 2.											
Treatments—											
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Groundnut cake 400 lb.	0	1	0	0	2/3	2/3	1/3	1/3	0	0	1/3
Leaf 4,000 lb. ..	0	0	1	0	1/3	0	2/3	0	2/3	1/3	1/3
Amm. sulphate 150 lb.	0	0	0	1	0	1/3	0	2/3	1/3	2/3	1/3

Particulars.	Treatments.									
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Acre yield in lb. ..	1,898	1,714	1,831	1,899	1,574	1,592	1,696	1,934	1,729	1,729
Percentage on control ..	100.0	100.9	96.1	111.9	92.7	111.4	99.5	113.9	101.9	101.9

Particulars.	Treatments—cont.		General mean.	Standard error.	'Z' test satisfied or not.	Critical difference.
(1)	(10)	(11)	(13)	(14)	(15)	(16)
Acre yield in lb. ..	1,859	1,823	1,768	102.5	Yes.	201
Percentage on control ..	100.5	107.7	104.1	0.04		11.83

Conclusion—8, 4, 6, 10, 11, 9, 2, 1, 7, 3, 5.

Second crop—1950-51.

Field—No. A. 12-a.				Date of sowing—27th September 1951.							
Plot size—10' x 14'.				Date of planting—3rd November 1951.							
Layout—11 x 6 randomized blocks.				Date of harvest—11th February 1952.							
Variety—PTB. 20.											

Particulars.	Treatments.									
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Acre yield in lb. ..	1,808	2,011	1,917	2,190	2,013	2,098	1,953	2,138	2,108	2,108
Percentage on control ..	100.0	125.1	119.2	136.8	125.2	130.5	121.5	132.8	131.1	131.1
1950-51 percentage on control ..	100.0	120.0	115.3	157.4	128.6	130.5	139.4	151.9	148.8	148.8

Particulars.	Treatments—cont.		General mean.	Standard error.	'Z' test satisfied or not.	Critical difference.
(1)	(10)	(11)	(13)	(14)	(15)	(16)
Acre yield in lb. ..	2,221	2,053	1,860	76.26	Yes.	153
Percentage on control ..	138.1	127.7	126.2	5.17		10.35
1950-51 percentage on control ..	154.3	132.6	134.3	30.88	Not satisfied.	

Conclusion—10, 4, 8, 9, 6, 11, 5, 2, 7, 3, 1.

(b) *Groundnut cake, wood ash and superphosphate*.—The experiment comprising application of groundnut cake at 500 lb. per acre, superphosphate at 200 lb. per acre and wood ash at 4,000 lb. per acre alone and in combinations over a basal dressing of green leaf at 2,000 lb. per acre was continued. The object was to find out if a combination of cake with wood ash and superphosphate

would be better than groundnut cake alone. From the results presented in the Table X, it will be found that cake in general secured increased yield in both the seasons. The results of combined analysis for three years are given in Table X. It will be found that a combination of cake and ash secured the maximum yield generally, with an average increased yield of 29.5 per cent over green leaf at 2,000 lb. per acre.

TABLE X.—Cake, ash and super.

First crop.									
Field No.—A. 8-bc.				Date of sowing—2nd June 1951.					
Plot size—16' x 27'.				" planting—3rd July 1951.					
Layout—8 x 4 randomized block.				" harvest—19th October 1951.					
Variety—PTB. 2.									

Treatments—	Summary of results.								
1 Leaf 2,000 lb. per acre.	2 Do. + Groundnut cake 500 lb. per acre.	3 Do. + Super 200 lb. per acre.	4 Do. + Ash 4,000 lb. per acre.	5 Do. + Groundnut cake + super.	6 Do. + Groundnut cake + ash.	7 Do. + Super + ash.	8 Do. + Super + Groundnut cake + ash.		

Particulars.	Treatments.								
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Acre yield in lb. ..	1,348	1,714	1,861	1,784	1,865	1,840	1,802	1,840	1,840
Percentage on control ..	100.0	127.2	123.2	130.9	138.4	136.5	133.7	136.5	136.5

Particulars.	General mean.	Standard error.	'Z' test satisfied or not.	Critical difference.
(1)	(10)	(11)	(12)	(13)
Acre yield in lb. ..	1,733	91.8	Yes.	191
Percentage on control ..	123.3	6.8		14.18

Conclusion—5, 6, 8, 7, 4, 2, 3, 1

Second crop.

Field No.—A. 8-bc.				Date of sowing—27th September 1951.							
Plot size—16' x 27'.				" planting—2nd November 1951.							
Layout—8 x 4 randomized.				" harvest—9th February 1952.							
Variety—PTB. 20.											

Particulars.	Treatments.								
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Acre yield in lb. ..	1,798	2,218	1,840	2,047	2,395	2,388	2,143	2,470	2,470
Percentage on control ..	100.0	123.4	102.3	114.9	133.2	132.8	119.2	137.4	137.4

Particulars.	General mean.	Standard error.	'Z' test satisfied or not.	Critical difference.
(1)	(10)	(11)	(12)	(13)
Acre yield in lb. ..	2,164	88.7	Yes.	185
Percentage on control ..	120.4	4.94		10.27

Conclusion—8, 5, 6, 2, 7, 4, 3, 1.

Combined analysis of the three years results—Summary of results of the treatments.

Particulars.	1.	2.	3.	4.	5.	6.	7.	8.	9.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Acre yield in lb. ..	1,613	2,046	1,806	1,949	2,088	2,144	2,008	2,115	2,115
Percentage on control ..	100.0	122.9	108.5	117.1	125.4	129.5	120.6	126.0	126.0

Particulars.	General mean.	Standard error.	'Z' test satisfied or not.	Critical difference.
(1)	(10)	(11)	(12)	(13)
Acre yield in lb. ..	1,977	133.9	Yes.	262
Percentage on control ..	118.8	8.1		

Conclusion—8 to 4 6, 8, 5, 2, 7, 4, 3, 1.

Summary of the results for the six seasons.

Particulars. (1)	1. (2)	2. (3)	3. (4)	4. (5)	5. (6)	6. (7)
1949-50—						
I Crop	92.9	105.9	94.8	95.7	110.6	101.3
II Crop	84.8	93.7	103.8	103.8	93.7	99.4
1950-51—						
I Crop	70.6	121.0	78.9	99.1	99.1	122.6
II Crop	80.8	100.8	86.8	96.9	108.3	118.4
1951-52—						
I Crop	73.6	99.6	96.7	102.4	103.9	106.8
II Crop	82.1	101.7	85.5	95.9	112.1	109.8
	7.	8.	General mean.	Standard error.	'Z' test satisfied or not.	Critical difference.
	(1)	(9)	(10)	(11)	(12)	(13)
1949-50—						
I Crop	98.5	100.3				
II Crop	106.7	114.1				
1950-51—						
I Crop	92.4	115.9	100.0	5.5	Yes.	10.8
II Crop	105.3	90.9				
1951-52—						
I Crop	103.9	105.3				
II Crop	99.4	113.3				
Conclusions—						
1949-50—						
I Crop—5, 2, 6, 8, 7, 4, 3, 1.						
II Crop—3, 7, 8, 4, 6, 5, 2, 1.						
1950-51—						
I Crop—6, 2, 8, 5, 4, 7, 3, 1.						
II Crop—6, 7, 5, 2, 4, 8, 3, 1.						
1951-52—						
I Crop—6, 8, 7, 5, 4, 2, 3, 1.						
II Crop—8, 5, 6, 2, 7, 4, 3, 1.						

(c) *Application of phosphate through green manure compared to application direct to paddy crop.*—The experiment to find out the efficacy of application of superphosphate to leguminous green manure crops like Wild indigo in the single crop lands and *Dhaincha* in the double crop lands was continued. The results of green leaf yields did not satisfy the 'Z' test in the previous year; the results pertaining to single crop lands this year also did not satisfy the 'Z' test but there is indication of increased yield of green matter with the application of superphosphate. In the double-crop lands the results satisfied the 'Z' test. Superphosphate to supply 60 lb. P 205 brought about an increased yield of green matter to the extent of 117.6 per cent over no phosphate and 69.6 per cent over superphosphate to supply 30 lb. P 205 per acre, and the yield of grain increased with the quantity of green leaf applied, the maximum increase being 23.9 per cent. The results are set out in Table XI.

TABLE XI.—Green manure phosphate.

Treatments—	1.	2.	3.	4.	5.	6.	7.
1 Green manure without phosphate.							
2 do. plus superphosphate to supply 30 lb. P2O5 per acre.							
3 do. do. do. 60 lb. P2O5 per acre.							
4 Green leaf as in (2) plus super at 30 lb. P2O5 to paddy.							
5 do. (3) plus super at 60 lb. do.							
6 Green leaf alone as in (2).							
7 do. (3).							
Field No.—G. 1-cd.							
Plot size—15' x 18'.							
Green manure—Wild indigo.							
Layout—7 x 4 randomized blocks.							
Sown—19th November 1950.							
Trampled—24th July 1951.							

Summary of results for yield of green manure.

Particulars. (1)	1. (2)	2. (3)	3. (4)	General mean. (5)	Standard error. (6)	'Z' test. (7)
Acre yield in lb.	1,976	2,581	3,186	2,581	622.28	Not satisfied.
Percentage on control	100.0	130.6	161.2	130.6	81.49	..

Single crop lands—cont.

Summary of results for yield of paddy (grain).

Sown—2nd June 1951. Planted—27th July 1951.	Harvested—18th October 1951. Variety—PTB. 7.	1.	2.	3.	4.	5.	6.	7.
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Acre yield in lb.		1,094	1,016	1,119	1,063	872	867	895
Percentage on control		100.0	92.9	102.3	97.2	79.7	79.3	81.9
			General mean. (9)	Standard error. (10)	'Z' test. (11)			
Acre yield in lb.			989	112.75	Not satisfied.			
Percentage on control			90.5	..	..			

Double crop lands.

Field No.—B. 8-b.
Plot size—15' x 20'.
Layout—7 x 4 randomized block.

Green manure—*Dhaincha*.
Sown—31st January 1951.
Trampled—1st July 1951.

Summary of results for yield of green matter.

(1)	1. (2)	2. (3)	3. (4)	General mean. (5)	Standard error. (6)	'Z' test. (7)	Critical difference. (8)
Acre yield in lb.	3,666	7,687	13,286	8,180	1570.56	Satisfied.	3843.9
Percentage on control	100.0	206.9	362.4	223.1	42.84	..	104.8

Summary of results for yield of paddy (grain).

Sown—5th June 1951. Planted—7th July 1951.	Harvested—10th October 1951. Variety—PTB. 2.	1.	2.	3.	4.	5.	6.	7.
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Acre yield in lb.		1,634	1,815	2,069	1,851	1,997	1,888	2,033
Percentage on control		100.0	111.1	126.6	113.3	122.2	115.6	124.4
				General mean. (9)	Standard error. (10)	'Z' test. (11)	Critical difference. (12)	
Acre yield in lb.				1,898	10,458	Satisfied.	220	
Percentage on control				116.2	6.39	13.46	..	

(d) *Fused phosphate.*—The experiment with this commercial 'fused' phosphate containing 22 per cent P 205 was continued during this year also to test its efficacy as compared to super. The results in both seasons did not satisfy the 'Z' test. The experiment is discontinued as there was no evidence of increased yield by application of this fertilizer (vide Table XII).

TABLE XII.—Fused-phosphate experiment—I crop.

Field No.—A-12 b.
Size of plot—13' x 20'.
Layout—9 x 4 randomized blocks.
Variety—PTB. 2.

Sown—2nd June 1951.
Transplanted—5th July 1951.
Harvested—24th October 1951.

- 1 Green leaf at 2,500 lb. per acre.
- 2 Ammonium sulphate to supply 30 lb. N.
- 3 Green leaf at 2,500 lb. per acre plus super-phosphate to supply 30 lb. P₂O₅.
- 4 Do. do. plus fused phosphate to supply 30 lb. P₂O₅.
- 5 Ammonium sulphate to supply 30 lb. N. plus super-phosphate to supply 30 lb. P₂O₅.
- 6 Do. do. do. fused phosphate do.
- 7 Green leaf at 2,500 lb. per acre plus ammonium sulphate to supply 30 lb. N.
- 8 Treatment 7 plus super-phosphate to supply 30 lb. P₂O₅ acre.
- 9 Do. fused phosphate to supply 30 lb. P₂O₅ acre.

Particulars.	1	2	3	4	5	6	7	8	9
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Acre yield in lb. ..	2,297	2,109	2,318	2,124	1,879	2,354	2,255	2,213	2,172
Percentage on control (Tri.) ..	100.0	91.8	100.9	92.5	81.8	102.6	98.2	96.4	94.6
1950-51 ..	100.0	97.2	75.5	102.2	84.4	84.4	108.9	107.2	98.8

Particulars.	General mean.	'Z' test satisfied or not.
(1)	(11)	(12)
Acre yield in lb. ..	2,191	..
Percentage on control (Tri.) ..	95.4	Not satisfied.
1950-51 ..	85.4	..

Fused phosphate experiment—II crop.

Field No.—A-12-b. Sown—27th September 1951.
 Size of plot—13' x 20'. Planted—3rd November 1951.
 Layout—9 x 4 randomized blocks. Harvested—20th February 1952.

Treatments same as first crop.

Particulars.	1	2	3	4	5	6	7	8	9
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Acre yield in lb. ..	662	1,225	1,275	1,050	928	1,093	1,287	1,437	1,162
Percentage on control (Tri.) ..	100.0	142.1	147.9	121.8	107.4	126.8	149.3	166.7	134.8
1950-51 ..	100.0	93.8	101.2	95.0	85.2	96.3	123.5	124.4	107.4

Particulars.	General mean.	'Z' test satisfied or not.
(1)	(11)	(12)
Acre yield in lb. ..	1,150.3	..
Percentage on control (Tri.) ..	132.98	No.
1950-51 ..	102.9	Not satisfied.

(e) Green leaf and superphosphate.—The experiment with two doses of phosphate, namely, 30 lb. and 60 lb. P 205 per acre without and with green leaf 2,000, 4,000 and 6,000 lb. per acre was continued. In both the seasons the results satisfied the 'Z' test for doses of leaf and superphosphate and not for interaction. In the first-crop season the combination of leaf at 4,000 lb. plus superphosphate to supply 60 lb. P 205 per acre recorded the best yield while in the second-crop season leaf at 6,000 lb. per acre and superphosphate to supply 60 lb. P 205 per acre secured the best yield. During the previous year in the first-crop season green leaf at 6,000 lb. per acre recorded the best yield. The results are given in Table XIII.

TABLE XIII.—Green leaf and super phosphate experiment.

Field No.—A 5-a.	Sown on 2nd June 1951.
Plot size—13' x 17'.	Planted on 4th July 1951.
Layout—12 x 4 randomized blocks.	Harvested on 24th October 1951.
Variety—PTB. 2.	
Treatments—	Treatments—cont.
1 Leaf at 0 lb. per acre.	7 Leaf at 2,000 lb. plus super to supply 30 lb. P205.
2 Leaf at 2,000 lb. per acre.	8 Leaf at 2,000 lb. plus super to supply 60 lb. P205.
3 Leaf at 4,000 lb. per acre.	9 Leaf at 4,000 lb. plus super to supply 30 lb. P205.
4 Leaf at 4,000 lb. per acre.	10 Leaf at 4,000 lb. plus super to supply 60 lb. P205.
5 Leaf at 6,000 lb. per acre.	11 Leaf at 6,000 lb. plus super to supply 30 lb. P205.
6 Leaf at 0 lb. plus super to supply 30 lb. P205.	12 Leaf at 6,000 lb. plus super to supply 60 lb. P205.
7 Leaf at 0 lb. plus super to supply 60 lb. P205.	

Summary of results for leaves only.

Particulars.	0 lb.	2,000 lb.	4,000 lb.	6,000 lb.	General mean.	Standard error.	'Z' test.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Acre yield in lb. ..	2,070	2,287	2,464	2,333	2288.4	79.41	..	156
Percentage on control ..	100.0	110.5	119.0	112.7	110.6	3.84	Yes.	7.53
1950-51 ..	100.0	111.1	115.5	118.4	111.3	6.15	Satisfied.	11.46
Conclusions—(6,000 lb. 4,000 lb. 2,000 lb. 0 lb.)					4,000 lb.	6,000 lb.	2,000 lb.	0
1950-51—6,000 lb. 4,000 lb. 2,000 lb. 0 lb.								

Summary of results for super only.

Particulars.	0 lb.	30 lb.	60 lb.	General mean.	Standard error.	'Z' test satisfied or not.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Acre yield in lb. ..	2,144	2,353	2,368	2288.4	68.72	..	134
Percentage on control ..	100.0	109.8	110.3	106.7	3.2	Yes.	6.25
1950-51 ..	100.0	99.9	104.1	101.3	4.86	Not satisfied.	..
Conclusion—60 lb. 30 lb. 0 lb.							

Interaction.

Particulars.	0 lb. leaf.			2,000 lb.			4,000 lb.		
	0 lb.	30 lb.	60 lb.	0 lb.	30 lb.	60 lb.	0 lb.	30 lb.	60 lb.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Acre yield in lb. ..	1,873	2,255	2,082	2,168	2,353	2,340	2,353	2,452	2,587
Percentage on control ..	100.0	120.4	111.2	115.7	125.7	124.9	125.7	130.9	138.1
1950-51 ..	100.0	112.3	119.3	121.4	108.8	104.1	107.2	122.7	120.8
Particulars.	6,000 lb.			General mean.			Standard error.		
	0 lb.	30 lb.	60 lb.	(11)	(12)	(13)	(14)	(15)	(16)
Acre yield in lb. ..	2,181	2,353	2,464	2288.4	136.85	No.			
Percentage on control ..	116.5	125.7	131.6	122.2	7.31	..			
1950-51 ..	111.6	115.6	130.2	114.5	11.1	Not satisfied.			

Green leaf and superphosphate experiment second crop—1951-52.

Field No.—A 5-a. Date of sowing—27th September 1951.
 Plot size—13' x 17'. Date of planting—2nd November 1951.
 Layout—12 x 4 randomized blocks. Date of harvest planted—8th February 1952.
 Variety—PTB. 20.

Treatments same as as in I crop.

(For leaves only)								
Particulars.	0 lb.	2,000 lb.	4,000 lb.	6,000 lb.	General mean.	Standard error.	'Z' test satisfied or not.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Acre yield in lb.	2,029	2,176	2,362	2,674	2,310	85.07	Yes.	167
Percentages on control ..	100.0	107.2	116.4	131.8	113.85	4.19	..	8.19
1950-51	100.0	109.4	97.7	116.1	115.8	9.62	Not satisfied.	..
Conclusion—6,070 lb.	4,000 lb.	2,000 lb.	0 lb.					
(For supply only)								

Particulars.	0 lb. leaf.			2,000 lb.			4,000 lb.		
	0 lb.	30 lb.	60 lb.	0 lb.	30 lb.	60 lb.	0 lb.	30 lb.	60 lb.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Acre yield in lb. ..	1,922	2,045	2,119	2,070	2,131	2,328	2,269	2,328	2,489
Percentage on control ..	100.0	106.4	110.8	107.7	110.8	121.1	118.1	121.1	129.5
1950-51 ..	100.0	107.5	94.3	113.2	99.1	92.4	103.7	105.1	96.2
Particulars.	6,000 lb.			General mean.			Standard error.		
	0 lb.	30 lb.	60 lb.	(11)	(12)	(13)	(14)	(15)	(16)
Acre yield in lb. ..	2,563	2,649	2,800	2,310	48.97	..			
Percentage on control ..	133.3	137.8	146.1	120.2	2.55	No			
1950-51 ..	94.3	108.0	111.9	102.1	15.18	Not satisfied.			

(f) *Pre-season manuring for the broadcast first crop.*—The broadcast crop of paddy in the first-crop season in Malabar generally goes without adequate manuring as bulky manures like green leaf will not be available in sufficient quantities at this part of the year. An experiment was therefore designed to find out if heavy manuring of transplanted second-crop would obviate the necessity of basal manuring for the following broadcast crop of paddy and maintain the fertility of the soil.

The second crop was manured with heavy doses of cattle manure and green leaf as two separate treatments along with no manure as control, in split plot design. From the results presented in Table XIV it will be seen that in the second-crop season green leaf recorded the maximum increased yield of 50.8 per cent over no manure and cattle manure 27.8 per cent. In the following first-crop season the results satisfied the 'Z' test for main plot treatments and sub-plot treatments and not for interaction. Manuring recorded 31.6 per cent increased yield and in the sub-plot effects, cattle manure recorded 9.4 per cent increased yield over no manure and 7.2 per cent increase over green leaf showing thereby that cattle manure in such heavy doses have good residual effect. In the next second-crop season the 'Z' test was satisfied for main plot treatments alone, cattle manure again recording 17.3 per cent increased yield over no manure.

TABLE XIV.—Preseason manuring.

Treatments—
1 Green leaf at 6,000 lb. per acre.
2 Cattle manure at 10 tons per acre.
3 No manure.

The above treatments are given in the second crop season followed by—
I. Manure (Green leaf at 2,000 lb. + Superphosphate to supply 30 lb. P₂O₅ + Ammonium sulphate at 150 lb. per acre).
II. No manure, in the first crop season.

Summary of results—Second crop 1950-51.

Field number—A 10 b, c. 11 b, c.
Variety—PTB 20.
Plot size—30' x 32'
Layout—3 x 4 split plot design.

Sown—13th September 1950.
Planted—29th October 1950.
Harvested—29th January 1951.

Particulars.	1	2	3	General mean.	Standard error.	'Z' test satisfied or not.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Acre yield in lb.	1,769	1,443	1,048	1,420	98.83	Satisfied.	242.00
Percentage on control	168.8	137.7	100.0	135.5	9.43	..	23.1
Conclusion—1, 2, 3,							

Broadcast first crop, 1951-52.

Sown—20th April 1951.
Harvested—26th September 1951.

Leaf and super applied—20th April 1951.
Ammonium sulphate—10th July 1951.

Summary of results for main plot treatments.

Particulars.	Manure.	No manure.	General mean.	Standard error.	'Z' test satisfied or not.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Acre yield in lb.	2,420	1,759	2,090	193.53	Satisfied.	616.00
Percentage on control	137.6	100.0	118.8	11.0	..	35.01
Conclusion—Manure. No manure.						

Summary of results for sub-plot treatments, i.e., residual effect of pre-season manuring.

Particulars.	Green leaf.	Cattle manure.	No manure.	General mean.	Standard error.	'Z' test satisfied or not.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Acre yield in lb.	2,055	2,207	2,009	2,090	66.46	Satisfied.	145
Percentage on control	102.3	109.8	100.0	104.0	3.30	..	7.2
Conclusion—Cattle manure, Green leaf, No manure.							

Summary of results for interaction.

Particulars.	Manure.			No manure.			General mean.	Standard error.	'Z' test satisfied or not.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Acre yield in lb.	2,362	2,509	2,390	1,746	1,903	1,627	2,090	94.05	Not satisfied.
Percentage on control	145.2	154.2	146.9	107.4	116.9	100.0	128.4	6.07	..

Second crop, 1951-52 Summary of results for main plots.

Particulars.	Green leaf.	Cattle manure.	No manure.	General mean.	Standard error.	'Z' test satisfied or not.	Critical difference.
Acre yield in lb.	2,326	2,417	2,028	2,257	30.70	Satisfied.	75
Percentage on control	114.7	119.2	100.0	111.3	1.51	..	3.71
Conclusion—Cattle manure, Green leaf, No manure.							

Summary of results for interaction.

Particulars.	Green leaf.		Cattle manure.		No manure.		General mean.	Standard error.	'Z' test satisfied or not.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Acre yield in lb.	2,321	2,330	2,413	2,422	2,064	1,991	2,257	101.11	Not satisfied.
Percentage on control	112.5	112.9	116.9	117.3	100.0	96.6	109.4	4.9	..

(g) *Compost manure experiment on the Modan land.*—The experiment designed to evaluate the comparative merits of farm-yard manure and compost of farm wastes on equal nitrogen basis was continued. The results satisfied the 'Z' test and farm-yard manure recorded 25.4 per cent increased yield over no manure. The combined analysis for three years show that in two out of three seasons, compost was as good as farm-yard manure. In all seasons it recorded increased yield over control, an average increase of 12.6 per cent. (Table XV.)

TABLE XV.—Compost manure experiment.

Field No.—Block VIII Plots 14 and 15.
Plot size—38' x 29'.

Layout—3 x 6 randomized blocks.
Variety—PTB 28 (Kattamodan).

Treatments—
1 No manure.
2 Compost to supply 60 lb. Nitrogen.
3 Farm yard manure to supply 60 lb. Nitrogen.

Summary of results.

Particulars.	Treatments.			General mean.	Standard error.	'Z' test satisfied or not.	Critical difference (P=0.05).
(1)	(2)	(3)					
Acre yield in lb.	1,503	1,674	1,944	1,707	111.81	Yes.	249
Percentage on control	100.0	111.4	129.3	113.6	7.4	..	16.6
Conclusion—3, 2, 1.							

Combined analysis for three seasons.

Summary of results for treatments.

Particulars.	1	2	3	General mean.	Standard error.	'Z' test satisfied or not.	Critical difference.
(1)	(2)	(3)					
Acre yield in lb.	1,161	1,324	1,409	1,298	61.0	Satisfied.	128.1
Percentage in control	100.0	114.0	121.4	111.8	5.3	..	11.1
Conclusion—3, 2, 1.							

(h) *Semi-acidulated phosphate trial.*—An experiment was taken up for the first time with semi-acidulated phosphate containing 35.3 per cent, P₂O₅ against superphosphate at a rate to supply 80 lb. P₂O₅ per acre over a basal dressing of groundnut cake to supply 40 lb. nitrogen per acre. The fertilizers were applied both broadcast and placed. In both the seasons the results did not indicate any favourable effect. (Table XVI.)

TABLE XVI.—Semi-acidulated phosphate experiment.

First-crop season.

Field No.—A. Plots—2 bc.
Plot Size—32' x 25'.
Layout—3 x 5 randomized blocks.
Variety—PTB 2.

Sown—13th July 1951.
Planted—4th September 1951.
Harvested—15th November 1951.

First crop season—cont.

Treatments—

- 1 Control.
- 2 Groundnut cake at 40 lb. per acre.
- 3 Do. + Super 80 lb. P₂O₅ (Broadcast)
- 4 Do. + Semi-acidulated phosphate 80 lb. P₂O₅ (Broadcast)
- 5 Do. + Super 80 lb. P₂O₅ (Placed)
- 6 Do. + Semi acid ulated Phosphate 80 lb. P₂O₅ (Placed).

Summary of results.

Particulars.	1	2	3	4	5	6	General mean.	Standard error.	'Z' test. satisfied or not.
Acre yield in lb.	1,266	1,544	1,506	1,443	1,481	1,392	1,439	116.58	No.
Percentage on control..	100.0	122.0	119.0	114.0	117.0	110.0	113.7	9.2	"

Second crop season.

Sown—5th October 1951.
Planted—3rd December 1951.

Harvested—25th February 1952
Variety—PTB-10.

Summary of results.

Particulars.	1	2	3	4	5	6	General mean.	Standard error.	'Z' test. satisfied or not.
Acre yield in lb.	1,101	1,401.5	1,323	1,128.7	1,159	1,310.6	1,237.3	146.12	No.
Percentage on control..	100.0	127.3	120.1	102.5	105.2	119.1	112.4	13.27	"

(i) *Studies on laterite soils.*—Malabar soils contain large proportions of iron and alumina in the presence of which paddy does not respond to phosphatic manures. An experiment was, therefore, designed for the first time to see how far incremental doses and combinations of lime (0, 1,500 and 3,000 lb.), green leaf (0, 5,000 and 7,500 lb.) and superphosphate (0, 30, 45 and 60 lb. P₂O₅) would influence the yield. The experiment was conducted both in the first and second seasons. In the first-crop season, the result did not satisfy the 'Z' test. In the second-crop season, the results satisfied the 'Z' test for leaf and P₂O₅, as well as lime, leaf and P₂O₅ interactions. Incremental doses of lime, leaf and phosphoric acid contributed to increased yields in general. (Table XVII)

TABLE XVII.—Laterite Soil Studies.

First-crop season.

Treatments—

- 1 No manure.
- 2 Leaf 5,000 lb. per acre.
- 3 Leaf 7,500 lb. per acre.
- 4 Super 30 lb. P₂O₅ per acre.
- 5 Super 45 lb. P₂O₅ per acre.
- 6 Super 60 lb. P₂O₅ per acre.
- 7 Lime at 1,500 lb. per acre.
- 8 Lime at 3,000 lb. per acre.
- 9 Leaf 5,000 lb.—Super 30 lb. per acre.
- 10 Leaf 5,000 lb.—Super 45 lb. per acre.
- 11 Leaf 5,000 lb.—Super 60 lb. per acre.
- 12 Leaf 5,000 lb.—Lime 1,500 lb. per acre.
- 13 Leaf 5,000 lb.—Lime 3,000 lb. per acre.
- 14 Super 30 lb.—Lime 1,000 lb. per acre.
- 15 Super 30 lb.—Lime 3,000 lb. per acre.
- 16 Super 45 lb.—Lime 1,500 lb. per acre.
- 17 Super 45 lb.—Lime 3,000 lb. per acre.
- 18 Super 60 lb.—Lime 1,500 lb. per acre.
- 19 Super 60 lb.—Lime 3,000 lb. per acre.
- 20 Leaf 5,000 lb.—Super 30 lb.—Lime 1,500 lb. per acre.
- 21 Leaf 5,000 lb.—Super 45 lb.—Lime 1,500 lb. per acre.
- 22 Leaf 5,000 lb.—Super 60 lb.—Lime 1,500 lb. per acre.
- 23 Leaf 5,000 lb.—Super 30 lb.—Lime 3,000 lb. per acre.
- 24 Leaf 5,000 lb.—Super 45 lb.—Lime 3,000 lb. per acre.
- 25 Leaf 5,000 lb.—Super 60 lb.—Lime 3,000 lb. per acre.
- 26 Leaf 7,500 lb.—Super 30 lb. per acre.
- 27 Leaf 7,500 lb.—Super 45 lb. per acre.
- 28 Leaf 7,500 lb.—Super 60 lb. per acre.
- 29 Leaf 7,500 lb.—Lime 1,500 lb. per acre.
- 30 Leaf 7,500 lb.—Lime 3,000 lb. per acre.
- 31 Leaf 7,500 lb.—Super 30 lb.—Lime 1,500 lb. per acre.
- 32 Leaf 7,500 lb.—Super 45 lb.—Lime 1,500 lb. per acre.
- 33 Leaf 7,500 lb.—Super 60 lb.—Lime 1,500 lb. per acre.
- 34 Leaf 7,500 lb.—Super 30 lb.—Lime 3,000 lb. per acre.
- 35 Leaf 7,500 lb.—Super 45 lb.—Lime 3,000 lb. per acre.
- 36 Leaf 7,500 lb.—Super 60 lb.—Lime 3,000 lb. per acre.

First crop season—cont.

Treatments—

Field No.—III. Plots—3, 7, 8 and 13.
Size of plot—10' × 20'.
Layout—Split plot design.
Variety—PTB. 9.

Sown—13th July 1951.
Planted—31st August 1951.
Harvested—13th November 1951.

Summary of results.

Particulars.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Acre yield in pounds.	152	143	180	108	108	103	78	105	122	128	54
Percentage control.	100.0	94.1	118.4	71.5	71.5	67.8	51.3	69.1	80.2	84.2	35.5
Particulars.	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
Acre yield in pounds.	108	74	134	103	98	75	68	74	223	264	180
Percentage control.	71.5	48.7	88.1	67.8	88.2	49.3	44.7	48.7	146.7	173.7	118.4
Particulars.	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)
Acre yield in pounds.	173	56	164	84	225	196	196	180	161	386	199
Percentage control.	113.8	36.8	107.9	55.5	148.0	128.8	128.8	118.4	105.9	253.9	125.0
Particulars.	(34)	(35)	(36)	General	Standard error percentage on 'Z' test.						
Acre yield in pounds.	..	..	210	295	225	150.0	111.3	Not satisfied			
Percentage on control	..	..	138.8	194.1	148.0	99.5	73.8	..			

Second crop season.

Treatments—
Sown—5th October 1951.
Planted—1st December 1951.

Harvested—3rd March 1952.
Variety—PTB. 10.

Summary of results.

Particulars.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Acre yield in pounds.	356	636	699	384	531	369	342	426	992	950	922
Percentage control.	100.0	178.4	198.8	107.8	149.0	104.0	98.0	119.6	278.4	268.7	259.0
Particulars.	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
Acre yield in pounds.	818	985	664	1,209	785	964	825	906	1,426	1,411	1,572
Percentage control.	229.4	276.5	88.3	339.2	219.6	270.6	231.4	255.0	400.0	396.0	441.2
Particulars.	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)
Acre yield in pounds.	1,258	1,461	1,586	1,370	1,160	1,342	950	1,726	1,432	1,775	1,705
Percentage control.	353.2	408.0	445.1	384.3	325.5	376.6	270.6	484.3	402.0	498.0	478.4
Particulars.	(34)	(35)	(36)	General mean.	Standard error percentage on 'Z' test.						Critical difference.
Acre yield in pounds	..	..	1,914	1,934	1,998	1,105	14.9	Yes	42		
Percentage on control	..	..	537.3	541.2	560.8	100	4.180	..	11.75		

8. *Cultural experiments*—(a) *Treatments of seedlings with insecticides.*—(i) *Against stem-borer.*—The experiment commenced during the second crop season last year, consisting of treating the seedlings with different insecticides to see if the treatment would prevent incidence of pests and diseases in the transplant field was continued. Seedlings treated with crude oil emulsion and gammaxane 0.05 per cent showed poor survival due to the deleterious effect of the insecticides. The maximum yield of grain is recorded by control plots followed by plots treated

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with Bordeaux mixture. Gammexane 0.05 per cent and 0.025 per cent, fish oil soap and crude oil emulsion. Bordeaux mixture conferred greatest resistance to stem-borer attack, compared to D.D.T. and control. Table XVIII.

TABLE XVIII.—Insecticides trials—First crop—1951-52.

Field No.—B 4 b 2. Plot Size—4' x 30'. Layout—8 x 4 randomized blocks. Variety—PTB. 26.	Date of sowing—7th May 1951. Date of planting—4th July 1951. Date of harvest—4th October 1951.
Treatments— 1 Gammexane 0.05 per cent. 2 Gammexane 0.025 per cent. 3 DDT, 0.25 per cent. 4 DDT, 0.16 per cent.	Treatments—cont. 5 Fish oil soap. 6 Crude oil emulsion. 7 Bordeaux mixture. 8 Control.

Yield data.

Particulars.	Treatments.								General mean.	Standard error.	'Z' test satisfied or not.	Critical difference (P = 0.05).
	1	2	3	4	5	6	7	8				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Acre yield in lb.	2,329	2,579	2,236	2,328	2,504	1,998	2,509	2,728	2,412	115.7	Yes.	2.41
Percentage on control.	85.4	94.6	82.0	85.4	91.9	93.3	95.3	100.0	91.0	4.37	..	9.08
1950-51	..	104.8	105.9	99.2	99.8	92.8	96.3	98.5	100.0	99.7	7.18	Not satisfied.
Conclusion—	8	7	2	5	1	4	3	6				

Treatment.	Percentage of infection.								General mean.	Standard error.	'Z' test satisfied or not.	Critical difference.
	1	2	3	4	5	6	7	8				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Percentage of infection over control.	46.1	66.0	114.9	79.1	64.0	44.9	70.9	100.0	73.2	18.42	Yes.	38.22
1950-51	..	118.1	111.6	92.8	139.1	73.7	64.4	81.1	100.0	97.6	19.81	Not satisfied.
Conclusion—	8	8	4	7	2	5	1	6				

In the second crop season the treatments were slightly modified to include only B.H.C. and D.D.T. in two strengths. Sprayings were given both in the nursery and in the transplant field. It will be seen from the results that B.H.C. 0.1 per cent gave the highest yield with the minimum percentage of infection of stem-borer. Table XIX.

TABLE XIX.—Insecticides trial—Second crop.

Field No.—Block III. Variety—PTB. 21. Date of sowing—5th September 1951.	Date of planting—14th December 1951. Date of harvest—28th January 1952.
Treatment— 1 BHC, 0.1 per cent. 2 Do. 0.05 per cent. 3 DDT, 0.2 per cent. 4 Do. 0.1 per cent. 5 Control.	Sprayings— Nursery crop—(1) 22nd September 1951. (2) 6th October 1951. (3) 10th October 1951. Transplanted crop— (1) 15th November 1951. (2) 30th November 1951.
Nursery area—6 cents per treatment. Seedlings of 6 cents nursery planted in 39 cents.	

Percentage of infection.

Number and date of observations.	1	2	3	4	5	General mean.	Standard error.	'Z' test satisfied or not.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1 5th November 1951.	79.7	60.1	60.3	130.6	100.0	86.14	29.02	Satisfied.	60.47
2 19th November 1951.	20.8	39.6	42.6	39.6	100.0	50.3	11.42	..	23.84
3 10th January 1952.	100.8	140.5	106.6	72.7	100.0	104.1	20.51	..	42.79
4 25th January 1952.	80.9	169.2	129.2	94.2	100.0	114.7	21.68	..	45.19
Total ..	291.2	409.4	338.7	337.1	400.0				
Average ..	72.8	102.35	84.68	84.28	100.0				
Conclusion—	4	5	1	2	3				

Particulars.	1	2	3	4	5	General mean.	Standard error.	'Z' test satisfied or not.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Acre yield in lb. ..	2,136	1,938	1,926	1,895	1,572	1,893	92.8	Yes.	194
Percentage on control.	135.9	123.3	122.5	120.6	100.0	120.5	5.91	..	12.32
Conclusion—	1	2	3	4	5				

(ii) Against 'kodu' (*Pachydropsis oryzae*).—An experiment was designed for the first time in the second crop season to find out whether treating the crop with D.D.T. and B.H.C. in different strengths would prevent infestation of Kodu. No effect was noticed either in the infection or in the yield of grains seen from results in Table XX.

TABLE XX.—Kodu trials.

Field No.—I block. Variety—PTB. 12. Planted—22nd September 1951. Harvested—18th January 1952.	Treatment— I Dusts of DDT, 5 per cent. II BHC, 5 per cent. III BHC, 10 per cent. IV Control.
Size of plots 42 cents per treatment which is divided into 6 sub-plots.	

Percentage of infestation.

Particulars.	I	II	III	IV	General mean.	Standard error per centage.	'Z' test.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
I Set of observation 19th October 1951 over control.	100.0	137.4	124.9	100.0	115.6	34.65	No.
II Set of observation 9th November 1951 over control.	112.5	74.9	87.4	100.0	93.7	23.99	..

Yield data.

Particulars.	I	II	III	IV	General mean.	Standard error per centage.	'Z' test.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Acre yield ..	2,355	2,143	2,281	2,464	2,311	80.9	Yes	191
Percentage on control.	95.6	86.9	92.6	100.0	93.8	3.23	..	6.99
Conclusion—	4	1	3	2				

(b) 'Udu' cultivation.—For the first time a trial on 'udu' cultivation was laid out. A long duration second crop variety was mixed with a medium duration first crop variety in the proportion of 1:3 and nursery raised. From the results it will be seen that no advantage is gained by growing two varieties as 'udu' over two crops following one another. Table XXI.

TABLE XXI.—*Udu trials.*

Field No.—B. 6 b and c.
Plot size of strip—18' x 25'.
Layout—8 x 4 randomized blocks.
Date of sowing—7th May 1951.
Date of planting—2nd July 1951.
Date of harvest—
PTB. 23—19th September 1951.
PTB. 8—5th October 1951.

Summary of results.

First crop.

First crop.												
Particulars.	1	2	3	4	5	6	7	8	General mean.	Standard error.	'Z' test satisfied or not.	Critical difference.
(1).	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Acres yield in lb.	1,431	2,150	1,575	2,113	1,938	2,725	1,594	2,550	1,286	66.1	Yes.	194
Percentage on general mean.	71.22	106.9	78.37	105.1	96.4	135.6	79.3	126.9	100	5.14	,	15.12
Conclusion—	6	8	2	4	5	7	3	1				

Second crop.

Date of showing—27th September 1951.	Date of harvest—24th January 1952 (treatments 1, 3, 5 and 7).
Date of planting—1st November 1951.	28th February 1952 (treatments 2, 4, 6 and 8).

Particulars.	1	2	3	4	5	6
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Acre yield in lb.	2,925	2,338	1,506	2,688	2,925	2,125
Percentage on general mean	120·5	96·8	62·08	110·7	120·5	87·5

Particulars.	7	8	General mean.	Standard error.	* Z' test satisfied or not.	Critical difference
	(8)	(9)	(10)	(11)	(12)	(13)
Acre yield in lb.	2,119	2,788	2,426·7	259·6	Yes.	534
Percentage on general mean	87·3	114·3	100	10·70	Yes.	22·2

Conclusion—1 5 8 4 2 6 7 3.

Combined results of first and second crop season.

Particulars.	1	2	3	4	5	6
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Acce yield in lb.	4,356	4,488	3,081	4,701	4,863	4,850
Percentage on general mean	98.2	101.1	69.4	108.2	109.6	109.3

Particulars.	7	8	General mean.	Standard error.	'Z' test satisfied or not.	Critical difference.
	(8)	(9)	(10)	(11)	(12)	(13)
Acce yield in lb.	3,713	5,338	4423.75	362.7	Yes.	757
Percentage on general mean	83.7	120.3	100.0	8.2	Yes.	17.1

Conclusion—1 2 3 4 5 6 7 8.

9. *Depth of colour of rice foliage.*—The trial for evaluating how far morphological differences like difference the intensity of green colour are associated with quantitative factors affecting yield was continued with two light green cultures and two dark green cultures in the variety *chornali* under manure and no-manure conditions. The results are set out in Table XXII. The associations noted previously namely, that light green cultures had in general better tillering while the dark green cultures had longer ear-heads, was maintained, though the results as

regards productive tillers did not satisfy the 'z' test. Manuring had little influence on the association. It is proposed to continue the experiment with one in each of the dark-green and light-green culture with different ages in the nursery under manured and unmanured conditions.

TABLE XXII.—*Depth of colour of rice foliage.*

Treatments—
 Light green cultures 8769 and 8773 } Under manure and no manure conditions.
 Dark green cultures 8787 and 8792 }
 Field No.—B-1 a.
 Layout—8 × 4 split plot design.
 Manure—Green leaf at 4,000 lb. Groundnut cake at
 400 lb./acre.
 Plot size—5' × 30'.
 Sown—25th May 1951.
 Planted—30th June 1951 (8" × 6" doubles).
 Harvested—12th October 1951.

(i) *Yield per acre.*

Summary of results for main plot treatments.

Particulars.	Manure.	No manure.	General mean.	Standard error.	'Z' test satisfied or not.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Acres yield in lb.	2,623	2,350	2,487	80.03	Satisfied.	163.00
Surface in general mean	105.5	94.5	100	3.22	..	8.57

Summary of results for sub-plot treatments.

Particulars.	8769.	8773.	8789.	8792.	G - ral mean.	Stan- dard error.	"Z" test, satis- fied or not. (P=0.05).	Critical differ- ence. (P 0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Acres yield in lb.	2,654	2,229	2,468	2,596	2,487	61.03	Satisfied.	130.00
Percentage on general mean.	106.7	89.5	99.3	104.4	100	2.49	..	5.23

Summary of results for interaction.

	Manure.				No manure.	
	8769.	8773.	8789.	8792.	8769.	8773.
	(1)	(2)	(3)	(4)	(5)	(6)
Acre yield in lb.	2,802	2,294	2,584	2,810	2,505	2,183
Percentage on general mean	112.7	92.5	103.9	112.9	100.6	87.0
	No manure— <i>com.</i>			General mean.	Standard error.	'Z' test satisfied or not. (P=0.05).
	8789	8792				
	(7)	(8)	(9)	(10)	(11)	
Acre yield in lb.	2,352	2,381	2,487	87.54	Not.	
Percentage on general mean	94.6	95.8	100	3.52	satisfied.	

(ii) *Productive tillers.*

Summary of results for main plots.

	Manure.	No manure.	General mean.	Standard error.	'Z' test satisfied or not.
(1)	(2)	(3)	(4)	(5)	(6)
Percentage on general mean	104.4	95.6	100	9.49	Not satisfied.

Summary of results for sub-plots.

	8769.	8773.	8789.	8792.	General mean.	Standard error.	Z test satisfied or not, (P=0.05.)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Percentage on general mean	109.5	95.4	95.4	98.9	100	6.50.	Not satisfied.

Summary of results for interaction.

	8769.	8773.	8789.	8792.	8769.	8773.	8789.	8792.	General mean.	Standard error.	Z, test satisfied or not (P=0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Percentage on general mean.	113.3	99.3	106.4	99.3	106.4	92.2	85.1	99.3	100	8.92	Not satisfied.

(iii) *Panicle length.*

Summary of results for main plots.

	Manure.	No manure.	General mean.	Standard error.	"Z" test satisfied or not. (P=0.05.)
(1)	(2)	(3)	(4)	(5)	(6)
Percentage on general mean ..	100.4	99.6	100	2.11	Not satisfied.

Summary of results for sub-plots.

	8769.	8773.	8789.	8792.	General mean.	Standard error.	"Z" test satisfied or not. (P=0.05.)	Critical difference
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Percentage on general mean ..	99.1	96.7	98.2	105.9	100	1.84	Satisfied.	3.87

Conclusion—8792, 8769, 8789, 8773.

Summary of results for interaction.

	8769.	8773.	8789.	8792.	8769.	8773.	8789.	8792.	General mean.	Standard error.	"Z" test satisfied or not. (P=0.05.)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Percentage on general mean.	99.1	97.2	98.2	100.8	99.1	96.2	98.2	104.9	100	2.57	Not satisfied.

10. *Dryage and germination studies.*—The study on the fluctuations in weight and germination of rice strains in bulk storage was continued. During the monsoon period, all the second-crop varieties stored during April 1950 showed a steady increase in weight ranging from 0.5 per cent to 1.0 per cent. But from December onwards, an average loss in weight of 2 per cent was noted. Viability was almost constant for six months up to September in all varieties except PTB. 10 which deteriorated from the third month after storage. PTB. 4 and PTB. 21 showed more than 60 per cent germination even after one year of storage. A loss in weight going up to 0.5 per cent was noted in the first-crop varieties stored in December 1951 and the loss continued for 2½ months up to March. From April onwards, all the varieties have commenced gaining in weight.

11. *Trial of dicotex (weed killer on the modan paddy).*—In order to find out the effect of using the weed killer as against hand weeding, a trial was laid out with the above product in different strengths. Spraying the chemical in concentrations of 1 in 50 and 1 in 100 produced some effect. As regards grain yield the results did not satisfy the 'Z' test. Table XXIII (a) and (b).

TABLE XXIII (a).—*Dicotex experiment—Modan, 1951–52.*

Field No.—B1. IX Plot 16.
Plot size—4' x 25'.
Layout—8 x 4 randomised.

Date of sowing—3rd May 1951.
Variety—PTB. 29.
Date of harvest—23rd August 1951.

Treatments—

- 1 Dicotex 1 part in 50 parts of water sprayed one month after sowing paddy.
- 2 Dicotex 1 part in 50 parts of water sprayed twice one month and two months after sowing.
- 3 Dicotex 1 part in 100 parts of water sprayed one month after sowing.
- 4 Dicotex 1 part in 100 parts of water sprayed one month and two months after sowing.
- 5 Dicotex 1 part in 500 parts of water sprayed one month after sowing.
- 6 Dicotex 1 part in 500 parts of water sprayed twice one month and two months after sowing.
- 7 Hand weeding at the time of first spraying.
- 8 As in 7 + hand weeding two months after sowing.

Summary of results.

Particulars.	1.	2.	3.	4.	5.	6.	7.	8.	General mean.	Standard error.	"Z" test satisfied or not. (P=0.05.)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Acro yield in lb.	1,035	906	1,001	919	987	913	1,103	1,076	993	73.18	No.
Percentage on control	93.8	82.1	90.8	83.3	89.5	82.8	100.0	97.5	89.98	6.63	..

12. *Economics of growing the variety Chennellu in the shade and in the open.*—In order to find out the economics of growing chennellu, a shade loving variety of paddy, in the shade under trees and in the open, a bulk trial was undertaken. It was found that it has given higher yield in the shade with a net profit of Rs. 36-2-0 per acre compared to Rs. 8-10-0 in the open. In the open, weeds were more and hence cultivation expense per acre also was a little more than in the shade.

TABLE XXIII (b).—*Chennellu—Shade and non-shade.*

Particulars.	Under shade.	No shade.
(1)	(2)	(3)
Area sown ..	0.24 acre	0.19 acre.
Date of sowing ..	2nd May 1951	2nd May 1951.
Date of flowering ..	21st July 1951	25th July 1951.
Date of harvest ..	24th August 1951	24th August 1951.
Grain yield in lb. per acre ..	609	552.
Straw yield in lb. per acre ..	1330	737.
Expenses per acre ..	Rs. 76-1-0	Rs. 81- 8-0.
Income per acre ..	„ 112-3-0	„ 90- 2-0.
Profit for acre ..	„ 36-2-0	„ 8-10-0.

13. *All-India co-ordinated crop weather scheme.*—This is the fourth year of the scheme. The micro and macro climatic observations were taken regularly and per schedule. The crop weather observations and the estimations of the incidence of pests and diseases were continued as in the previous years. Moisture estimations from the soil samples drawn from 3 inches, 6 inches, 12 inches, 18 inches and 24 inches were conducted. The various crop weather data gathered during the year were tabulated and sent to the Director of Agricultural Meteorology, Poona.

14. *Cost of production of paddy.*—A comparative study of the cost of cultivation per acre and cost of producing 1 cwt. of paddy in the first and second-crop seasons is given in Table XXIV.

TABLE XXIV.—*Abstract cost of cultivation of paddy in wet lands—1951–52.*

Season.	Year.	Acro yield in lb.	Cost of cultivation per acre.	Cost of producing 1 cwt. of paddy.
			RS. A. P.	RS. A. P.
First crop ..	1939-40 ..	2,910	40 0 0	1 8 0
	1944-45 ..	2,989	93 9 0	3 8 0
	1949-50 ..	2,402	140 1 0	6 8 6
	1950-51 ..	2,123	148 0 0	7 12 4
	1951-52 ..	2,153	134 2 5	6 15 8
Second crop ..	1939-40 ..	1,778	32 10 0	2 1 0
	1944-45 ..	2,644	49 6 0	5 7 0
	1949-50 ..	2,683	127 12 0	5 5 3
	1950-51 ..	1,387	113 9 0	9 3 3
	1951-52 ..	2,655	101 11 0	4 4 8
Both crops together	1939-40 ..	4,688	72 10 0	1 11 9
	1944-45 ..	5,633	212 15 0	4 3 8
	1949-50 ..	5,085	267 13 0	5 14 0
	1950-51 ..	3,510	261 9 0	8 5 5
	1951-52 ..	4,808	235 13 5	5 8 0

1939-40 = Pre-war.

15. *Cotton in rice fallows.*—With the collaboration of the Cotton Specialist, investigations were undertaken to find out how far the growing of cotton in single-crop lands under irrigated condition will succeed in rice fallows after the harvest of single-crop paddy. Three experiments were laid out.

(a) *Time of sowing-cum-manurial experiment*.—Variety P. 216 F was sown in 'E' block after the harvest of paddy in stubbles. The sowing was done on two dates with an interval of a fortnight, each treatment having a manure and no manure plot. 40 lb. of nitrogen was applied as ammonium sulphate in two doses. Though the experiment was mainly for the purpose of an early crop, no produce could be collected within 4½ months from the date of sowing. Even the yield obtained after that gave only 19 lb. kapas per acre from the manured plots of the second sowing.

(b) *Varietal trials*.—Seven selected varieties were grown in non-replicated plots giving an area of 2 cents each and another set of 70 once-tested early maturing types (Aduthurai) suited to rice fallows, were grown. In all these cases, the produce was obtained only after 4½ months from date of sowing. The yields were very poor. Madras Uganda gave the maximum yield of 48 lb. per acre whereas P. 216[F gave only 17 lb. per acre. Three of the selections gave the highest recording 125 lb. per acre. The trials were not very encouraging. This may be due to the poor fertility of the soil and even timely irrigations did not give a good growth and stand to the crop.

16. *Crops other than paddy*—(1) *Ginger scheme*.—The scheme of research on ginger commenced under the aegis of the Indian Council of Agricultural Research was continued. Besides cultural and manurial experiments, studies on varietal and mycological aspects, curing and preservation of ginger were undertaken on which separate reports were submitted.

(2) *Green-manure crops*—(a) *Daincha*.—This was sown to an extent of 2.18 acres in double-crop lands after the harvest of second crop paddy during February and March. It was sown at the rate of 20 lb. per acre. The yield of green matter pulled out in June worked out to 5,000 lb. per acre. An area of 18 cents was sown to this in *Modan* area in May 1952 for collection of seed. Germination is quite satisfactory.

(b) *Crotalaria striata*.—Plants numbering 2,550 were planted at 3 feet apart along the *palliyal* field bunds during the last week of July 1951 for collection of seeds. One thousand five hundred plants that established gave a total quantity of 22 lb. 12 oz. seeds. From among the plants planted in September 1950, 438 were ratooned and 432 were left as perennial during June 1951. The idea was to find out if there would be greater production of seeds. A quantity of 32½ lb. of seeds were gathered from the ratoons and 11½ lb. of seeds from non-ratooned plants in six pickings commencing from August 1951 and ending February 1952. The plants thereafter perished in the heat of the summer.

(c) *Sesbania speciosa*.—During July 1951, 13,813 seedlings were planted at one foot apart along the wet land field bunds and they were pulled out and applied to the respective plots during September–October at the time of preparing the plots for second-crop planting. On an average, one pound of green matter per plant was recorded within a period of three months and the output per acre on this basis worked out to 2,000 lb. Fresh planting was taken up during October 1951 at the time of second crop planting, with 33,720 seedlings for multiplication of seed. These gave 247 lb. of seed and latter in June green matter which worked out to 2½ lb. per plant and 3,800 lb. from field buds covering an acre. A trial was also undertaken to study the influence, on the yield of green matter, of different ages of seedlings planted on the same date and of seedlings of the same age planted on different dates. Seedlings aged 63 days, 48 days and 33 days were planted on the same date in the first week of March in third-crop paddy fields and periodical planting of seedlings aged 41 days was done in four batches at 15 days interval from the time of planting of *Punja* crop (third crop). Seedlings of 63 days planted at the time of planting the paddy crop had the best growth. The trial will be repeated in the ensuing season. It may be mentioned that, during the summer months in 1952 when the pre-monsoon showers completely failed, the *sesbania* plants withstood the droughty conditions remarkably well and put forth fresh growth with the rains received late in May and gave green matter to the

extent of 3,800 lb. from bunds covering an acre of field as indicated above. In the broadcast fields the seeds were dibbled along the field bunds inside at the time of sowing paddy. The germination is good and the plants have grown to a height of 10 inches by the end of June.

(d) *Glyricidia maculata*.—With a view to raise more plants of this useful green manure plant, seedlings of three months' growth and cuttings of 1½ months' growth were planted along road sides and field bunds. Periodical observations taken on 40 plants at random in the two categories of plants show that the seedlings when established were poor and weak in growth while the rooted cuttings put forth busy growth, the number of functioning leaflets being three to four times more than in the seedlings. The advantage of planting the rooted cuttings is however partly lost by low percentage in the sprouting capacity in the nursery. A trial was therefore initiated to discover some treatments that would hasten sprouting in the cuttings. The treatments and results are given in the tabular form below. It will be seen from the results that dipping the cuttings in medium strength of Hortomone (20 c.c. in one gallon) overnight, not only increased the percentage of sprouting but induced early sprouting also. Table XXV.

TABLE XXV.

Treatment.	Total percentage of germination.	Remarks.	
(1)	(2)	(3)	(4)
	PER CENT.		
1 Control (cuttings planted as it is) ..	66	Sprouting commenced on the 16th day.	Completed on the 56th day after planting.
2 Cutting covered with cow dung clay mixture over the top portion.	83	Sprouting commenced on the 19th day.	Completed on the 34th day after planting.
3 Cuttings dispersed in hot water of 35°–40°, e.g., for 1½ hours.	75	Sprouting commenced on the 20th day.	Completed on the 39th day after planting.
4 Hortomone 4 c.c. in 1 gallon ..	58	Sprouting commenced on the 13th day.	Completed on the 49th day after planting.
5 Hortomone 20 c.c. in 1 gallon ..	100	Do.	Completed on the 21st day after planting.
6 Hortomone 48 c.c. in 1 gallon ..	100	Do.	Completed on the 28th day after planting.

Planting of *glyricidia* seedlings along the approach roads and field bunds was taken up and so far 500 plants have established. More are kept ready for planting in the current season during the monsoon.

(e) *Indigofera teysmanii*.—Sixty-five seeds of the above plant were received from Lecturing and Systematic Botanist and sown in pots on 29th November 1951. Sixteen seedlings sprouted and were transplanted on 16th March 1952. During the three months of growth the plants had attained an average height of 121.2 c.m. The branching is also profuse. Second batch of sowing was done and out of 140 seeds, 40 seedlings grew up and are making satisfactory growth.

(f) *Wild indigo*.—An area of 5.20 acres in the single-crop lands and 50 cents in the *modan* area was sown to this crop in November 1951. The yield of green matter from the *modan* area worked out to 4,000 lb. per acre. In single crop lands the yield worked out to 2,000 lb. per acre. Mixed with horsegram in the single crop lands it gave only 1,000 lb. of green matter per acre as the drought affected the crop in the early stage. Wild indigo sown in the double crop area covering 3.48 acres after the harvest of second crop paddy gave 3,000 lb. of green matter per acre after 3½ months' growth. As poor germination of the seeds is a limiting factor in successful growing of this crop, studies were undertaken to see if periodical sowing in the standing second crop would ensure good stand, both dressed (pounding with sand) and undressed seeds were used. Sown four days before the harvest of the second crop, i.e., on 13th January 1952, it came up

very well and gave green matter at 4,500 lb. with dressed seeds and 4,450 lb. with undressed seeds Table XXVI.

TABLE XXVI.

Date of sowing.	Acre yield from plots sown with dressed seeds.		Acre yield from plots sown with undressed seeds.	
(1)	(2)	(3)	(4)	(5)
	LB.	LB.		
At the time of II crop paddy planting—				
27th October 1951.		6	95	
13th November 1951		218½	62½	
30th November 1951		92	42	
14th December 1951		152	200	
29th December 1951		139	475	
13th January 1952		4,500	4,450	

four days before harvest.

(g) *Green manure mixtures*.—Mixtures of green manures were raised so as to ensure uniform stand since for example wild indigo fails under over moist conditions while dhaincha does not withstand drought unlike wild indigo. Wild indigo with crotalaria and dhaincha was sown to an extent of 58·4 cents in low level lands in February 1952 after the harvest of second crop paddy. The total green matter obtained worked out to 3,339 lb. per acre. A mixture of dhaincha and crotalaria striata sown to an extent of 2·6 acres gave 4,573 lb. green matter per acre. The mixture of crotalaria, dhaincha and sesbania sown in an area of 40·79 cents gave the maximum yield of 6,534 lb. green matter per acre.

A total quantity of 178,224 lb. of green leaves from trees and shrubs was out and applied to fields.

(3) *Ragi*.—Eight cultures of ragi, namely, AKP. 1, AKP. 2, Co. 2, Co. 3, R. 382, Local and K. 1 were transplanted for comparative yield trial in the third crop season in double crop paddy lands. The plots were given a basal dressing of farmyard manure at 5 cart-loads per acre and a top dressing of ammonium sulphate at 60 lb. per acre. AKP. 1 was the earliest to flower followed by R. 382 and R. 952, K. 1 was late by one month and had therefore to be discarded. As will be seen from the table the maximum yield is recorded by AKP. 2 followed by R. 382, confirming the results obtained in the previous year. The crop gave poor yield in general. Table XXVII.

TABLE XXVII.—*Ragi*.

Field No.—B. 2c.
Plot size—10' × 15'.
Layout—7 × 4 randomized blocks.

Date of sowing—21st February 1952.
Date of planting—16th March 1952.
Date of harvest—4th June and 18th June 1952.

Summary of results.

Particulars.	AKP. 1.	AKP. 2.	Co. 2.	Co. 3.	R. 382.	R. 952.	Local.	General mean.	Standard error.	'Z' test satisfied or not.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Acre yield in lb. ..	54	290	204	222	268	113	32	169	37·2	Yes.	78
Percentage on (Local) control.	168·8	906·3	637·5	693·9	837·5	353·1	100·0	528·2	116·47	Yes.	244·6
1950-51 ..	56·9	107·6	80·4	94·6	101·9	82·6	100·0	78·0	13·96	Not satisfied.	..

Conclusion—AKP. 2 R. 382 Co. 3 Co. 2 R. 952 AKP. 1 Local

(4) *Gingelly*.—Following paddy, gingelly was sown in modan lands covering an area of 9·07 acres of which 6·05 acres were covered by TMV. 1 and the rest by local gingelly. The average yield of TMV. 1 was too poor being only 67 lb. per acre while that of local was 194 lb. with a maximum of 259 lb. per acre. The crop was manured with cattle manure at 10 cart-loads per acre.

Sowing trial with three varieties, TMV. 1, TMV. 2 and local was conducted as in the previous year. The sowing was done in three batches on 25th August 1951, 10th September 1951 and 19th September 1951. The local variety recorded the best yield in all batches. As local gingelly was the best under the local conditions, it was proposed to isolate single plants. Single plants numbering 152 were isolated. These will be studied in the ensuing season.

(5) *Groundnut*.—The growth of TMV. 1 groundnut sown in May 1951 over an area of 87·1 cents was satisfactory and the yield worked out to 850 lb. pods per acre. In June 1952 the same strain was sown to the extent of 1·20 acres in the modan lands. The plots were manured with cattle manure at 10 cart-loads per acre for the preceding crop of gingelly. The stand is satisfactory.

TMV. 2 groundnut was sown in October 1951 in single-crop paddy lands under dry and irrigated conditions in an area of 3 cents and 5·2 cents, respectively. Though the germination was fair, the crop under the dry conditions was a complete failure. The crop under irrigated conditions also did not fair well and the yield was only 76 lb. pods per acre.

(6) *Coconut*.—Ten hybrid seedlings of Andaman × Straits Settlements were got from Nileskwar and planted during October 1951. Four seedlings of Jaffna variety were also obtained from the same source and planted in November 1951. All the seedlings have established.

(7) *Blackgram*.—During the year, eight varieties of blackgram were put under comparative yield trial in the single crop lands and in the double-crop lands. The trials in single-crop lands failed completely due to drought. In the double-crop lands Pattambi and Malabar varieties were the earliest to flower. The Pattambi variety recorded the best yield as in the previous year. Local variety sown as bulk gave an acre yield of 220 lb. while the Trichy variety grown under similar conditions had luxuriant growth but did not set pods. This was turned into green manure the yield of which worked out to 16,335 lb. per acre, the total area being 2·32 acres. Table XXVIII.

TABLE XXVIII.—*Blackgram*—Comparative yield trial.

Field No.—B. 3b.
Plot size—4' × 30'.
Layout—8 × 4 randomized blocks.
Sown—20th February 1952.
Harvested—26th May 1952.

Treatments—
1 Laigudi.
2 Kumbakonam.
3 Tiruchirappalli.
4 Mangalore.
5 Nannilam.
6 Malabar.
7 Pattambi.
8 Chidambaram.

Particulars.	1	2	3	4	5	6	7	8	General mean.	Standard error.	'Z' test satisfied or not.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Acre yield in lb.	204	182	204	204	125	283	500	113	227	32·24	..	67
Percentage on control (Tr. 7 Variety Pattambi).	40·8	36·4	40·8	40·8	25·0	56·6	100·0	22·6	51·9	7·37	Yes.	15·33
1950-51 ..	83·7	73·5	71·4	63·8	70·2	81·3	100·0	94·9	81·8	7·85	Not satisfied.	..

Conclusion—7 6 1 3 4 2 5 8

(8) *Horsegram*.—The crop grown pure to the extent of 5·6 acres in the single-crop lands had poor germination due to droughty conditions prevailing and pod setting also was completely affected. The crop was however ploughed in as green manure, the yield working out to 2,500 lb.

(9) *Perennial greengram*.—Two ounces of seeds of this variety received from the Pulses Specialist were sown in the month of July. The germination was good. The plants started flowering by the end of October and pod setting was also good. A total quantity of 1½ ounce of seed was collected. The plants did not have perennial habit.

(10) *Black-eye soyabean*.—A few seeds received from the Headquarters Deputy Director of Agriculture were sown during summer. About 60 per cent of the seeds germinated. Ten plants flowered which gave 18 pods from which ¼ ounce of seed was obtained.

(11) *Sugarcane*.—Variety Co. 419 grown in an area of 9.2 cents gave 1,148 lb. cane for chewing purpose and 1,500 cuttings. The crop was ratooned in the second week of February 1952. The stand is good. Variety *Poovan* was got during the year and planted in 1 cent for multiplication of planting material.

(12) *Banana*.—The banana planted in the previous year had mild attack of a disease which was not identified and 60 of the plants had to be removed and burnt. From the remaining plants covering an area of 65 cents, 385 bunches weighing 3,915 lb. were harvested and sold besides suckers numbering 63 in different varieties. During the year, fresh planting was done in an area of 8.2 cents comprising 25 varieties. Each pit was manured with farmyard manure at 15 lb. and wood ash at 5 lb. in addition to green leaf at 10 lb.

Banana (Nendran) trial—(i) *Manurial*.—Two sets of manurial experiments in Nendran were laid out as follows:—

(a) *Lime experiment*—*Object*.—To find out the best combination of groundnut cake (0 lb., 1 lb., 1½ lb. and 2 lb. per plant) and ammonium sulphate (4 oz., 5 oz., and 8 oz. per plant) with and without lime (¼ lb. per plant) for Nendran. The planting was done on 24th April 1952.

A basal dressing of leaf at 10 lb. per plant was given for all the plants. The first dose of manure was given on 25th June 1952. The second dose is to be applied after 4 months from planting.

(b) *Nitrogen, phosphoric acid and potash experiment*—*Object*.—To find out the best combination of nitrogen (½ lb. per plant), phosphoric acid (½ lb. per plant) and potash (½ lb. per plant) as manure for plantain to yield best results.

The planting was done on 30th April 1952. Green leaf, super and potassium sulphate were applied on the day of planting.

(ii) *Cultural experiment*—*Object*.—To verify and scientifically explain the rationale of the local practice of crushing, etc., of the Nendran suckers before planting.

Eight treatments have been given. These include crushing the shoot before and after planting, cutting the shoot before planting and drying the shoot before planting besides combinations of all the three treatments. The crop was planted on 26th April 1952.

(13) *Pineapple*.—From an area of 29 cents under this crop planted during 1949, 186 fruits weighing 406½ lb. were obtained.

(14) *Tapioca*.—Comparative yield trial laid out with eight varieties during August 1950 was harvested in August 1951. Variety *Valenca* gave the maximum yield of 12,932 lb. per acre followed by *Manjakuttan*. Table XXIX.

TABLE XXIX.—Comparative yield trials of tapioca varieties.

Field No.—F. 6 c.
Plot size—12' × 9'.
Layout—8 × 4 randomized blocks.
Planted—19th August 1950.
Harvested—1st August 1951.

Variety—
1 Onthenkadan.
2 Valenca.
3 Neelam.
4 Manjakuttan.
5 Rettiappa.
6 Nendran.
7 Vellarotti.
8 Elamuriyan.

Particulars.	1	2	3	4	5	6	7	8	General mean.	Standard error.	'Z' test satisfied or not.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Acres yield in lb.	10,411	12,932	11,193	12,176	4,538	7,940	4,310	8,470	8,996	4,309	No.
Percentage on general mean.	115.1	144.1	124.0	136.3	50.3	88.3	48.1	93.8	100.0	47.9	

During August 1951, a comparative yield trial was laid out with 18 varieties. The crop is on the ground.

Boron trial.—The experiment was conducted with Boron at the rate of 0, 20, 30 and 40 lb. per acre. The results did not satisfy the 'Z' test. Table XXX.

TABLE XXX.—Tapioca boron trial.

Field No.—F. 6 b. e. Layout—4 × 6 randomized blocks. Size of plot—15' × 12'. Planted—21st August 1950. Harvested—1st August 1951.		Borax at				General mean.	Standard error per cent.	'Z' test.
Particulars.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Acres yield	9,217	7,098	5,042	4,880	6,584	6,584	2.054	No.
Percentage of control	100.0	77.1	54.7	52.9	71.2	71.2	22.29	
Percentage of Control 1950-51.	100.0	104.7	106.6	102.0	103.3	103.3	133.8	Not satisfied.

From the bulk crop covering an area of 2.57 acres, an average yield of 2,000 lb. with a maximum of 6,000 lb. per acre was obtained. During the year *Valenca* was planted over an area of 1.98 acres, *Butter stick* in 35 cents and *Malavella* a short duration variety in seven cents. Growth of the crop is satisfactory.

A trial was also taken up in order to find out which portion of the stem is best for planting purpose. The cuttings were taken from the basal, middle and top portions and planted out in replicated trial. Plots planted with basal materials had better sprouting and quicker growth. The crop is on the ground.

(15) *Sweet potato*—*June-September season*.—The varieties V. 2, V. 6, V. 10, V. 12, I.B. 22, B. 196, B. 210, B. 4304 and B. 4004 were received and they were planted for multiplication of planting materials. During November-February season, regular yield trials were laid out. The stand was not uniform.

The following acre yields were recorded from an area of 1½ cents under each variety:—

	LB.		LB.
B. 4304	397	V. 10	417
B. 4004	1,097	V. 12	1,763
B. 219	1,130	B. 196	1,427
V. 2	1,292	I.B. 22	962
V. 6	1,433	Local	1,191

Regular yield trials will be laid out in the coming season.

(16) *Vegetables and root crops*—*Summer vegetables*.—*Vellarimathan*, water melon, bottle gourd, *Kummati*, ribbed gourd, snake gourd, bitter gourd, ash gourd, pumpkin, thorny cucumber, cucumber, medicinal ash gourd, lady's finger, summer colocasia, chillies and brinjal were grown to the extent of 91.83 cents from December to May.

Vellarimathan.—Single vine cultures of *Vellarimathan* were sown under comparative yield trial this year also but had to be rejected as the progenies were segregating for fruit characters. Two promising types in each of the long

and round types were selected for multiplication in the coming season. *Vellari-mathan* sown as bulk gave 3,912 lb. fruits per acre; 10 lb. 7 oz. of seeds were extracted.

Summer colocasia.—This was planted in an area of 3.5 cents. The crop yielded 11,800 lb. corms per acre as against 25,448 lb. last year.

Bottle gourd.—This was grown in an area of 2 cents. It gave an acre yield of 3,950 lb. fruits. Seeds weighing 8 lb. 9 oz. were extracted.

Snake gourd.—Three varieties of snake gourd, namely, giant long, white and green long were grown in an area of 5.5 cents. Giant long was the earliest to flower and fruits measuring 6 feet 3 inches were obtained and the acre yield worked out to 5,740 lb. Two pounds and 12 ounces of seeds were also extracted.

Ash gourd.—This was grown in an area of 8.48 cents and yielded 1,821 lb. of fruit, the acre yield being 20,941 lb.

Medicinal ash gourd.—The F. 3 progenies of a crosses between the medicinal ash gourd and the ordinary ash gourd grown in an area of 2 cents yielded 317 lb., the acre yield working out to 15,850 lb. as against 14,800 lb. last year.

Monsoon vegetables, 1951.—From the new era cowpea sown in an area of 93 cents, 240 lb. of seeds were collected. The acre yield worked out to 258 lb.

Monsoon vegetables, 1952.—Cowpea 419 was sown in an area of 4 cents and new era cowpea to the extent of 156.2 cents. The plots received wild indigo at 2,000 lb. per acre ploughed in situ. Lady's finger was dibbled to the extent of 17.99 cents. Chillies (402) and brinjal seedlings were transplanted in an area of 4 cents and 8.42 cents, respectively. Besides six selections of lab-lab, D.L. 692, 279, 259, 389, 268, 453 and two in Lima bean (red specked and giant poded) were sown in pits.

Yam.—The two-year old crop of yam covering 70 cents was harvested. The acre yield worked out to 7,000 lb. Fresh planting was done in an area of 98.6 cents. During the year, the second batch of seed weight experiment with four treatments, namely, $\frac{1}{2}$ lb., 1 lb., $1\frac{1}{2}$ lb. and 2 lb. was laid out. The crop is on the ground.

Colocasia.—The four varieties of colocasia, namely, *Palchempu*, *Thallamelotti*, *Malaraman*, and summer colocasia planted during the year were attacked by *Phytophthora Colocasiae* in the month of August. Summer colocasia was harvested in December and it gave only 880 lb. of corms per acre. The rest of the varieties were harvested in March. *Palchempu* gave an acre yield of 3,330 lb. followed by *Malaraman* with 2,460 lb. Fresh planting was done in an area of 85 cents with the above four varieties.

(17) *Pepper*.—Only 98 out of 110 old vines bore fruits this year. From these, 244 lb. green pepper were gathered which gave 81 lb. of dry pepper. Fresh vines numbering 102 were planted during the year bringing the total number to 600.

(18) *Vetiver*.—A manurial experiment to find out the influence of cattle manure at 10 tons, wood ash at 1,000 lb. and bone meal at 2 cwt. on the production of roots and oil content was laid out in the modan lands covering an area of 86.4 cents. Three sets were planted to be harvested after 12, 15 and 18 months after planting. The crop is having a good stand on the first week of August 1952.

(19) *Kapok*.—Seventy out of 135 trees alone bore pods this year and 11,199 pods weighing 846 lb. were harvested out of which 170 lb. of clean floss and 228 lb. seeds were obtained. Fresh planting will be taken up in the current season. The special variety of kapok seedlings (*Ceiba pentandra*) numbering 15 planted during August 1951 are coming up well. These were manured with cattle manure at 80 lb. per pit in May 1952.

(20) *Water chestnut*.—Out of 20 vines established last year, eight vines have survived and are growing very well. They have not yet flowered.

(21) *Orchard—Jacks—Singapore*.—Out of 20 trees planted in 1948 only 2 flowered and 4 fruits were obtained with a total weight of 47 lb. Seedlings numbering 83 were raised and 70 seedlings were sold. Fresh nursery has been sown with 200 seeds. Twenty seedlings planted on the station in November 1951 are coming up well.

Two seedlings in Pattukkottai variety, three in Panrutti and two in Rudrakshi are making satisfactory growth. Seeds numbering 3,000 in the local variety were sown, out of which 110 seedlings were already distributed.

From the 29 existing plants of Malta lemon, 2,331 fruits weighing 405 lb. were harvested and cuttings numbering 256 were rooted. From the three plants of Nepali Round 204 fruits weighing 50 lb. and from two plants of Nepali Oblong 113 fruits weighing 50 lb. were harvested. Out of 11 plants in acid lime planted in December 1947, six were in bearing and gave 236 fruits weighing 24 lb. One hundred seed were sown for supply of seedlings. From eight plants of Seville lime, 144 fruits weighing 43 lb. were obtained. Two out of 15 budded plants of Sathgudi planted in December 1947 flowered during the year giving 36 fruits weighing 13 lb. The fruits were of medium size and the quantity was quite good. One plant in Citron Hawaii gave 12 fruits weighing 99 lb. but the fruits are not popular in the locality.

One seedling of breadfruit planted during October 1948 gave 19 fruits weighing 18 lb. Two seedlings were received from Kallar and planted in July 1951. One plant had established and is making satisfactory growth.

Three plants of Rambutan, three of Avocado and one in nut meg are making satisfactory growth.

(22) *Balsa wood*.—Two plants planted in September 1948 are on the ground. The growth at this stage is not very promising. Forty seedlings were planted in November 1951. The severe heat of the summer affected the plants and in spite of pot watering, only 12 survived. These plants are having fresh growth with the receipt of the monsoon rains.

(23) *Miscellaneous crops*.—Fifty suckers of rattan received from Banana Research Officer, Aduthurai, were planted in March 1952. They have not sprouted. One pound of seeds in buckwheat received from Nanjanad were sown in 2 cents in modan lands on 30th May 1952. The germination and the present stand are quite good. Forty seeds in *Calamus sapionum* received from Lecturing and Systematic Botanist were sown on 6th June 1952. Two hundred Kudzu vines received from Paddy Breeding Station, Mangalore, were planted on 15th December 1952. They established and survived the severe summer. Twelve crowns of the same received from Division of Agronomy, Delhi, were planted on 10th March 1952. They are making satisfactory growth and will be multiplied in the current season. *Species of Calopogonium*, *Centrosema* and *Pueraria* were sown in an area of 6 cents, 3 cents and 3 cents, respectively, in the last week of May 1952. All except *Pueraria* germinated well.

(24) *Fodder grasses*.—Thin Napier planted in the paddock area in June 1951 did not come up well and the stray plants did not survive the severe drought conditions. Fresh planting of the same was taken up in June 1952 covering an area of 1.29 acres. Guinea grass slips were also planted in the paddock area to the extent of 1.65 acres. *Cenchrus ciliaris* and *Cenchrus setigerus* sown in the paddock area in June 1951 completely failed. They did not germinate under laboratory conditions also. The crop of Pigeon pea sown dibbled and broadcast in May 1951 covering 3 cents each gave three cuttings at three months intervals. The first pruning secured the maximum yield of 9,768 lb. from dibbled crop and 12,342 lb. from the broadcast crop per acre. A quantity of 5,920 lb. and 9,075 lb. for the second pruning and 363 lb. and 759 lb. for the third pruning were recorded from dibbled and broadcast area, respectively. The stubbles left in the field have put forth fresh sprouts with the receipt of the rains in May 1952. During the year 196,350 lb. of green grass, 830 lb. of thin Napier, 400 lb. of cumbu hybrid grass, 17,420 lb. of Guinea grass, 1,646 lb. of Napier grass and 1,643 lb. of water grass were cut and fed to cattle.

16-A. *Silage*.—During the year 26,375 lb. of green grass were ensiled and 13,460 lb. good quality silage was obtained.

17. *Livestock*.—The Scindhi breeding bull No. 429 did not perform any service. Buffalo breeding bull No. 77 performed 47 services and No. 120, 23 services. The three milch buffaloes, Nos. 39, 78 and 112 together gave 4,900½ lb. of milk with a daily average of 4.5 lb.

18. *Exhibition*.—Three agricultural exhibitions were conducted on 30th September 1951, 29th January 1952 and 30th June 1952.

19. *Vanamahotsava*.—The following seedlings were distributed during the tree-planting week in July 1951: Coconut seedlings 50 numbers, Bodantum seedlings 100 numbers and Malta lemon rooted cuttings 104 numbers. Thirty-seven jack seedlings were planted on the farm.

20. *Seed distribution*.—The following seed produce was distributed from the station:—

Statement of seed distribution, 1951-52.

	LB.	OZ.		NOS.
Paddy	143,140	..	Plantain suckers	76
Vegetable seeds ..	36	4½	Singapore jack seedlings ..	86
Gingelly, local ..	40	..	Local jack	770
Gingelly, TMV. 1 ..	10	4	Lemon cuttings	1,082
Groundnut, TMV 1 ..	534	..	Moringa seedlings	9
Kapok seed	25	4	Kew pineapple suckers ..	24
Sesbania seed	0	10	Papaya seedlings	64
Thin Napier grass seeds	4	..	Tapioca cuttings	33,165
			Napier grass slips	5,000
			Guinea grass slips	9,000
			Water grass slips	2,000
			Kapok seedlings	20

21. Efforts to increase the revenue are given in Appendix I and Appendix II relates to the financial statement.

AGRICULTURAL RESEARCH STATION, PATTAMBI,
13th September 1952.

P. UTTAMAN,
Assistant Paddy Specialist.

AGRICULTURAL COLLEGE AND
RESEARCH INSTITUTE,
LAWLEY ROAD P.O., COIMBATORE,
15th September 1952.

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

APPENDIX I.

EFFORTS TO INCREASE THE INCOME OF THE FARM.

As will be seen from the financial statement in Appendix IV, the receipts of the station more than meet the working expenses.

The well in block VIII was renovated during the year and it is proposed to provide a bore to this in order to ensure adequate supply of water even in seasons when the north-east monsoon rains completely fail. This well will be utilized for converting about 5 acres of *Modan* lands into single crop lands and raising irrigated crops of tapioca, blackgram, etc.

In the *Modan* lands, an area of 95.6 cents is grown to ginger in place of the less remunerative paddy crop. In addition to the 110 vines of pepper in bearing, further planting was done and 600 vines were planted by the end of June 1952. The number will be raised to 1,000 in the course of the coming year. Seedlings of Kapok were raised and they await planting. Production of rooted cuttings and planting materials of lemons, jacks and other fruit plants were stepped up.

It is expected that these efforts will result in an increase of income by Rs. 10,000 in the course of the next five years.

APPENDIX II.

FINANCIAL STATEMENT.

Agricultural Research Station, Pattambi.

40. C. Agriculture—Experimental Farms—(a) Agricultural Research Station—Voted.

Expenditure.

Head of accounts—	RS.	A.	P.
Pay of officers	2,927	12	0
Pay of establishment	13,892	3	0
Cost of living allowance	5,243	2	0
Travelling allowance	1,557	5	6
Petty construction and repairs	4,208	15	3
Working expenses	44,544	10	9
Purchase of deadstock	2,779	0	0
Other contingencies including service postage	332	7	6
Purchase of livestock	1,875	0	0
Dearness allowance to menials	8,604	2	0
Cost of land	7,630	0	0
Total ..	93,594	9	6

Expenditure on schemes—

1. Ginger scheme—

40. g. Agriculture—Agricultural Experiments and Research—(ii) Excluding Post-war Reconstruction—Scheme for Research on Ginger.

	RS.	A.	P.
Pay of establishment	1,730	0	0
Cost of living allowance	551	3	0
Travelling allowance	103	2	0
Wages to skilled coolie and other charges	3,286	15	6
Cost of living allowance to menials	231	8	0
Total ..	5,902	12	6

40. g. Agriculture—Agricultural Experiments and Research—(ii) Post-war Reconstruction—Meteorology Section.

2. Crop weather scheme (Meteorology)—

	RS.	A.	P.
Pay of establishment	1,862	13	0
Cost of living allowance	552	13	0
Other charges	61	3	9
Travelling allowance	20	12	0
Total ..	2,497	9	9

40. d. Agriculture, etc.—(i) Ordinary areas excluding Post-war Reconstruction (training of fieldmen and maistris).

3. Agricultural demonstration and propaganda—

	RS.	A.	P.
Pay of establishment	620	15	0
Dearness allowance	149	1	0
Travelling allowance	7	7	0
Stipend	4,883	2	0
Total ..	5,660	9	0

49, d, Agriculture, etc.—(i) Ordinary excluding Post-war Reconstruction (training of fieldman and maistries)—cont.

4. Khus oil scheme—

40, d, Agricultural experiments and Research—(ii) Post-war Reconstruction Scheme for extraction of Khus Oil.

	RS.	A.	P.
Contingencies	449	9	0
Receipts.			
Head of account—	RS.	A.	P.
XXIX Agriculture—Research stations	7,374	13	6
Do. Miscellaneous receipts	737	14	6
Value of Paddy seeds transferred to Circle Offices	42,940	13	0
Value of vegetable seeds	725	11	0
Total	51,779	4	0

ANNUAL REPORT OF THE AGRICULTURAL RESEARCH STATION,
PATTUKKOTTAI, FOR 1951-52 (FASLI 1361).

Season and rainfall—(i) South-west monsoon.—The total rainfall for the year was 26.59 inches on 61 rainy days against 33.75 inches on 48 rainy days during the last fasli. The ten-year average rainfall for the place is 38.60 inches on 66 rainy days. The rainfall during the year was considerably less than that of last year and also that of the ten-year average rainfall. The monsoon broke out in the second week of July. The rains received during the period was 8.85 inches spread over 17 days as against 11.37 inches on 19 days during the corresponding period of south-west monsoon last year. The normal rainfall for the period is 12.05 inches spread over 21 days. The rainfall during the period though insufficient helped to start cultivation in dry lands and sowing of dry crops like groundnut, greengram and redgram was done in the second week of July itself. But cumbu and gingelly alone could be raised in the second week of August. In wet lands, samba planting of paddy was done in the last week of August in all high-level plots.

(ii) North-east monsoon.—The monsoon started in the last week of September. But the total quantity of rain received during the season was less than in last year and also the average of the past 10 years. The total precipitation received during the period was 14.01 inches on 36 days while during the corresponding period of the previous year it was 18.47 inches for 24 days. The average for the past ten years is 20.38 inches on 34.6 days. The insufficient rainfall during the month of October affected the crops both in the wet and dry lands. In dry lands, the yield of groundnut crop T.M.V. 1 was very much affected due to the rainless conditions at the time of peg formation. In wet lands, the Samba paddy crop was attacked by mealy bug and hence the yield was much affected. With the help of the rains received during the last week of November, sunnhemp was sown in dry lands as a second crop after the harvest of the main crops groundnut, greengram and cumbu.

(iii) Hot-weather period.—The rains during the season were received in the third and fourth week of February. A total rainfall of 3.7 inches on 8 days has been received during the period as against 3.9 inches on 5 days during the corresponding period of last year. Though the rain received during this year was much more than that of last year, it was still lower than the normal rainfall which is 6.17 inches on 10.4 rainy days. The rains received during the month of February were useful to the sowing of groundnut crop in rice fallows. But the complete drought condition that prevailed during March affected the crop to a great extent. There was severe attack of surul pocchi (*stomoptera nerteria*) in all the groundnut plots and the yield became unexpectedly poor. The water both in the permanent as well as in the temporary wells went very low in spite of frequent deepening of the same and they fail to supply enough water for the crops like groundnut, cotton and other garden land crops. The green-manure crops like daincha, sunnhemp and sesbania raised in rice fallows after the harvest of the groundnut crop could not at all be irrigated and hence they became much stunted in growth. They could not supply enough green leaves for the Kuruvai crop of 1952-53.

The rainfall data is furnished in Table I.

TABLE I.—Statement showing the rainfall data for 1951-52 at the Agricultural Research Station, Pattukkottai.

Month.	Week.	1951-52.		1950-51.		Average normal rainfall (ten years).	
		Rainfall in inches.	Number of days.	Rainfall in inches.	Number of days.	Rainfall in inches.	Number of days.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
South-west monsoon.							
June	7-13	0.08	..	0.22	1	0.27	1.2
	14-20	0.03	..	0.26	1	0.09	1.0
	21-27	..	..	0.44	1	0.10	0.6
	28-30	0.63	2	..	..	0.18	0.3

Month.	Week.	1951-52.		1950-51.		Average normal rainfall (ten years)	
		Rainfall in inches.	Number of days.	Rainfall in inches.	Number of days.	Rainfall in inches.	Number of days.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
South-west monsoon—cont.							
July	1-4	1.57	2	1.47	3	0.16	0.6
	5-11	3.01	2	1.47	3	0.96	1.5
	12-18	0.02	1	0.11	1	0.33	1.1
	19-25	0.18	2	1.14	2	0.67	1.5
August	26-1	0.80	3	0.07	1	1.29	1.8
	2-8	0.23	1	4.16	3	0.62	1.4
	9-15	0.15	1	1.35	2	0.48	0.9
	16-22	0.08	1	1.17	2	0.97	1.5
	23-29	0.79	2	0.03	1	1.35	1.8
September	30-5	0.91	1	0.79	2	0.81	1.3
	6-12	0.37	1	0.79	2	0.59	1.3
	13-19	0.37	1	0.79	2	1.99	1.6
	20-26	0.37	1	0.79	2	1.19	1.6
Total		8.85	17	11.37	19	12.05	21.0
North-east monsoon.							
September	27-3	1.09	4	1.80	2	1.31	2.0
	4-10	0.74	2	0.23	1	1.34	2.0
October	11-17	0.62	2	2.28	2	1.63	2.8
	18-24	0.05	1	0.48	2	2.20	2.8
	25-31	1.51	3	1.77	3	1.18	2.2
November	1-7	1.86	4	4.32	6	2.17	2.9
	8-14	3.75	5	0.37	1	2.11	3.0
	15-21	0.47	1	1.16	2	0.80	2.9
	22-28	1.29	3	1.91	1	1.16	2.2
December	29-5	0.08	1	1.80	1	1.08	2.1
	6-12	0.60	3	3.46	2	1.27	2.6
	13-19	0.30	2	0.22	1	0.47	1.3
	20-26	0.30	2	0.04	1	0.61	1.1
January	27-3	0.30	2	0.20	1	0.41	1.1
	4-10	0.22	1	0.95	2	0.30	0.7
	11-17	1.12	4	0.30	1	0.18	0.5
	18-24	0.22	1	0.30	1	0.18	0.5
	25-31	1.12	4	0.30	1	0.18	0.5
Total		14.01	36	18.47	24	20.38	34.6
Hot weather.							
February	1-7	0.63	1	0.09	0.3	0.05	0.2
	8-14	0.63	1	0.09	0.3	0.11	0.2
	15-21	0.63	1	0.09	0.3	0.40	0.5
	22-29	0.63	1	0.09	0.3	0.09	0.3
March	1-7	0.63	1	0.09	0.3	0.21	0.7
	8-14	0.63	1	0.09	0.3	0.02	0.2
	15-21	0.63	1	0.09	0.3	0.22	0.3
	22-28	0.63	1	0.09	0.3	0.77	0.9
	29-4	0.63	1	0.09	0.3	0.94	1.1
April	5-11	0.14	2	1.96	1	0.30	0.9
	12-18	1.03	1	0.42	1	0.45	0.8
	19-25	0.63	1	0.09	0.3	0.33	0.3
	26-2	0.63	1	0.09	0.3	0.07	0.3
May	3-9	0.63	1	0.09	0.3	0.18	0.2
	10-16	0.63	1	0.09	0.3	0.98	1.0
	17-23	0.74	1	0.02	0.1	0.37	0.8
	24-30	0.63	1	0.09	0.3	0.28	0.8
	31-6	0.50	1	0.09	0.3	0.31	0.9
Total		3.73	8	3.91	5	6.17	10.4
Grand total		26.59	61	33.75	48	38.60	66.0

The maximum temperature ranged from 80.5° F to 101.5° F and the minimum temperature from 70.4° F to 85.4° F.

2. Crops—Cereals—Paddy—(a) Kuruvai season.—The water in the channel was received on 22nd June 1951 and the Kuruvai cultivation of paddy was begun as soon as the water was received in the channels. Dry nurseries of Kuruvai were begun to be raised on 6th June 1951 and completed on 1st August 1951. Transplanting of Kuruvai seedlings was commenced on 2nd July 1951 and completed by 22nd August 1951. The Kuruvai nurseries, majority of them dry nurseries and 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, 200 lb. of old indigo seed and 100 lb. of superphosphate per acre. The crop was top-dressed with ammonium sulphate at 50 to 100 lb. per acre in the third week of transplantation. The crop was harvested in the third week of September. The areas under various strains raised as bulk crops in Kuruvai are given below :—

ADT. 3	ACS.
ADT. 9	4.62
ADT. 20	0.50
	3.18

Table II shows the average yield of paddy crop per acre from 1936-37 onwards.

TABLE II.—Average yields of Kuruvai in lb. per acre.

Strains.	1936-37.	1937-38.	1938-39.	1939-40.	1940-41.	1941-42.	1942-43.	1943-44.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Adt. 3	1,329	1,608	1,737	2,020	2,080	2,130	1,610	2,350
Adt. 4	1,988	1,496	2,011	2,386	2,416	2,202	2,537	2,705
Adt. 9	2,088	1,144	2,360	1,736	2,784	2,213	2,660	2,363
Adt. 12	1,098	973	1,889	2,533	2,604	2,400	3,000	3,020
Adt. 14			2,040	2,056	2,144	2,360	2,920	3,266
Adt. 15			1,536	2,386	2,264	2,360	2,320	3,108
Adt. 16					3,712	2,640	3,000	3,176
Adt. 18					2,420	2,234	2,520	3,388
Adt. 19				2,176	2,116	1,920	2,960	2,608
Adt. 20						2,000	3,240	3,420
Co. 10								
Strains.	1944-45.	1945-46.	1946-47.	1947-48.	1948-49.	1949-50.	1950-51.	1951-52.
(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	
Adt. 3	1,736	2,000	2,040	2,198	2,106	1,828	2,380	2,236
Adt. 4	1,906	2,618	2,560	2,024	2,860	1,865		2,922
Adt. 9	1,984	3,340	3,004	2,180	2,860			
Adt. 12	2,032	2,468						
Adt. 14	1,863	2,720	2,772	2,968				
Adt. 15	2,056	2,224	2,192	1,908				
Adt. 16	1,634	2,272	2,760	2,696				
Adt. 18	2,252	2,792	2,968	2,696				
Adt. 19	2,176	2,320	2,680	2,400				
Adt. 20	1,928	2,352	2,760	2,176		1,873	2,580	2,723
Co. 10	2,268	2,603	2,800	2,024				

Sesbania seedlings were planted on the bunds all round the Kuruvai crop at four inches apart for getting enough green-manure for thaladi crop. Daincha and sesbania were grown in summer 1952 in samba areas with the help of the well water. The crops put on very good growth with the help of the rains received during the period and they gave sufficient green-manure for Kuruvai crop. Daincha gave 26,000 lb. of green leaves per acre within 2 months and sesbania 31,000 lb. within 3½ months.

Kuruvai varietal trials.—This was conducted during the year in a modified form as per instructions of the Research Council. The object of the experiment is to fix the most suitable variety both among the long and short duration varieties of Kuruvai. This is the first year of the trial and 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

The results were not significant in the case of short-duration varieties but among the long-duration varieties ADT. 16 gave the maximum yield. In the previous years among the six varieties, namely, ADT. 3, ADT. 14, ADT. 19, ADT. 20, PLR. 2 and Co. 10 compared, ADT. 14 gave the maximum yield.

The details of the experiment are shown in Tables III and IV.

TABLE III.—Agricultural Research Station, Pattukkottai, 1951-52—Kuruwai varietal trials—(short duration)—First year.

Field No.—G. 12.	Size of plot— $\frac{1}{4}$ cent.
Date of sowing—18th July 1951.	Treatments—Five.
Date of planting—4th August 1951.	Replication—Six and randomised.
Date of harvest—19th and 25th October 1951.	
Treatments—ADT. 3, ADT. 4, ADT. 20, PLR. 2 and PTB. 10.	

Summary of results.									
	ADT. 3.	ADT. 4.	ADT. 20.	PLR. 2.	PTB. 10.	General mean.	Standard error.	'F' value satisfied or not.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
acre yield in lb. ..	2,333	2,669	2,638	2,469	2,600	2,541	..	Not satisfied.	
Percentage on general mean.	91.8	105.0	103.6	97.1	102.3	100.0	3.64	..	

TABLE IV.—Kuruwai varietal trial—(long duration)—First year.

Field No.—G. 11.	Size of plot— $\frac{1}{4}$ cent.
Date of sowing—3rd July 1951.	Treatments—Six.
Date of planting—25th July 1951.	Replication—Six and randomised.
Date of harvest—13th, 16th, 19th to 21st and 25th October 1951.	
Treatments—Co. 10, Co. 18, ADT. 12, ADT. 14, ADT. 16 and ADT. 18.	

Summary of results.											
	Co. 10.	Co. 18.	ADT. 12.	ADT. 14.	ADT. 16.	ADT. 18.	General mean.	Standard error.	'F' value satisfied or not.	Critical difference.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
Acres yield in lb. ..	1,800	1,733	2,200	2,235	2,467	1,731	1,994	137.0	Satisfied.	398.8	
Percentage on general mean.	80.2	84.9	110.3	112.1	123.7	86.8	100.0	6.87	..	20	

Conclusion—ADT. 18. ADT. 14. ADT. 12. Co. 13. ADT. 18. Co. 10.

(b) Samba season.—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 in 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, 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 fourth and fifth weeks after planting. The sunnhemp crop raised in samba fields 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. The following strains have been grown during samba season as bulk crop under areas noted against each :—

	ACS.
Co. 25	11.46
Co. 19	0.56
ADT. 8	0.59
SR. 26-B	0.43

Table V gives the yields of Samba strains. The strain Co. 25 has been found to give the maximum yield.

TABLE V.—Average yields of Samba in lb. per acre.

Strains.	1935-36.	1936-37.	1937-38.	1938-39.	1939-40.	1940-41.	1941-42.	1942-43.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Adt. 1	..	..	1,333	2,496	2,538	1,854	2,300	1,714
Adt. 2	..	1,862	1,861	2,506	..	..	..	..
Adt. 5	..	..	2,372	1,422	1,680	1,694	2,358	1,711
Adt. 8	..	..	..	1,900	1,500	2,213	1,564	1,840
Adt. 10	..	1,684	2,643	2,367	2,108	2,429	2,301	1,175
Adt. 11	..	1,940	2,423	1,936	2,557	2,789	2,352	2,061
Adt. 17	..	..	..	..	..	..	..	1,729
G.E.B. 24	..	1,708	2,208	1,416	2,904	1,742	1,306	1,190
Co. 4	..	..	..	..	..	..	..	1,432
Co. 16	..	..	..	..	..	..	..	1,956
Co. 19	..	..	..	..	..	..	..	..
PTB. 15	..	..	..	..	..	..	..	..
Co. 26	..	..	..	..	..	..	..	..
Co. 25	..	..	..	..	..	..	..	..
S.R. 26 B	..	..	..	..	..	..	..	..

Strains.	1943-44.	1944-45.	1945-46.	1946-47.	1947-48.	1948-49.	1949-50.	1950-51.	1951-52.
(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	
Adt. 1	2,092	1,925	2,692	1,440	980	..	..	..	..
Adt. 2	..	..	..	..	2,414	..	..	..	..
Adt. 5	2,314	1,386	2,451	1,395	1,325	..	..	..	..
Adt. 8	..	..	..	..	..	..	2,175	1,113	..
Adt. 10	2,776	1,758	..	..	..	..	..	..	..
Adt. 11	2,032	2,004	..	..	..	..	..	..	..
Adt. 17	2,174	1,775	2,337	2,295	1,576	..	..	..	..
G.E.B. 24	1,650	1,920	2,378	2,080	1,820	..	..	..	..
Co. 4	..	..	..	..	..	..	..	..	..
Co. 16	2,344	1,365	2,692	1,760	1,172	..	..	..	..
Co. 19	..	2,363	2,812	2,360	2,277	2,349	2,663	2,537	1,963
PTB. 15	..	..	1,944	2,049	2,598	1,603	2,306	..	..
Co. 26	..	..	..	..	..	1,407	2,141	..	..
Co. 25	..	..	..	..	..	..	2,673	2,939	2,323
S.R. 26 B	..	..	..	..	..	..	..	..	2,280

Samba varietal trials.—As in the case of Kuruwai paddy long and short-duration varieties of samba of almost of uniform duration were compared with the object of fixing the most suitable type of paddy for the season. The following varieties were compared in each of the long and short-duration varieties :—

Short-duration varieties.	Long-duration varieties.
ADT. 8	Co. 3
ADT. 21	Co. 16
ADT. 22	Co. 25
GEB. 24	ADT. 1
Co. 2	PTB. 15
ASD. 5	

The experiment was conducted for the first time in this modified form. ADT. 8 among the short-duration varieties and Co. 25 of the long-duration varieties gave the highest yields. GEB. 24 being the earliest to mature among the short-duration varieties was very badly affected by birds and could not give any yield. The varieties compared both in Kuruwai 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. Even in the

previous year, Co. 25 had been found to give the maximum yield when compared with other varieties, namely, BCP. 1, Co. 19, ADT. 2, ADT. 8 and ASD 5. The details of the experiment are shown in Tables VI and VII.

TABLE VI.—Samba varietal trials (short-duration)—First year.

Field Number.—F-1 and 2. Size of plot— $\frac{1}{2}$ cent.
Date of sowing—31st July 1951. Treatments—Five.
Date of planting—5th September 1951. Replications—Eight and randomized.
Date of harvest—3rd January 1952.
Treatments—ADT. 8, ADT. 21, ADT. 22, Co. 2 and ASD. 5.

Summary of results.

	ADT. 8.	ADT. 21.	ADT. 22.	Co. 2.	ASD. 5.	General mean.	Standard error.	'F' value satisfied or not.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Acres yield in lb.	3,475	2,377	3,250	2,998	3,323	3,084	79.6	Yes.	231.3
Percentage on general mean	112.7	77.0	105.4	97.2	107.8	100.0	2.58	..	8
Conclusion—ADT. 8, ASD. 5, ADT. 22, Co. 2, ADT. 21.									

TABLE VII.—Samba varietal trials (long-duration)—First year.

Field Number.—F-3. Size of plot— $\frac{1}{2}$ cent.
Date of sowing—31st July 1951. Treatments—Five.
Date of planting—3rd September 1951. Replications—Eight and randomized.
Date of harvest—31st December 1951 and 2nd February 1952.
Treatments—ADT. 1, Co. 3, Co. 16, Co. 25 and PTB. 15.

Summary of results.

	ADT. 1.	Co. 3.	Co. 16.	Co. 25.	PTB. 15.	General mean.	Standard error.	'F' value satisfied or not.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Acres yield in lb.	2,998	1,475	3,275	3,475	3,000	2,845	176.4	Yes.	512.1
Percentage on general mean	105.4	51.8	115.1	122.1	105.4	100.0	6.2	..	18
Conclusion—Co. 25, Co. 16, PTB. 15, ADT. 1, Co. 13.									

Twenty-one cultures of Arantangi varieties of paddy were raised in trial plots keeping Kattavellai, Kodavellai and Kaivarai Samba standards respectively as control. The results were not significant. The details of the experiment are given in Table VIII.

TABLE VIII.—Trials with Arantangi varieties of paddy (Samba season)—First year.

Field Number.—H-16. Size of plot— $\frac{1}{2}$ cent.
Date of sowing—26th July 1951. Treatments—Twenty-one.
Date of planting—4th September 1951. Replication—Four and randomized.
Date of harvest—5th February 1952. Treatments—398, 413, 418, 424, 454, 470, Kattal Vellai standard, 655, 701, 718, 757, 762, 790, Kodai Vellai standard, 898, 936, 948, 977, 1057, 1130 and Kaivarai Samba standard.

(1) Summary of results.

	398.	413.	418.	424.	454.	470.	Kattal Vellai standard.	Standard error.	'F' value satisfied or not.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Acres yield in lb.	3,188	2,994	2,875	3,325	2,000	2,688	2,800	..	No.
Percentage on general mean	113.8	107.0	102.7	118.8	71.4	96.0	100.0	12.09	..

(2) Summary of results.

	655.	701.	718.	757.	762.	790.	Kodai Vellai standard.	Standard error.	'F' value satisfied or not.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Acres yield in lb.	2,525	2,900	2,800	2,575	2,969	3,000	2,800	..	No.
Percentage on general mean	90.2	103.6	100.0	92.0	108.0	107.1	100.0	9.924	..

(3) Summary of results.

	898.	936.	948.	977.	1057.	1130.	Kaivarai Samba standard.	Standard error.	'F' value satisfied or not.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Acres yield in lb.	1,400	2,019	1,725	1,550	1,575	1,900	1,950	..	No.
Percentage on general mean	71.8	103.5	88.5	79.5	80.8	97.4	100.0	20.60	..

(c) *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 greenleaf 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 super phosphate per acre. Green leaves were obtained from the sesbania grown on the Kuruvai bunds and also from the trees grown on the boundary. The varieties grown in thaladi were Co. 25 and ADT. 8 paddy, the area being 7.73 acres and 2.03 acres respectively. 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 Guesarol 950 before transplantation. The moths were also caught in large numbers by setting of light traps. The crop was harvested in the fourth week of February. The average yield of thaladi strains of paddy is given in Table IX.

TABLE IX.—Average yields of Thaladi in lb. per acre.

Strains.	1936-37.	1937-38.	1938-39.	1939-40.	1940-41.	1941-42.	1942-43.	1943-44.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Adt. 1	..	..	..	..	..	..	2,453	..
Adt. 2	..	1,854	1,144	1,279	1,349	1,359	1,423	1,467
Adt. 8	..	1,612	1,676	1,538	1,437	1,380	1,420	1,455
Adt. 11	..	..	..	..	..	1,600	1,887	2,016
Co. 2	..	1,505	1,350	1,560	1,550	1,425	1,239	1,188
Co. 16	..	..	..	..	..	..	2,240	..
Co. 19	..	..	..	..	..	..	..	2,540
Strains.	1944-45.	1945-46.	1946-47.	1947-48.	1948-49.	1949-50.	1950-51.	1951-52.
(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	
Adt. 1	..	..	1,440	2,036	..	..	..	..
Adt. 2	1,090	1,180	..	..	..	..	..	..
Adt. 3	1,357	1,225	1,330	1,188	1,107	1,363	1,360	1,113
Adt. 11	1,531	..	..	..	..	..	..	..
Co. 2	1,220	1,520	..	..	..	..	..	..
Co. 16	..	1,294	1,430	..	..	..	..	..
Co. 19	1,845	1,586	1,586	1,498	..	..	1,871	..

3. *Irrigation experiment*.—The modified irrigation experiment for both Kuruvai and Samba was conducted for the third year. The object of the experiment is to know the maximum yield per unit quantity of water combined with the time of sowing. 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 and

reduced rates for the third set of plots. The results were not significant during 1951-52. But in previous years it was found that highest yield has been obtained with the maximum supply of water. The details of the experiment have been furnished in Table X.

TABLE X.—Irrigation experiments on kuruvai ADT. 3—Third year.

Field number.—G. 2 to 9.

	First time of sowing.	Second time of sowing.	Third time of sowing.
Date of sowing	18th July 1951.	25th July 1951.	1st August 1951.
Date of planting	8th August 1951.	14th August 1951.	22nd August 1951.
Date of harvest	18th October 1951.	21st October 1951.	25th October 1951.
Quality of water allowed—			
	'a'—72"	'c'—52"	
	'b'—62"	'd'—42"	

Summary of results.

(a) Time of sowing.

Particulars.	Time of sowing.			General mean.	Standard error.	'Z' test satisfied or not. (P = 0.05).	Critical difference (P = 0.05).
	I.	II.	III.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Acre yield in lb. ..	1,687	2,081	1,756	1,825	..	No.	..
Percentage on general mean.	92.4	111.3	96.2	100.0	6.642	..	23

(b) Quantity of water.

Particulars.	Quantity of water.				General mean.	Standard error.	'Z' test satisfied or not. (P = 0.05).	Critical difference (P = 0.05).
	A.	B.	C.	D.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Acre yield in lb. ..	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	..	10

(c) Time of sowing × Quantity of water.

Particulars.	First sowing.				Second sowing.			
	A.	B.	C.	D.	A.	B.	C.	D.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Acre yield in lb. ..	1,812	1,745	1,443	1,750	2,058	2,010	2,092	1,964
Percentage on general mean.	99.3	95.6	79.1	95.9	112.3	110.1	114.1	107.6

Particulars.	Third sowing.				General mean.	Standard error.	'Z' test satisfied or not. (P = 0.05).	Critical difference (P = 0.05).
	A.	B.	C.	D.				
(1)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Acre yield in lb. ..	1,739	1,809	1,737	1,739	1,825	..	No.	..
Percentage on general mean.	95.3	99.1	95.2	95.3	100.0	5.704	..	17

Irrigation experiments on Samba Co. 19—Third year.

	First time of sowing.	Second time of sowing.	Third time of sowing.
Date of sowing	18th August 1951.	25th August 1951.	1st September 1951.
Date of planting	23rd September 1951.	1st October 1951.	8th and 9th October 1951.
Date of harvest	14th February 1952.	14th and 16th February 1952.	16th February 1952.

Quantity of water allowed—

'a'—88"

'c'—77"

'c'—66"

'd'—55"

Summary of results.

(a) Time of sowing.

Particulars.	Time of sowings.			General mean.	Standard error.	'Z' test satisfied or not. (P = 0.05).	Critical difference (P = 0.05).
	I.	II.	III.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Acre yield in lb. ..	885	1,524	2,045	1,485	..	Yes.	..
Percentage on general mean.	59.6	102.6	137.7	100.0	7.311	..	25

Conclusion—Third time of sowing, Second time of sowing, First time of sowing.

(b) Quantity of water.

Particulars.	Quantity of water.				General mean.	Standard error.	'F' value satisfied or not.	Critical difference (P = 0.05).
	A.	B.	C.	D.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Acre yield in lb. ..	1,576	1,477	1,344	1,541	1,435	..	No.	..
Percentage on general mean.	106.1	99.5	99.5	103.8	100.0	8.546	..	25

(c) Time of sowing × Quantity of water.

Particulars.	First sowing.				Second sowing.			
	A.	B.	C.	D.	A.	B.	C.	D.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Acre yield in lb. ..	994	868	632	1,048	1,795	1,535	1,290	1,476
Percentage on general mean.	67.0	58.5	42.6	70.6	120.9	103.4	86.9	99.4

Particulars.	Third sowing.				General mean.	Standard error.	'F' value satisfied or not.	Critical difference (P = 0.05).
	A.	B.	C.	D.				
(1)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Acre yield in lb. ..	1,940	2,029	2,111	2,100	1,485	..	No.	..
Percentage on general mean.	130.6	136.6	142.2	141.4	100.0	14.81	..	48

4. Other cereals—Ragi—Groundnut cotton mixed crops.—Co. 2 ragi was sown in 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 intercrop. P 216F cotton seed was dibbled on the bunds 6 inches apart in the ragi crop at the time of transplantation of seedlings. In the fourth week after planting ragi seedlings were found to be affected by 'Piricularia' in patches. The seedlings were given a spraying of bordeaux mixture to arrest the spread of the disease. Even though the crop could not receive sufficient supply of water on account of drought, yet the results obtained are not discouraging.

	Yield per acre.						
	LB.						
Ragi Co. 2	..	..	..	..	..	..	320
Cotton P216F. ..	..	..	..	..	..	..	20
Groundnut TMV. 2 ..	..	..	..	..	..	..	160

5. Oil Seeds.—(i) Groundnut varietal trials.—As per instructions of the Superintendent, Agricultural Research Station, Tindivanam, five short-duration cultures of groundnut were sown in summer in rice fallows in replicated plots as was done last year. The cultures tried were AH. 4111, AH. 4218, AH. 4515, AH. 6481 and TMV. 2. The crop was sown on 18th March 1952 and harvested on 16th July 1952. Due to the 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 poochi' (*Stomopteryx nerteria*). It was found that the yields obtained in all the varieties were not only poor but the pods also were not of uniform maturity.

Variety.	Yield per acre.						
	LB.						
TMV. 2	..	..	..	..	..	..	555
A.H. 4111	..	..	..	..	..	..	454
A.H. 4218	..	..	..	..	..	..	543
A.H. 4515	..	..	..	..	..	..	411
A.H. 6481	..	..	..	..	..	..	540

(ii) *Groundnut TMV. 1 in dry lands.*—Groundnut TMV. 1 was sown in dry lands in August as a mixed 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 cotton P 216F over an area of 0.50 acre. In both 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 came up nicely and have given 80 lb. of sunnhemp seed per acre. From the performance of the individual crops raised as a mixture it was quite clear that the main crop groundnut or redgram was not at all affected by sowing sunnhemp as a mixture with the same. The low yield of groundnut and redgram is only due to peculiar weather conditions that prevailed during the period.

	Seed rate per acre.	Area.	Acre yield.
	LB.	acre.	LB.
P216 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.

(iii) *Groundnut short duration in rice fallows.*—During the year under report 15 acres were sown with groundnut in summer in rice fallows. Irrigation was given by lifting water both from permanent wells Nos. I and II and also from temporary wells dug for the purpose. In addition to the electric motor and pump-set already in the station a portable oil engine was got temporarily with hose pipe arrangement 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 13 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 affected by 'surul poochi' (*stomopteryx nerteria*) and to a certain extent controlled by dusting Gammoxene 810. In spite of deepening of the temporary wells they could not supply enough water for the crop. The following are the details of yield and areas of groundnut sown in rice fallows:—

	Area in acres.	Yield per acre.
		LB.
Groundnut TMV. 1	2.21	495
Groundnut TMV. 2	12.80	422

Cotton P 216F 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 A.H. 4111 were grown in the orchard block in between the fruit plants in the month of August and A.H. 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.	December.
	LB.	LB.
A.H. 4111	950	1,650
TMV. 2	618	..

(iv) *Coconut.*—The total number of coconut trees in the farm are 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 given to them in summer. Coconut husks were buried in trenches formed between trees for manure. The coconut trees began to yield and the total number of nuts harvested during the year from twenty-one trees is 250. During the year under report the gaps between the trees and also some of the vacant spaces in the farm were planted with fresh seedlings. Thus 12 coconut seedlings were planted during the year. In addition to the above ten Andaman variety and four Jafna variety of coconut seedlings have been planted during the year on the road side.

6. *Pulses*—(i) *Redgram culture 37.*—This was sown in dry lands as a mixture crop with groundnut TMV. 1 in an area of 0.35 acre. The crop came up well in the earlier stages but due to adverse conditions of weather later, there was much of vegetative growth and a low yield of pods.

(ii) *Redgram short duration variety.*—Short-duration variety of redgram otherwise called as Tonkasi variety was sown in the paddy field bunds but due to unexpected profuse growth sesbania and cotton in the field bunds, the crop did not come up well and hence it was a failure.

(iii) *Greengram culture 62.*—An area of 0.50 acre was sown with the crop. The crop came up well until the flowering stage. When the crop began to put forth pods it was suddenly affected by a virulent type of leaf spot disease which was identified by the Government Mycologist as 'cereospora species'. Before any remedial measures could be taken up the whole crop almost dried up. The pods collected were empty in most of the cases and the seeds got became unfit for seed purposes.

(iv) *Blackgram.*—Blackgram dry land variety was sown in paddy field bunds to a length of 1,024 feet to see its performance in this tract. The crop came up well and gave an yield of 23 lb. of blackgram seed.

7. *Fibre crops.*—(i) Sunnhemp 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 acre yield of 80 lb. of seed without any adverse effect on the main crop. Sunnhemp was also raised for seed and fibre purposes in dry lands after the harvest of 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 acre yield of 145 lb. of seed per acre. The stalks were dried and kept stocked for the extraction of fibre. But for want of facilities for retting they were used as manure for paddy crop.

(ii) *Long duration variety sunnhemp.*—Fifty lb. of this variety were received from the Agricultural Demonstrator, Kovur, during October 1951. A portion of the seeds were sown in this station to see its performance in November. The seeds germinated well but the crop began to flower even on the 40th day. No pods were set up. The crop was a failure. The seeds were sown in May 1952 in summer again.

(iii) *Cotton.*—A number of selected varieties of cotton were grown in 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 1.50 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 yield 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 adverse weather conditions and insufficient supply of water. Cotton P 216 F was also sown in lines six feet apart as a mixture with groundnut TMV. 1 in rice fallows. Due to lack of 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 plots under varietal trials P. 216 F. cotton has given an acre yield of 1,350 lb. The data and the experimental details are furnished in Table XI.

TABLE XI.—Cotton yield trial.

Varietal Trial A.				
Variety.		Acre yield in lb.	Variety.	Acre yield in lb.
(1)		(2)	(2)	(4)
Busoga	..	828	Sealand.	558
Kampala	..	786	Cocker	916
7682	..	975	P. 23 F	1,009
MU. 1	..	947	P. 216 F	1,125

Time of sowing cum manure.

Treatments.		Yield in lb. per acre.			
(1)		I.	II.	III.	IV.
		(2)	(3)	(4)	(5)
T-1. MI.	..	993	601	619	632
MO.	..	886	281	444	517
T-2. MI.	..	843	1,111	245	237
MO.	..	514	575	312	364
T-3. MI.	..	307	377	219	22
MO.	..	373	132	219	18
T-4. MI.	..	88	157	70	83
MO.	..	35	233	26	9

T₁, T₂, T₃, T₄ represents the times of sowing at fortnightly intervals (i.e.)

T₁—6th January 1952.

T₂—21st January 1952.

T₃—4th February 1952.

T₄—19th February 1952.

M₁ means, manured plots (i.e.) The manured plots received 45 lb. of phosphoric acid in the form of superphosphate as a basal dressing and 40 lb. of nitrogen per acre in the form of ammonium sulphate.

Even in the bulk area with meagre irrigation the crop has given an encouraging yield. 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 cotton seeds.

(2) An application of superphosphate at 100 lb. per acre has been very useful in increasing 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 feet and 2 feet respectively.

(4) Flow irrigation or splash irrigation at more frequent intervals than for the groundnut crop will be necessary.

(iv) Cotton sown in field bunds.—Cotton 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 Kapas both in colour and length of the staple was far superior to the same obtained from the fields. By finding out the weight of Kapas

collected from plants on a particular length of field bund it was calculated that 30 lb. of kapas will be obtained from the field bunds of an acre of paddy crop.

8. Sweet-potato.—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.

9. Tapioca.—The long-duration varieties, namely, Butterstick, Haporia, Tapiern, Valenca and 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.
	ACRE.	LB.
Butterstick	0.08	7,000
Tapiern	0.06	2,554
Valenca	0.05	860
Bassoria	0.03	1,167

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 performance 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.
	ACRE.	LB.
Kankoil Vellai (936½ lb.)	0.08	11,706
Sundari Vellai (184 lb.)	0.015	12,200
Nachikootan (271 lb.)	0.0125	21,700
Chullikayalachadi (810½ lb.)	0.05	16,200
Kayalachadi (175 lb.)	0.0125	14,000
Kalikalan (200 lb.)	0.0125	16,000

10. Green manure crops.—Green manure crops like daincha, sunnhemp 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, sunnhemp in 2.65 acres and daincha in 2.75 acres. Owing to the failure of the 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 has 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 sunnhemp perhaps due to the adverse weather conditions of the treated crop gave less yield per acre than the untreated ones as detailed below:—

	Area.	Acre yield.
	ACRE.	LB.
Sunn hemp treated with bacterial culture	0.25	5,800
Sunn hemp untreated with bacterial culture	0.25	6,800

Sesbania seedlings were planted around 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 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.

11. *Vegetables*.—(i) During the year vegetables like lab lab, bendai, bitter gourd, snake gourd and brinjals were raised entirely for the production of seeds. The crops were manured with 50 tons of farm-yard manure per acre and 400 lb. of superphosphate per acre as a basal dressing. The quantities of seeds obtained are as detailed below:—

	Quantity of seeds obtained.	
	LB.	OZ.
Bendai	13	0
Snake gourd	79	3
Lab lab	1	7
Brinjals	2	5
Bitter gourd	4	8

(ii) *Sattur chillies*.—Chillie 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.

(iii) *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 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.
	ACRE.	LB.
Bellary onions	0.25	850 (first season).
Do.	0.10	148 (second season).

12. *Pest and diseases*.—(i) The samba and thaladi season paddy crop was attacked during the earhead stage by a bug "Menidahistrio", 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. The insecticide was effective but not found to be economical.

(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 Guesarol 950. Light traps were set up and moths were caught in large

numbers. To control against the rats in paddy fields rat bow traps were set up in large numbers and rats were caught daily.

(iv) 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.

The rats caught in the paddy fields were all applied to the fruit plants in the orchard as manure. As a manure rats have very good effects in the growth of citrus plants.

One particular lime plant was manured with rats while the other adjacent to the same growing under identical conditions was not manured with rats. The plant for which rats were applied show perceptible improvement in growth.

AGRICULTURAL RESEARCH STATION,
PATTUKKOTTAI,
6th February 1953.

S. LAKSHMANAN,
Farm Manager.

TANJORE,
11th February 1953.

K. VARADACHARI,
Deputy Director of Agriculture.

APPENDIX I.

ATTEMPTS MADE TO STEP UP THE INCOME OF NOT ONLY THE AREAS 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 areas 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 plenty of green fodder and other fodders available in the farm two Sindhi cows have been added to livestock of the farm to increase the receipt of the farm by 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 onions 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.

COST OF CULTIVATION OF BULK CROPS DURING 1951-52.

Serial number and name of crop.	Area in acres.	Expenditure— Cost of cultivation.	Receipts.	Profit or loss + or —.
(1)	(2)	(3)	(4)	(5)
		RS. A. P.	RS. A. P.	RS. A. P.
1 Paddy—Kuruvai — Bulk —ADT. 3 and ADT., 20.	9.76	1,444 15 0	3,350 7 0	+ 1,905 8 0
Samba	15.61	1,620 4 0	7,680 8 0	+ 4,934 11 0
Thaladi	9.76	1,125 9 0		
2 Groundnut mixed with cotton, TMV. 2 and TMV. 1.	14.60	1,427 3 0	1,184 0 0	- 243 3 0

ANNUAL REPORT OF THE
AGRICULTURAL RESEARCH STATION, PATTUKKOTTAI

APPENDIX I—*quoo*.

Serial number and name of crop. (1)	Area in acres. (2)	Expenditure — Cost of cultivation. (3)			Receipts. (4)			Profit or loss + or —. (5)		
		RS.	A.	P.	RS.	A.	P.	RS.	A.	P.
3 Vegetable seeds ..	0.50	220	15	0	633	8	0	+ 448	9	0
4 Tapioca	0.25	30	14	0	79	0	0	+ 48	2	0
5 Ragi, cotton and ground nut mixture.	0.25	70	3	0	42	4	0	— 27	15	0
6 Chillies	0.08	23	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 sunnhemp 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	0	640	0	0	+ 125	12	0

APPENDIX II.

FINANCIAL STATEMENT OF EXPENDITURE AND RECEIPTS FOR THE FASLI YEAR 1951-52.

A. Expenditure.

	RS.	A.	P.
Pay of establishment	3,977	1	0
Travelling allowance	174	11	0
Cost of living allowance (dearness allowance and house-rent allowance)	1,526	5	0
Contingencies—			
Petty construction and repairs	1,400	0	0
Other contingencies including rates and taxes	85	8	6
Purchase of deadstock	869	3	3
Working expenses	12,234	1	3
Dearness allowance to menials	1,902	11	0

B. Receipts.

XXIX. Agriculture—Agricultural Station Receipts	3,559	5	4
XXIX. Miscellaneous Receipts	520	5	9
XIII. Other Taxes and Duties—Sales Tax	13	7	9
By value of seeds transferred to other officers	14,202	11	0

ANNUAL REPORT OF THE POMOLOGICAL STATION, COONOOR
(NILGIRIS), FOR THE YEAR 1951-52 (FASLI 1361).

Season and rainfall.—The summary of weekly rainfall distribution for the year is presented in Table I.

TABLE I.—Rainfall statement of Pomological Station, Coonoor, for the year 1951-52.

Month.	Week.	1951-52.		1950-51.		Average for the past		10 years.		40 years.	
		Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)		
South-west monsoon.											
June	7-13	0.49	4	0.03	..	0.64	2.45	0.74	2.77		
	14-20	0.01	..	0.23	1	0.67	1.90	0.77	3.59		
	21-27	0.03	..	0.14	1	0.56	2.60	0.58	2.73		
June-July	28-4	0.34	2	..	..	0.34	2.55	0.56	3.23		
	5-11	1.44	4	1.07	2	0.77	3.27	0.63	2.32		
	12-18	1.76	6	0.12	..	0.79	3.64	1.05	3.80		
	19-25	1.09	6	0.81	4	0.51	3.13	0.74	3.59		
	26-1	..	..	2.89	4	0.61	2.53	0.54	3.04		
August	2-8	..	..	0.53	2	1.25	3.19	0.91	3.32		
	9-15	0.64	2	0.74	2	1.05	3.56	0.79	3.16		
	16-22	0.22	1	3.62	4	0.43	2.20	1.03	3.40		
	23-29	1.96	4	0.91	2	0.78	2.34	0.95	1.61		
August-September ..	30-5	..	..	0.06	..	0.55	2.52	0.60	2.49		
	6-12	0.27	2	0.23	1	0.59	2.72	0.60	2.31		
	13-19	1.85	3	0.17	1	0.74	2.85	1.09	3.25		
	20-26	3.69	4	0.35	1	0.93	2.59	1.11	2.95		
Total ..		13.79	38	11.93	25	11.21	44.04	12.74	47.61		
North-east monsoon.											
September-October.	27-3	2.52	3	1.14	2	1.32	3.20	1.31	3.64		
	4-10	0.22	1	2.16	4	1.20	3.20	1.45	3.45		
	11-17	2.09	3	2.75	5	3.32	4.80	2.86	4.11		
	18-24	0.23	1	0.37	2	2.82	4.04	3.26	4.47		
	25-31	0.61	3	..	..	2.10	3.05	3.89	3.67		
November	1-7	1.35	3	1.55	3	2.88	3.39	3.94	4.05		
	8-14	8.02	4	8.18	6	4.48	5.08	3.05	2.73		
	15-21	3.23	3	0.23	1	4.03	4.41	2.44	2.66		
	22-28	1.10	3	..	..	2.99	3.66	1.92	3.09		
November-December.	29-5	1.71	2	..	..	3.39	3.09	2.30	2.90		
	6-12	..	..	0.31	1	0.73	1.30	1.69	1.72		
	13-19	1.65	3	1.17	..	1.70	2.18	1.45	2.34		
	20-26	..	..	0.07	..	1.26	1.15	0.85	1.53		
December-January.	27-3	1.14	1	1.10	1	0.59	1.18	0.90	1.59		
	4-10	0.01	..	..	..	1.99	1.54	1.55	1.66		
	11-17	..	..	1.72	1	0.61	0.66	0.89	0.97		
	18-24	..	..	..	..	0.72	0.56	1.36	0.70		
	25-31	1.12	3	..	..	0.66	0.78	1.19	1.16		
Total ..		23.99	33	30.75	29	36.79	47.27	36.30	46.49		
Hot weather period.											
February	1-7	0.14	1	..	..	0.81	0.91	1.09	1.39		
	8-14	1.10	1	0.13	..	0.48	0.66	0.59	1.03		
	15-21	1.73	1	..	..	0.34	0.40	0.25	0.59		
	22-28	5.35	4	..	..	0.84	0.96	0.63	0.69		
March	1-7	0.22	1	..	..	1.16	0.34	0.30	0.78		
	8-14	..	..	..	..	0.12	0.32	0.32	0.84		
	15-21	0.12	1	..	..	0.23	0.75	0.57	1.04		
	22-28	0.21	1	7.01	4	0.70	1.47	0.60	1.37		
March-April	29-4	0.39	1	0.27	1	0.53	1.53	0.99	1.40		
	5-11	2.69	3	2.20	1	2.07	2.59	1.33	2.25		
	12-18	2.86	4	9.37	4	1.79	3.13	1.80	1.45		
	19-25	0.10	1	0.06	..	1.24	1.65	0.83	1.83		
April-May	26-2	1.18	3	0.02	..	0.93	1.76	1.04	2.19		
	3-9	0.08	1	1.04	2	0.92	1.31	1.24	1.33		
	10-16	0.18	2	1.94	3	0.82	1.00	0.96	2.10		
	17-23	0.08	1	0.95	2	0.71	2.27	1.00	2.83		
	24-30	0.35	1	0.88	2	0.87	1.75	0.95	2.54		
May-June	31-6	0.22	2	0.77	2	1.38	1.04	0.94	2.17		
Total ..		17.00	29	24.64	21	16.04	25.69	15.48	27.92		
Grand total ..		59.78	100	57.32	75	64.04	117.00	64.52	122.02		

The total rainfall during the year was again below normal, though it was more than that of the previous year by 2.46 inches only, it fell short of the normal average of the past ten-year and forty-year periods by nearly 5 inches. The precipitation during the south-west monsoon period was normal, while the north-east monsoon period which is the main rainy season of the tract, recorded a total of 28.99 inches which again fell short of the normal average by 7.31 inches. This deficit rainfall occurring for the third year in succession has been the primary factor which accounted for the sub-normal yields in most of the deciduous fruit crops.

Very acute water shortage was experienced during the month commencing from March to June during the year under report. The heavy rains (nearly 8 inches) received during the month of February when most of the early cropping plum and peach varieties were in blossom contributed to a very severe blossom shed, besides encouraging a quick vegetative growth on the mid season varieties. These seasonal factors have adversely affected the yields in the above said early fruiting varieties in particular.

The year was also characterized by unusual warmth and lack of optimum cold. In general the seasonal conditions proved to be again unfavourable for normal cropping in perennial fruit crops. The maximum temperatures at the station ranged between 84° F and 60° F and the minimum between 72° F and 36° F. The humidity conditions ranged between 100 and 18 per cent.

I.—APPLE.

A. Varietal performance.—The promising varieties, viz., Rome Beauty, Winterstein, Irish Peach and Allosop's Early at the station failed to crop well during the year apparently owing to the continued dry weather conditions as well as due to the lack of intense cold which is an essential factor, prerequisite to help the plants to break their dormancy. The growth performance and yield behaviour of nine new selections put under field test in 1948 were recorded. They were yet to attain the bearing age. Three varieties of apple located at Kodaikanal were newly introduced. They were propagated on Merton stocks in January 1952 recording a 50 per cent 'take'. The grafts were progressing satisfactorily in the field. The varieties, Delicious, American Mother and Braddock's Non Pareil, which yielded a few fruits each during 1951 season were making fair growth, although they failed to fruit during the season now under report. Of the twenty new scion varieties introduced from Auckland (New Zealand) five varieties, viz., Pigeonette, Giant Geniton, Kidd's Orange Red, Dunn's Favourite and Rokewood finally established in the orchard.

B. Nursery investigations—Multiplication of rootstocks.—An account of the mean suckers production in Crab and Merton stocks during the year is presented in Table II below.

TABLE II.—Apple rootstocks—Multiplication of stocks (mother plants layered in September 1946).

Rootstock.	Number of mother plants set out.	Mean number of suckers produced per mother plant from (1st July 1951 to 30th June 1952).	Mean number of rooted suckers produced per mother plant.
(1)	(2)	(3)	(4)
Crab	70	10.4	0.50
Merton 778	57	12.3	1.10
Merton 779	30	10.6	0.70
Merton 789	6	10.4	0.20
Merton 793	4	12.6	0.10

As in the previous year, Merton 778 continued to be the most prolific in rooted sucker production, followed by M. 779. Next in order in this respect were the Crab and M. 789 with a mean of 0.50 and 0.20 while M. 793 registered the mean of 0.1 which was therefore inferior to the rest. In view of the consistently good performance exhibited by the two Merton stocks 779 and 778,

the multiplication of rooted suckers of these two promising stocks was intensified by increasing the number of mother plants in the layering beds.

All the Merton stocks continued to maintain their immunity to woolly aphid pest during this year.

C. Orchard investigations—(1) Rootstock trials—(a) Rome Beauty.—The annual growth measurements of Rome Beauty on five rootstocks, viz., Mertons 778, 779, 789, 793 and Crab were recorded for the seventh year of its orchard life. The mean growth increments on each of the five stocks expressed as percentage and also in terms of mean tree yields recorded during the current season which is the third year of cropping. The data collected is presented in Table III.

TABLE III.—Apple—Rootstock trial—Rome Beauty—Growth and yield records of the trees on five rootstocks.

Rootstock.	Mean girth of the trees in 1945-46 (in cm.).	Mean girth of the trees in 1951-52 (in cm.).	Difference between columns (2) and (3) (in cm.).	Mean percentage of increase in the girth of the trees between 1945 to 1952.	Mean number of fruits borne during 1952.
(1)	(2)	(3)	(4)	(5)	(6)
Merton 778 ..	5.48	23.24	17.74	324.08	30
Merton 779 ..	5.10	22.67	17.57	344.50	64
Merton 789 ..	6.12	22.02	15.90	259.80	24
Merton 793 ..	5.74	21.73	15.99	278.57	22
Crab	5.98	20.94	14.96	250.16	29

The trees on M. 779 and M. 778 registered a more vigorous growth in the field when compared with those on other stocks. The superior performance of the two stocks was in conformity with the observations recorded during the previous season. Of the five rootstocks under trial Crab imparted the least vigour to the scion. All the trees in this trial bore a rather sparse crop during the year.

Among the trees on Merton stocks those on Merton 779 appear to lead the rest with a mean yield of 64 fruits per tree, followed in order by those on M. 778, M. 789 and M. 793, the trees on the last named stock yielding the minimum of only 22 fruits per tree. The performance of the trees on Crab was none too good with a mean tree yield of only 29 fruits.

Considering tree vigour and yield together Mertons 779 and 778 appear to possess the best rootstock potentialities for this variety of apple under Coonoor conditions.

(b) Winterstein.—The trial with this variety consists of grafts raised on four Merton stocks, viz., M. 778, M. 779, M. 789 and M. 793. The trial has been in progress since July 1948. Owing perhaps to defective soil conditions, the trial suffered heavy casualties during the subsequent years which resulted in several gap fillings. The mean annual growth measurements of the trees recorded during the year are furnished in Table IV.

TABLE IV.—Apple—Winterstein—Rootstock trial showing the growth measurements of trees on four stocks.

Stock.	Mean scion girth of trees in 1949-50 (in cm.).	Mean scion girth of trees in 1951-52 (in cm.).	Mean increment in scion girth, difference between columns (2) and (3) (in cm.).	Percentage of increase in the girth of trees from 1949 to 1952
(1)	(2)	(3)	(4)	(5)
Merton 778	3.90	5.08	1.18	30.26
Merton 779	4.10	5.07	0.97	23.66
Merton 789	3.50	4.45	0.95	27.14
Merton 793	3.50	3.80	0.30	8.57

The above data reveal that the plants have made rather slow growth during the year. M. 778 was leading the other stocks in respect of scion girth since planting, followed by the stocks M. 789 and M. 779. As in the case of the rootstock trial with Rome Beauty, the plants on M. 793 have contributed for the least

growth in this trial as well. The observations so far recorded in this trial, both in the field and in the nursery go to show that among the four Mertons, M. 778 and M. 779 have a greater promise of success as rootstocks for the two varieties of apple under Coonoor conditions, both in respect of the vigour they impart to the scion in their early orchard life as well as in respect of sucker production in the layering beds.

(2) *Irrigation trial*.—This trial with apple Allsop's Early as the scion on Crab stock was abandoned due to very heavy casualties in the field. The trial was therefore relaid during the year with grafts of Rome Beauty raised on M. 779, one of the promising Merton stocks immune to woolly aphid. The grafts which were planted in June 1952 were establishing in the field.

(3) *Trial to break the dormancy of apple trees*.—The trial with the dormant spray of 3 per cent linseed oil emulsion on Winterstein was continued for the fifth year in succession. The spraying trial was extended to include another chemical 'Sandolin' (a proprietary product) a compound containing dinitro-cresol to test the relative potentialities of the two substances in breaking the dormant period in this fruit.

The results of the spraying given during the dormant period of 1951 are set out in Table V.

TABLE V.—Apple—Winterstein—Trials with dormant spray of 3 per cent linseed oil emulsion and 0.5 per cent Sandolin 'A'.—Number of new flushes and fruits per tree and dates of blossoming.

Treatment.	Date of spraying.	Date of breaking dormancy.	Number of new flushes.	Number of fruits borne.
(1)	(2)	(3)	(4)	(5)
Sandolin 'A' 0.5 per cent ..	12th January 1952.	15th February 1952.	645	590
Linseed oil 3 per cent ..	12th January 1952.	24th February 1952.	520	325
Control	12th January 1952.	13th March 1952.	442	295

The data presented above reveals that in the tree sprayed with Sandolin 'A' 0.5 per cent, an earlier breaking of the buds by 26 days over the control was recorded while in the tree sprayed with 3 per cent linseed oil emulsion, earliest signs of breaking dormancy were noticed 18 days in advance of the untreated tree. Considering the crop borne by each tree the Sandolin spray treatment was responsible for the maximum yield of 590 fruits while the tree sprayed with linseed oil and the non-sprayed tree yielded 325 and 295 fruits, respectively. It may also be observed that the Sandolin 'A' sprayed tree produced a larger flush than the other two treatments. Thus, the efficacy of the linseed oil spray for obtaining earlier and larger crops in this variety of apple is fairly well established while the use of Sandolin 'A' has given indications of still better performance in the first year of its application. The latter chemical which was tried for the first season during this year deserved to be tried over a number of seasons to arrive at definite conclusions to determine its superiority over the other treatments.

(4) *Cordon training*.—The yield behaviour of the cordon trained trees was again studied for the second year in succession. Fruit counts recorded on the cordon trained trees indicated that Irish Peach cordons carried a mean crop of 23 fruits per tree, while Rome Beauty cordons failed to set any fruits, though they put forth stray abortive blossoms during the year under report.

II.—PLUM.

A. *Varietal performance*.—The mean tree yields of early bearing varieties like Rubio, Satsuma Seedling and Alu Bokhara were less than those of the previous year. The general orchard average of the plum crop was 30 lb. as against 36 lb.

of the previous year. Among the mid-season and late varieties, Hale recorded an average yield of 50 lb. per tree with a maximum of nearly 100 lb. while the usually shy bearing varieties like Abundance, Shiro, Gaviota, Czar and Combination recorded an average yield of 7 lb. per tree as against 10 lb. of the previous year. Hale, once again led all the other varieties in respect of yield and maintained its superiority over the others. The plum crop in general during this year has not been satisfactory. The result may be attributed to the cumulative effect of a number of adverse climatic factors such as failure of rain, untimely rains, etc., which prevailed during the year. The cropping in early varieties and the mid-season varieties, in particular, was depressed by the above factors which brought about low fruit set in the early varieties, and encouraged vegetative growth in the mid-season and late varieties.

Of the three varieties introduced from United States of America during 1950, two plants of Blue Damson and one of Reine Claude, established in the field but their progress was slow.

B. *Orchard performance on (a) common peach stock and (b) Prunus divericata stock*—(a) *Common peach stock*.—The annual growth measurements of the trees of seven varieties of plum on common peach stock planted in October 1946 are presented in Table VI.

TABLE VI.—Plum—Growth performance of seven plum varieties on common peach stock (measurements recorded in July 1952).

Scion varieties.	Number of trees.	Mean growth increments in scion girth (in cm.).	Mean growth increments in stock girth (in cm.).
(1)	(2)	(3)	(4)
Czar	1	2.8	2.3
Hale	7	2.4	2.8
Shiro	9	2.9	4.7
Alu Bokhara	9	2.1	1.9
Abundance	5	4.9	4.2
Rubio	9	3.0	2.1
Gaviota	6	1.2	2.3

The data presented above reveals that the largest increment in scion girth has been made by Abundance, followed by Rubio, while Gaviota has exhibited the least growth. The increment in stock girth once again outstripped that of the scion in Shiro and Gaviota during the year. The usual stock scion uneven bud joint observed in older budded trees of Czar and Gaviota with common peach was not so very conspicuously noted among the trees in this trial at this stage. All the trees in this plot bore a moderate crop during the year with Rubio and Alu Bokhara trees leading with a mean tree yield of 20 and 12 lb. each respectively.

(b) *Prunus divericata stock*.—The budded trees of Hale, Rubio and Combination on *Prunus divericata* continued to be very stunted in growth. They had attained an average size of barely 9.0 cm. in scion girth after 9 years of Orchard life. Only a very few fruits were borne on the trees of the three varieties during the year. This poor performance both in yield as well as in vegetative growth brings out once again the unsuitability of this stock for the above plum varieties under Coonoor conditions.

C. *Rootstock trial*.—Performance of Czar and Gaviota on plum seedling stocks and common peach stocks.—The growth increments recorded during the year in

each of the stionic combinations included in this trial (planted in 1948) are set out in Table VII.

TABLE VII.—Plum—Growth performance of Ozar and Gaviota on plum seedling stocks and on common peach stock (measurements recorded in June 1952).

Scion variety.	Rootstock.	Mean increments in		
		Stock girth (in cm.)	Scion girth (in cm.)	Difference between stock and scion girth (in cm.)
(1)	(2)	(3)	(4)	(5)
Seedlings of—				
Gaviota	Alu Bokhara	1.70	1.63	+ 0.07
Do.	Rubio	0.87	2.24	— 1.37
Do.	Satsuma Seedling	3.87	3.74	+ 0.13
Do.	Hale	3.10	4.05	— 0.95
Do.	Common peach	4.00	5.20	— 1.20
Czar	Alu Bokhara	2.60	1.87	+ 0.73
Do.	Rubio	2.23	2.54	— 0.31
Do.	Common peach	2.24	2.87	— 0.63

It would be seen from the above data that Gaviota on common peach stock has recorded the maximum growth of the stock and the scion during the year while Czar had the most vigorous stock growth on Alu Bokhara although common peach again led the others in scion girth in this variety during the year.

Among the several seedling stocks tested for Gaviota the growth of Rubio, Hale and Common peach stocks, has been outstripped by that of the scion during the year. In the case of Czar on Rubio and Common peach also, the growth of the scion had outstripped that of the stocks, except Alu Bokhara seedling stock which alone registered greater increase in girth than the Czar scion. The disparities in the relative stock scion growth in these combinations appear to offer no congenial graft joints in any of them.

D. Top-working trials.—In the top-working trials of Shiro and Abundance, the Hale branches top-worked on Shiro in 1948 developed a fair extension growth and produced a crop of nearly 200 fruits, while Satsuma top-worked during the same period on Shiro failed to unite. This result therefore indicates the graft incompatibility of Satsuma on Shiro.

Fruit counts recorded on Shiro trees situated in the vicinity of the tree top-worked to Hale once again indicated a larger crop than those situated away from the tree so top-worked. The former recorded 84 fruits per tree as against 24 borne by the latter. Similarly in a row of Abundance trees the branches nearer Kotagiri plum yielded on an average 177 fruits per tree as against 76 fruits of those far away from it. These observations once again confirmed the good polliniser influence of Hale and Kotagiri plums on Shiro and Abundance respectively.

E. Pruning trials—‘Short’ versus ‘long’ pruning—Gaviota.—The pruning treatments were repeated for the fifth year in succession in Gaviota. Once again, the results proved to be in favour of ‘long’ pruning. The mean tree yield in ‘short’ pruned trees worked out to 42 fruits as against 83 of the ‘long’ pruned ones.

Similar treatments were applied to two other promising varieties of plums, viz., Hale and Alu Bokhara. Here again the lightly pruned trees of Hale and Alu Bokhara registered higher yields by 73 and 399 fruits, respectively, over the corresponding severely pruned trees. This result is of sufficient economic value to the fruit grower in view of the assured higher yields resulting from the adoption of the improved method of pruning.

III.—PEAR.

A. Varietal performance.—The yield performance of Kieffer was below normal during the season. An estimated mean yield of only 40 lb. per tree was recorded during the season under report as against a mean of 60 lb. per tree recorded in

the previous season. Of the four selections of pear located in Kotagiri and planted in 1949 for a performance study, selection No. 2 again registered the best growth during the year. Among other varieties planted in 1946, New Pear was found to be of some promise in that it exhibited a more vigorous growth and attained a height of nearly 19 feet. This selection yielded a few good juicy fruits for the first time during the previous season, though it failed to crop during the season under report. Considering the initial growth made in the field, pear Jargonelle proved to be promising closely followed by Kalhatty, Beurre Hardy and Marie Louise in that respect.

B. Orchard investigations—(1) Growth performance of pear varieties. (Beurre Giffard, William, Jargonelle and Kieffer).—The respective growth performance of four pear varieties on stock pear planted in 1942 is summarised in Table VIII.

TABLE VIII.—Growth performance of pear varieties—Statement showing the comparative increments in growth from July 1951 to June 1952.

Scion varieties.	Mean increments in	
	Scion girth (in cm.)	Height (in cm.)
(1)	(2)	(3)
Beurre Giffard	8.50	56.75
William	9.40	57.20
Jargonelle	4.70	69.45
Kieffer	5.98	67.70

In height, Jargonelle registered the maximum growth increment closely followed by Kieffer, while in respect of scion girth William followed by Beurre Giffard, made better growth than the rest. The trees of Kieffer bore a sparse crop during the year recording a mean tree yield of 20 fruits per tree while the other varieties were yet to come to bearing.

(2) Top-working trials.—The growth performance of Kieffer pear topworked on China Pear (in 1944) continued to be satisfactory. The trees recorded a mean height of 16.5 feet since the time of top-working. The mean yield of these trees worked out to 24 fruits with a maximum of 50 fruits per tree. Grafts of this variety planted simultaneously with top-worked trees were yet to commence bearing. The precocious performance of the top-worked trees once again brings out the feasibility of converting unthrifty trees to fruitful ones by this method.

(3) Linseed oil emulsion spray (six per cent) on Beurre Giffard.—Considering the benefits derived on apple trees by a dormant spray of 3 per cent linseed oil emulsion, a similar spraying trials as in apple Winterstein was initiated during 1951 season on pear Beurre Giffard. One of the trees was sprayed with 6 per cent linseed oil emulsion in January 1952, and one was left unsprayed as control. The sprayed tree broke dormancy only 3 days earlier to the control and yielded a crop of 14 lb. The control tree yielded a crop weighing 9.5 lb. Thus there was no marked difference in yield between the sprayed and the control, difference being only 4.5 lb.

(4) Pruning and training.—The two 12-year old Beurre Giffard trees trained to Cadwell system in 1944 had put forth a few abortive blossoms in the previous two years, but failed to produce even stray flowers during the season under report. Therefore this method of training of pear Beurre Giffard has not proved to be of any value.

IV.—PEACH.

A. Varietal performance.—Killikrankie recorded a mean yield of only 5 lb. per tree with a maximum tree yield of 15 lb. The mean tree yield of Shah Pasand worked out to nearly 12 lb. per tree as against 13 lb. of the previous year. Red Shanghai failed to produce any crop while Shanghai Seedling recorded a mean tree yield of 7 lb. The cropping in peaches once again proved

to be very poor in the season. The exceptionally low yields recorded during this year and the past two years in the three abovenamed varieties were attributed mainly to the cumulative adverse effects of the successive failure of rains.

B. Orchard investigations—(1) Pruning trials—(a) Shanghai Seedling.—The pruning treatments were repeated for the fourth year in succession. The data recorded during the year is summarised in Table IX.

TABLE IX.—*Peach—Shanghai Seedling pruning trial showing the mean number of fruits and new flushes produced per shoot worked upon.*

Treatment.	Mean number of fruits.	Mean number of new flushes.
(1)	(2)	(3)
1 Cutting hard back shoots less than 11 inches and tipping shoots over 11 inches.	0.02	1.09
2 Cutting back shoots less than 11 inches and not tipping the other shoots.	0.82	1.46
3 Control —	0.01	0.05

From the above data it may be seen that treatment No. 2 shown in the table led treatment No. 1 and the control, both in respect of new flush production and the number of fruits borne per shoot worked upon. During the previous year, the control trees led the other pruning treatments. Therefore, it appears that the results recorded in this season are at variance with those of the previous season which obviously needs further confirmatory trials.

(b) *Peach Killikrankie.*—This trial is in its sixth year of working. The fruit counts recorded during the season in the two treatments indicated that 'long' pruned trees carried a mean crop of 108 fruits per tree against 71 fruits of those on the 'short' pruned ones.

The practice of 'short' or severe pruning has once again proved to be without any economic advantage. On the other hand such a practice merely led to reduction in cropping, appreciable loss of bearing shoots and progressive deterioration of the tree health. The results of the trial are sufficiently convincing to discourage this method of pruning as a regular orchard operation.

(2) *Peach age group trial.*—The growth measurements recorded in the two varieties in this trial in respect of stocks of different ages, viz., 8, 20 and 32 months of age are presented in Table X.

TABLE X.—*Mean growth increments of Red Shanghai and Shanghai Seedling on differently aged root stocks (measurements recorded in June 1952).*

Treatments.	Mean growth increments in			
	Red Shanghai.		Shanghai Seedling.	
	Stock girth (in. cm.).	Scion girth (in. cm.).	Stock girth (in. cm.).	Scion girth (in. cm.).
(1)	(2)	(3)	(4)	(5)
First age-group—				
Eight months old stock	3.88	4.65	1.61	1.90
Second age-group—				
Twenty months old stock	1.70	2.08	1.49	2.10
Third age-group—				
Thirty-two months old stock ..	0.89	1.16	1.64	1.87

It would be seen that the budlings of Red Shanghai on eight months old stock registered the maximum tree growth followed by those on twenty months old stock, while the plants on thirty-two months old stock were the least vigorous of the three combinations. In Shanghai Seedling, plants on twenty months old stock led the rest followed by those on eight and thirty-two months old stock. A few of the plants in each of the three age-groups bore a stray crop of fruits during the year. Preliminary fruit counts recorded in the season indicated that Red Shanghai

plants on eight months old stocks led with a mean of eighteen fruits per tree followed by those on thirty-two months old stocks with a mean of nine fruits only. The lowest mean yield of six fruits was recorded by the trees on twenty months old stock. In Shanghai Seedling the plants on eight and twenty months old stocks bore a mean crop of six fruits each while a single plant on the thirty-two months old stock matured only one fruit. It may well be necessary to extend the observations over a number of successive seasons for arriving at definite conclusions in this trial.

V.—PERSIMMON.

A. Varietal performance.—The performance of this fruit was satisfactory during the year. The orchard average yield in the case of Dai Dai Maru was 40 lb. while the unnamed variety recorded 32 lb. in this respect. The variety Tenanashi was found to produce large sized fruits recording a mean tree yield of 15 lb. The eating quality of this variety was adjudged to be superior to the other two varieties as well.

B. Nursery investigations—(1) Propagation trials.—Three inarches of persimmon Dai Dai Maru and one of unnamed variety raised on persimmon root-suckers in 1950 were planted out in the field during July 1951. The grafts established well and were progressing satisfactorily in the field. A further batch of twenty inarches of the same varieties raised during January to March 1951 on stocks of *Diospyros lotus* and persimmon root-suckers were planted out in December 1951. Of these only fifteen inarches successfully established and were making good growth in the field. A further lot of sixty inarches were also made during the corresponding period of 1952 and the grafts were awaiting separation.

(2) *Root-stock collection and multiplication.*—Seedlings of *Diospyros virginiana*, *D. lotus* and seedlings and suckers of *D. virginiana* and persimmon obtained from Sim's Park, Coonor, were planted in June 1951 to enrich the collection of stock material for propagation of persimmon. Seeds of a variety of persimmon known as a Gailey received from Auckland failed to germinate.

VI.—OTHER FRUITS.

Cherimoyer.—With a few to establish a progeny test plot of this fruit the following seedlings and grafts of reputed types from various sources were planted in 1949—

Seedlings of two outstanding local selections.

Seedlings of a reputed type from Kolakombay.

Farm seedlings and grafts.

Grafts on soursop from Ceylon.

Plants raised from seeds obtained from United States of America.

All the above plants were progressing satisfactorily. Preliminary growth observations at the end of the period under report revealed that, among the seedlings, those of the local selections had made maximum tree growth followed by the seedlings from United States of America. Among the clones, farm grafts, had made the most vigorous growth with those from Ceylon closely following.

Grafts versus seedlings.—The mean increments in growth made during the year by the seedlings and grafts in this trial are recorded in Table XI.

TABLE XI.—*Cherimoyer—Showing mean growth measurements of cherimoyer seedlings and grafts (recorded in June 1952).*

Treatment.	Stem or stock girth (in. cm.).	Scion girth (in. cm.).	Height (in. inches).	Spread (in. inches).
(1)	(2)	(3)	(4)	(5)
Seedlings	27.96	.. .. .	84.9	86.6
Grafts	30.98	24.63	90.25	86.6

It would be seen from the above data that the grafts were leading the seedlings in respect of stem girth and height while in respect of tree spread, there was almost equal response in both cases.

Passion fruit.—The performance of the purple fruited variety of passion fruit continued to be satisfactory during the year. This variety registered a mean yield of two hundred fruits per vine.

The only seedling of yellow passion fruit introduced from Ceylon in 1950 was found to be making a vigorous growth. The vine put forth the first crop of blossom during the year after nearly thirty months of planting; the vine was found to be developing a few fruits which were yet to mature at the time of this report.

Apricot.—The performance of this nut crop was not satisfactory during this year though the trees matured a small crop of fruits during the previous season.

Fig.—Among the local selections of fig the selection from Kalhatty continued to be most promising recording a mean crop set of ninety fruits per tree. The fruits were of fairly large size with an average eating quality. Three more selections of outstanding quality were introduced from Adar Estate, Penukonda and Kodaikanal as additions to the existing collection.

Miscellaneous fruits.—(a) *Blackberry and Raspberry.*—The performance of these two bush fruits was satisfactory during the year with an average yield of about 500 berries in the former and about 150 in the latter per cane.

(b) *Walnut.*—The yield performance of this nut crop was satisfactory during the year, each tree having set nearly 200 nuts on an average. Hand pollination was found to be an easy technique to ensure better cropping. Against a normal crop of 150 nuts per tree under open pollinated conditions a maximum yield of 200 nuts per tree was achieved by hand pollinating the flowers.

(c) *Japanese chestnut.*—A mean yield of 50 fruits of good eating quality per tree was recorded which is rather low considering the age and size of the trees at the station.

(d) *Seville lemon.*—The performance of this fruit continued to be encouraging. A mean yield of 40 fruits per tree each fruit weighing 4 oz. on an average, was recorded during the season. This fruit is perhaps the largest sized seedless lemon in cultivation on the hills. In view of its promising performance at the station large scale multiplication of the fruit by layering was being done for distribution to growers on the hills.

(e) *Loquat.*—The growth of the single plant of loquat, variety Advance, was satisfactory during the year.

New introductions.—(a) Plants of *Cassimiroa edulis* (White sapote) from United States of America and Queensland nut from Kallar introduced in 1950 were progressing well. They had grown to about 7 feet in height but had not come to bearing.

(b) *Melons.*—Four varieties of musk melons, viz., Jalbudama, Bathasa, Hingan and Sherbat Anar and 36 reciprocal crosses thereof were sown in the field for trial during March 1952. Of these Sherbat Anar, Jalbudama and Bathasa recorded a 50 per cent germination each, while Hingan and the crosses recorded only 40 per cent and 30 per cent respectively. Flowering commenced in all the varieties two months after planting. Fruits were not yet mature for testing their quality and for recording their descriptions.

VII.—VEGETABLES AND OTHER ECONOMIC PLANTS.

Vegetables.—The work on vegetables was restricted to the growing of promising varieties as inter-crops with a view to supplement the revenue of the station as well as for the multiplication of seed. Four varieties of cucumber and one of spinach received from a source in Chicago were tried at the station during the year. Of these cucumber Improved Long Green alone proved to be of fair quality and suitable for cultivation. Small quantities of seeds of the successful introductions were distributed to four other agricultural research stations for further trial. Long Island variety of dill, a spice crop, also introduced from the same source performed very well at the station. Seeds of this crop also were similarly distributed. The following quantities of different vegetable seeds which were

collected at the station during the year were transferred to the local agricultural demonstrator for distribution to the growers in the district.

	LB.	OZ.
Cabbage—Large Early Drumhead	1	10
Cauliflower—Pomocol	1	6
Beans (Black Valentine and local)	74	8
Tomatoes	0	12½
Lettuce	0	12

Other economic plants.—(a) *Scented geranium.*—The results of the assay on scented geranium oil extracted from the leaves of *Pelargonium graveolens* again proved to be very encouraging. The leaves were analysed to contain 0.062 per cent to 0.14 per cent of the geranium oil depending upon the proportion of the leaf matter contained in the pickings. The 'tops' which had a larger leaf content showed proportionately higher oil extract than the basal portion of the shoots which contained a lesser proportion of the leaf matter. Special efforts were put under way to popularise this plant towards the establishment of a commercial essential oil industry. The area under this crop at the station was extended considerably by planting over 10,000 cuttings with a view to maximise the production of the oil on a commercial basis.

(b) *Pyrethrum.*—The area under the high yielding progenies of this crop was extended. Splits of the tested high yielding progenies of this crop were supplied to other agricultural stations on the Nilgiris for further extension.

(c) *Strawberry.*—The high yielding progenies which were under test in this station were finally isolated and efforts were put under way to extend their cultivation in this station.

(d) *Nutmeg oil as weedicide.*—With a view to verify the belief that the fallen nutmeg leaves have a inhibitory action on the growth of weeds, the essential oil of nutmeg was distilled for testing its efficacy as a weedicide in a preliminary observation trial. The oil was applied in its pure and emulsified form with soap solution on five common weeds, viz., *Oxalis*, *Helichrysum*, *Erigeron*, *Lantana* and *Eupatorium*. It was observed that a 30 per cent emulsion of the oil with soap was partially effective only in their germinating stage. But the pure oil when sprayed at that stage, proved to be clearly phytocidal and too strong to permit the revival of the plants. The lethal action of the essential oil on grown up plants with tender foliage was also fairly severe. It was also observed that a thorough and effective spray of the oil on the leaf surface and on the growing point brought about a quick wilting of the weeds where as a partial spray resulted often in scorching the sprayed portion of the leaf surface, leaving the other parts green. Further observations with the dilute emulsions were in progress.

VIII.—MISCELLANEOUS.

(a) *Bee-keeping.*—Special attention was paid to increase the output of honey at the station. The strength of the bee hives at the end of the year was 38 as against 40 at the end of the previous year. The production of honey was little higher than in the last year, the average production of honey per hive being 4½ pounds as against the previous year's average of nearly four pounds.

(b) *Advisory work.*—Eighteen private orchards were visited by the staff of the station at the request of the owners and practical assistance and advice rendered on several aspects of fruit culture. Four skilled mazdoors were deputed to private orchards for over 30 days for assistance in pruning, spraying, planting and propagation work.

(c) *Supply of seeds and plants.*—The details of supplies of plants, seeds, etc., made during the year are furnished in Table XII.

TABLE XII.

Kinds of plants, seeds, etc.	Plants, number.	Cuttings, number.	Layers, number.	Splits, number.	Seeds. LB. OZ.
(1)	(2)	(3)	(4)	(5)	(6)
Apple	52	..	..	..	..
Pear	74	..	..	..	..
Peach	49	..	..	..	..
Plum	12	..	..	..	..
Cherimoyer	561	..	..	..	..
Cape gooseberry	28	..	..	..	..
Tree tomato	..	..	12	..	..
Seville lemon	294	..	..	..	..
Passion fruit	..	..	..	56	..
Strawberry	..	2,468	..	..	..
Scented geranium	2,004	..	..	..	170 8
Vegetables	..	..	..	..	..
Total	3,074	2,468	12	56	170 8

(d) *General.*—The year proved disappointing in the matter of timely and adequate rains for the third season in succession. Special efforts were put under way to fight the failing water-supply to such of the plots where water scarcity was keenly felt. As a result of the efforts a new pipe line for diversion of water over a length of 400 feet in the new area was erected to secure adequate irrigation for the Central area.

Special attention was paid to the extended cultivation of green manure crops such as *Centrosema pubescens*, *Calapogonium muconoides*, berseem, lucerne and several species of clovers with a view to improve the soil conditions at the station and to make the farm self-sufficient in respect of its manurial requirements.

IX.—MODEL ORCHARD-cum-NURSERY.

This is an annexe comprising an orchard and a nursery which is run on commercial basis under a scheme sanctioned for a period of three years at the first instance commencing from November 1949. This is situated to the north of the main station and extends over an area of 10 acres. A block of 6 acres has been planted to tested and promising varieties of apple, plum, peach and pear interspersed with attractive bowers of the passion fruit. The nursery which is in two parts is situated on either end of the main orchard extending over an area of about 3.5 acres. The progress of work in the main orchard area and the nursery since the inception of the scheme is outlined below.

Main orchard area.—The preparation of land with the clearance of the jungle trees and scrub commenced during the year 1949. An area of 6 acres was cleared and the land was made ready for planting by October 1949. On the basis of the past performance at the main station six varieties of plum, four of apple, one of pear, four of peach and a local selection of cherimoyer, which were determined to be the most promising ones were selected for planting in this commercial orchard. The varieties so selected are listed below:—

Plum.	Peach.
Shiro.	Killikrankie.
Hale.	Red Shanghai.
Alu Bokhara.	Shanghai Seedling.
Gaviota.	Shah Pasand.
Satsuma Seedling.	
Rubio.	
Pear.	Apple.
Kieffer.	Irish Peach.
	Rome Beauty.
	Allsop's Early.
	Winterstein.

These plants were set out in the field in October 1949 and they have made satisfactory growth so far. The plum trees in particular were the most vigorous of all and during the year under report sparse flowering was noticed in all the varieties followed by a sparse crop of fruits. Among the peaches, one variety of Killikrankie also attained the bearing age. The other fruits were still in their prebearing period. Growing of vegetables such as the cole crops and the potatoes was adopted on a planned basis as a part of a systematic inter cropping programme with the twofold object of maximising the revenue of the station and to build up a stock of pure seed for distribution.

Among the other methods resorted to capitalise the unthrifty prebearing period of the orchard were the cultivation of quick growing fruits such as passion fruit, lemon and tree-tomato and bee-keeping for the collection of honey. During the period under review a total quantity of nearly 4,000 pounds of the purple variety of passion fruit valued at Rs. 1,000 was realised. In addition to these the area under scented geranium and the high yielding progenies of pyrethrum was being extended in the alley spaces with the same objects in view.

Nursery.—To begin with the rugged portion of land assigned for the nursery section had to be thrown into terraces before regular nursery operations could be commenced. This preliminary work lasted up to December 1950, whence the sowing and other propagation activities commenced regularly. The initial efforts in 1951 in this direction yielded a stock of over 5,000 grafts of pears, plums and peaches. To cope with the increased demand for the fruit plants from the public, propagation work was further intensified. During the sowing season of 1952 over 120,000 seeds of common peach were sown for raising stock seedlings for the next propagation season. This is estimated to yield ultimately about 15,000 plants. Besides these, efforts were put under way for large-scale collection of passion fruit seedlings, Eucalyptus seedlings and scented geranium plants which are meant for a wide distribution covering a large part of the State.

Miscellaneous.—Want of adequate irrigation facilities in this unit continued to be a serious problem. Repeated approaches to the Municipal authorities for diversion of municipal channel water having proved futile the alternate possibilities of diversion of water from perennial jungle sources were being explored.

The detailed financial aspects of the scheme since its inception are presented below:—

STATEMENT OF EXPENDITURE AND RECEIPTS FROM THE INCEPTION OF THE SCHEME UP TO THE END OF JUNE 1952.

Expenditure.					RS.	A.	P.
Establishment	..	..	..	..	4,219	0	0
Contingencies	..	..	..	..	21,187	11	9
Total	..	..	..	..	25,406	11	9
Actual Receipts.							
Actual receipts	..	..	..	..	13,919	10	3
Value of transfers	..	..	..	..	4,446	2	0
Total	..	..	..	..	18,365	12	3
Value of stock on hand.							
Cost of 4,500 rooted cuttings of pear at 6 annas each.	..	..	..	..	1,687	8	0
Cost of 4,000 common peach seedlings at 3 annas each.	..	..	..	..	750	0	0
Cost of 7,500 budded and grafted plants at Rs. 1-12-0 each	..	..	..	..	13,125	0	0
Total	..	..	..	..	15,562	8	0
Total assets including receipts	..	..	..	..	33,928	4	2

APPENDIX III.

STATEMENT OF CHARGES AND RECEIPTS OF MODEL ORCHARD cum NURSERY, COONOR
(FROM JULY 1951 TO JUNE 1952).

Charges.		RS.	A.	P.
Pay of establishment—				
Temporary	895	2	0	
Dearness allowance	491	0	0	
Other compensatory allowances	216	0	0	
House rent allowance	72	0	0	
Travelling allowance	52	8	0	
Contingencies—				
Petty construction and repairs	..	..	..	..
Purchase of dead stock	198	10	0	
Working expenses	6,726	0	0	
Dearness allowance to menials	427	7	0	

Receipts.

XXIX-A. Agricultural receipts—				
Agricultural stations	10,008	14	0	
Miscellaneous	..	..	..	..
XIII—O.T.	0	0	3	
Value of transfers	2,096	10	0	

NOTE.—This excludes value of plants on hand at the end of the year, which amounts to roughly Rs. 15,500.

APPENDIX IV.

STATEMENT SHOWING COSTS OF CULTIVATION AND RECEIPTS FOR THREE OF THE MAJOR
FRUIT CROPS AT THE POMOLOGICAL STATION, COONOR.

1. Plum.—Rubio and Hale—Field No. 9—Area 1 acre—83 trees (26 years old).

Cultivation charges.		Receipts.	
	RS. A. P.		LB.
1 Cultural operations like weed- ing, hoeing, etc.	125 8 0	1 Yield from 83 trees	1,495
2 Manuring including the cost of manure.	213 5 10	2 Value of yields at 5 annas per lb. of Rubio and at 6 annas per lb. of Hale.	529 11 0
3 Pruning and spraying ..	14 3 9	3 Deduct cost of cultivation ..	362 9 7
4 Harvesting and other charges.	9 8 0	4 Net return per acre	167 1 5
Total ..	362 9 7		

2. Peach.—Killikrankie—Field No. 1—Area 0.20 acre—12 trees (20 years old).

Cultivation charges.		Receipts.	
	RS. A. P.		LB.
1 Cultural operation like weed- ing, hoeing, etc.	25 0 0	1 Yield from 12 trees	150
2 Manuring including the cost of manure.	45 0 0	2 Value of yields at 2 annas per lb.	112 8 0
3 Pruning and spraying ..	10 0 0	3 Deduct cost of cultivation ..	87 8 0
4 Harvesting and other charges.	7 8 0	4 Net return per 0.20 acre ..	25 0 0
Total ..	87 8 0	5 Net return per acre	125 0 0

3. Persimmon—Field No. 7—Area 0.25 acre—30 years old 50 trees.

Cultivation charges.		Receipts.	
	RS. A. P.		LB.
1 Cultural operations like weed- ing, hoeing, etc.	86 2 0	1 Yield from 50 trees	1,000
2 Manuring including the cost of manure.	138 10 0	2 Value of yields at 6 annas per lb.	375 0 0
3 Spraying including the cost of spray	5 4 0	3 Deduct cost of cultivation ..	240 2 0
4 Cost of pruning ..	5 0 0	4 Net return for 0.25 acre ..	134 14 0
5 Harvesting and other charges.	5 2 0	5 Net return per acre	539 8 0
Total ..	240 2 0		

APPENDIX V.

MODEL ORCHARD cum NURSERY, COONOR.

Expenditure—Fieldwar.

Field number.	1949-50.			1950-51.		
	Working expenses.	Permanent improvement.	Total.	Working expenses.	Permanent improvement.	Total.
	(2)	(3)	(4)	(5)	(6)	(7)
(1)	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
I	821 12 11	296 13 0	1,118 9 11	2,178 5 10	..	2,178 5 10
II	375 6 5	..	375 6 5	1,144 3 3	..	1,144 3 3
III	292 10 3	..	292 10 3	1,017 2 4	287 12 0	1,304 14 4
IV	538 10 11	..	538 10 11	1,388 9 11	..	1,388 9 11
V	161 2 10	..	161 2 10	611 14 5	..	611 14 5
N.A. ..	1,875 4 1	120 0 6	1,995 4 1	1,256 8 0	1,130 5 0	2,386 13 6
N.B. ..	106 0 8	..	106 0 8	387 12 6	..	387 12 6
Total.						
1951-52.						
	Working expenses.	Permanent improvement.	Total.	Working expenses.	Permanent improvement.	Total.
	(8)	(9)	(10)	(11)	(12)	(13)
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
I	1,484 6 9	..	1,484 6 9	4,484 9 2	296 13 0	4,781 6 2
II	966 9 6	..	966 9 6	2,486 3 2	..	2,486 3 2
III	577 0 9	..	577 0 9	1,886 13 4	287 12 0	2,174 9 4
IV	1,098 9 6	..	1,098 9 6	3,025 14 4	..	3,025 14 4
V	537 11 3	..	537 11 3	1,310 12 6	..	1,310 12 6
N.A. ..	1,648 11 10	..	1,648 11 10	4,780 7 11	1,250 5 0	6,030 12 11
N.B. ..	2,545 12 4	251 2 0	2,796 14 4	3,039 9 6	251 2 0	3,290 11 6

Receipts.

Field number.	1949-50.		1950-51.		1951-52.		Total.	
	RS.	A. P.	RS.	A. P.	RS.	A. P.	RS.	A. P.
I	..	..	..	108 13 0	1,672 4 0	..	1,781 1 0	..
II	..	..	..	115 15 0	2,158 13 10	..	2,274 12 10	..
III	..	..	..	442 4 0	467 15 4	..	910 3 4	..
IV	..	..	..	713 3 0	729 4 0	..	1,442 7 0	..
V	..	..	..	50 11 0	252 14 8	..	303 9 8	..
N.A. ..	..	..	291 8 0	5,236 1 0	6,410 11 0	..	11,938 4 0	..
N.B. ..	..	..	..	..	228 10 0	..	228 10 0	..
Grand total ..	..	..	291 8 0	6,666 15 0	11,920 8 10	..	18,878 15 10	..

ANNUAL REPORT OF THE BURLIAR FRUIT STATION FOR THE YEAR 1951-52 (FASLI 1361).

Season and rainfall.—The summary of the weekly rainfall distribution for the year under report is presented in Table I.

TABLE I.—Rainfall statement for the year 1951-52.

TABLE 1. - RAINFALL DATA.									
Month.	Week.	1951-52.		1950-51.		Average rainfall for the past ten years.		Average rainfall for the past 39 years.	
		Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.
South-west monsoon.									
June	7-13	0.41	3	0.08	..	0.53	1.2	0.35	1.58
	14-20	0.10	1	0.49	2	0.50	2.2	0.52	2.27
	21-27	..	..	..	..	0.30	1.5	0.43	1.17
June July	28-4	..	..	0.06	..	0.29	1.8	0.47	1.37
	5-11	0.08	..	0.98	3	0.51	2.5	0.46	2.13
	12-18	0.61	2	0.19	1	0.60	2.9	0.67	2.33
July-August	19-25	0.28	1	0.84	3	0.85	2.4	0.75	2.45
	26-1	..	..	1.22	4	0.64	2.3	0.60	2.75
	2-8	..	..	0.76	2	0.73	3.1	0.72	2.62
August-September	9-15	0.30	1	1.10	3	0.76	2.8	0.73	2.37
	16-22	..	..	2.96	3	0.97	1.8	1.17	2.36
	23-29	2.27	4	1.46	4	0.90	2.5	0.75	2.43
Total ..	30-6	..	..	0.05	..	0.56	2.0	0.63	2.33
	6-12	0.73	2	0.19	1	0.61	1.9	0.48	1.66
	13-19	2.32	3	..	..	0.65	1.7	1.21	2.47
Total ..	20-26	2.67	5	0.38	2	0.55	2.5	0.91	2.73
		9.82	22	10.76	28	9.95	35.1	10.85	35.02
North-east monsoon.									
September-October	27-3	1.92	2	0.67	3	1.09	3.0	1.10	2.77
	4-10	..	..	0.44	1	1.53	2.9	1.50	3.33
	11-17	3.52	2	3.05	6	2.95	4.0	2.91	3.38
November	18-24	0.36	1	0.19	1	2.55	3.4	4.03	4.01
	25-31	0.91	2	..	..	2.58	2.3	4.79	3.89
	1-7	2.80	5	0.57	3	2.45	3.4	3.01	3.99
November-December	8-14	5.46	4	7.76	7	4.55	4.6	3.53	3.49
	15-21	1.76	3	1.05	2	2.98	3.9	2.32	2.61
	22-28	3.78	2	..	..	3.42	3.6	1.88	2.60
December-January	29-5	3.08	4	..	..	2.61	2.7	1.55	2.59
	6-12	..	..	0.35	1	1.10	1.7	1.27	1.53
	13-19	0.69	2	0.31	1	0.57	2.0	1.38	1.76
Total ..	20-26	..	..	0.40	1	1.35	1.5	1.56	1.11
	27-3	0.56	1	1.84	1	0.62	1.0	1.78	1.43
	4-10	0.06	..	0.08	..	1.42	1.6	1.12	1.00
Total ..	11-17	..	..	1.95	1	0.40	0.5	0.70	1.94
	18-24	..	..	..	..	0.45	0.6	0.81	1.15
	25-31	1.34	2	..	..	0.40	0.9	0.85	1.10
Total ..		23.24	30	10.16	28	33.02	44.1	36.09	42.63
Hot weather.									
February	1-7	0.02	..	..	..	0.64	1.1	1.99	1.33
	8-14	0.56	1	..	..	0.60	1.0	0.90	0.93
	15-21	2.25	1	..	..	0.85	1.3	0.72	0.19
March	22-29	12.82	4	..	..	0.53	0.8	0.70	0.18
	1-7	2.36	1	..	..	0.21	0.3	0.52	0.39
	8-14	..	..	..	..	0.28	0.4	0.36	0.90
March-April	15-21	..	..	..	..	0.94	0.7	0.79	0.96
	22-28	0.07	..	1.55	3	0.67	1.4	0.45	0.95
	29-4	0.11	1	0.28	2	0.67	1.4	0.34	1.22
April-May	5-11	0.61	2	0.61	1	1.15	2.3	0.25	1.00
	12-18	6.33	3	6.33	4	2.51	2.6	0.77	1.60
	19-25	..	..	0.16	1	0.64	1.6	0.63	1.57
May-June	26-2	..	..	0.54	1	0.78	1.2	0.26	1.64
	3-9	..	..	1.16	2	0.49	1.8	1.00	2.23
	10-16	..	..	1.11	3	0.75	2.0	1.7	1.51
Total ..	17-23	..	..	1.28	2	1.2	2.6	0.67	2.26
	24-30	0.49	1	0.07	..	0.52	1.3	0.79	1.60
	31-6	0.16	..	0.41	1	0.31	1.8	0.52	1.71
Total ..		21.78	14	13.55	20	13.56	25.6	12.83	22.67
Grand total ..		54.84	66	43.47	76	56.53	104.8	59.77	100.32

Taking the total precipitation into consideration the year can be regarded as favourable for most of the crops in the station. With its total rainfall of 54.8 inches the year under report was definitely better than the previous year which recorded a total rainfall of 43.47 inches although the total rainfall was not equal to the previous 39 years average. Considering, however, the actual number of rainy days, the year should be considered as poor, recording only 66 rainy days as against the average of 104.8 of the past ten years and against 100.32 of the past 39 years' average. It would be apparent from the table that the rainfall has been distributed ununiformly. The year experienced heavy rains in the hot-weather period but the precipitation was uneven with heavy downpours interrupted by comparatively long periods of drought. On the whole the better seasonal conditions which prevailed during the year have had their beneficial influence on the cropping in the several fruit and other economic crops growing in the station.

I. ORCHARD.

A. *New plantings and sowings.*—With a view to extend the area under cacao and to build up the parent plant material for raising a large stock of plants to meet the mounting demand from the growers, 28 seedlings and 22 budded plants (raised on own roots) of the Criollo variety were planted during July–August 1951. Over 500 banana suckers of the chief commercial varieties, viz., Deraivazhai and Laden were planted in the available spaces with a view to supplementing the resources of revenue of the station. The other new plantings constituted ten seedlings of tree-tomato, two rooted cuttings of the yellow passion fruit from Coonoor and two rooted cuttings of *Passiflora quadrangularis* commonly known as the giant granadilla from the Anamalais.

In the nursery, 16,500 seeds of cinnamon, 9,848 seeds of nutmeg, 3,654 seeds of mangosteen, 9,375 beans of Criollo cacao, 3,480 seeds of clove and 7,320 seeds of eight different jack selections and 665 seeds of durian were sown. From these sowings a total number of 7,575 seedlings of cacao, 2,200 of cinnamon, 4,428 of nutmeg, 2,214 of clove, 5,718 of jack, 2,580 of mangosteen, 572 of litchi, 322 of avocado, 337 of durian were ultimately obtained for distribution. Other sowings made during the season included seeds of *Muristica beddomei*, *Myristica malabarica* and seeds of *Cullenia excelsa* in small quantities. A total quantity of 2½ lb. of *Peuraria phaseoloides* seeds was also sown on the slopes of the station to provide a cover crop for preventing soil erosion as well as to enrich the soil.

Besides these a large number of seedlings of vegetatively propagated plants of the several fruit and other economic crops were raised for distribution.

B. *Harvest of orchard produce.*—The harvests made during the year of the several important crops are furnished in Table II.

TABLE II.—Summary of harvest of orchard produce, 1950–52.

Serial number and name of produce.	1950–51.		1951–52.	
	Number of trees which yielded.	Yield.	Number of trees which yielded.	Yield.
		LB. OZ.		LB. OZ.
(1)	(2)	(3)	(4)	(5)
1 Mangosteen	36	2,001 (numbers)	89	23,181 (numbers)
2 Pummelo	10	501 8	9	1,163 8
3 Litchi	3	188 8	3	353 0
4 Durian	7	198 0	7	506 8
5 Avocado	1	5 0	1	77 0
6 Carambola sweet	2	309 0	2	115 0
7 Langsat	4	68 8	3	197 8
8 Bread fruit	8	40 8	6	343 0
9 Grape fruit	8	155 0	5	119 8

30—2000—5000

Serial number and name of produce.	1950–51.		1951–52.	
	Number of trees which yielded.	Yield.	Number of trees which yielded.	Yield.
		LB. OZ.		LB. OZ.
(1)	(2)	(3)	(4)	(5)
10 Jack	18	2,637 0	18	3,890 0
11 Clove	8	4 8 6 (dry)	11	8 (dry)
		14 8 (green)	31	1 (green)
12 Bull's heart	5	51 0 5	117	8
13 Surinam cherry	2	3 8 2	1	0
14 <i>Garcinia tinctoria</i>	1	40 8 2	40	8
15 Cardamom	40	2 10 40	2	18
16 Coconut	3	9 (numbers)	4	16 (numbers)
17 Cacao (pods)	8	2½ (numbers)	8	278 (numbers)
18 <i>Monstera deliciosa</i>	1	0 8 1	0	8
19 Cinnamon bark	1	2 14 1	1	11
20 <i>Feijoa sellowiana</i>	1	2 0 1	2	0
21 Tree tomato	3	2 0 1	6	0
22 Nutmeg (fruits)	..	.. 15	19803 (numbers)	
23 Nutmeg (mace)	..	.. 15	14	5½

The harvest figures show appreciable increased yields in breadfruit, jack, bull's heart, cacao, nutmeg, clove, etc. over the previous year's yields. The season appears to have been less favourable in respect of few crops such as carambola (sweet) and grapefruit in which either a lesser proportion of trees has cropped or the total yields realised were poorer than in the last season. In the case of mangosteen it would be observed that there was not only a higher percentage of trees in cropping but there was also a high orchard average of 260 fruits as compared to only a mean of 55 fruits of the previous season. The heavy cropping in this fruit is partly attributed to the lean cropping which preceded in the previous season and partly to the fairly heavy summer showers received in 1951 followed by an interval of comparatively dry period preceding the blossoming. The favourable rains received during the year under report have also had the beneficial influence on the cropping in the other major fruit crops listed above.

II. FRUIT CROPS AND NURSERY.

1. *Mangosteen—Propagation trials.*—(a) *Inarching.*—With a view to determine a suitable method of clonal propagation of this fruit crop, trials employing various methods of vegetative propagation were undertaken and the results of these trials are detailed below. The nine inarches raised on 3 to 4 year old *Garcinia tinctoria* seedlings were separated after nearly thirteen months of the operation. The inarches, however, failed to survive. This trial has yielded results of the delayed incompatibility consistently for six years and as such further pursuit of research in this direction was discontinued.

(b) *Side-grafting.*—A single side-graft raised *in situ* on a mangosteen seedlings in July 1949, continued to make sufficient progress in the field and made an extension growth of nearly 16 inches during the course of 3 years with an increment of about 4 inches over last year's growth. This was kept under careful observation. Plants *in situ* were being nursed for similar operations in future.

(c) *Nurse-grafted Y-cutting method.*—A fresh trial of propagation of mangosteen by the above method was continued over this season. Commencing from February 1951 up to September 1951, inarches on *Garcinia tinctoria* employing this method were raised at the rate of five every month. The technique adopted in this method of propagation consists in using one arm of a 'Y' shaped leafy shoot

for inarching with the seedling stock. Soon after the union between the two portions is observed, the basal portion of the 'Y' shaped scion shoot is ringed and allowed to callus to promote better union between the scion and the stock. After such an union is noticed, the 'Y' shaped shoot along with the inarch so raised, is severed below the ringed portion and inserted fully in the soil medium. The inarches raised during the month of February to June 1951 showed early callus formation. Union was also found to be complete in a period of nearly twelve months of the operations in these grafts. One of the inarches raised in February 1951 in which union was complete and the ringed portion had developed good callus was separated in October 1951. But within a short period of fifteen days of planting all the grafts succumbed.

Out of a batch 40 inarches raised by this method from February 1951 to September 1951 only 22 inarches in all united properly and survived finally. All the five inarches made in February and four of March totally failed to unite, thereby indicating possibly, the unsuitability of these months for this operation. In the other batches, two to three inarches had failed to unite in all the months excepting in the June batch in which all the five inarches raised were found to be in a healthy condition.

2. Jack—(1) *Propagation trials*—(a) *Cincturing and etiolation*.—A fresh monthly trial employing this method of propagation was laid out commencing from March 1951. Five shoots were cinctured and etiolated every month for a period of twelve months. Though there was callus formation in almost all the batches, root primordia failed to develop even after a period of fifteen months. Therefore this method of propagation requires extended trials to decide the merits or otherwise of this method.

(b) *Inarching*.—Four out of five inarches of jack (*Artocarpus integer*) on breadfruit seedling stock (*Artocarpus incisa*) which were raised in July 1951 were successfully separated in February 1952. Though the union between the two was good at the time of separation, the grafts failed to survive finally. Observations on the stock and scion growth revealed that the stock (breadfruit seedling) had a tendency to register a more vigorous growth and thereby to outgrow the scion with the result that the scion shoots in all the inarches died within a fortnight after separation. This stock, therefore, should be deemed unsuitable in view of the differential rate of growth between the stock and scion.

(2) (a) *Pollination studies and hybridisation*.—To study the effect of hand pollination with breadfruit (seedless) on jack a trial was laid out in December 1951 with the following treatments:—

- (i) Open pollination—spikes to be allowed to set fruit under natural conditions.
- (ii) Hand pollination with pollen from the same tree.
- (iii) No pollination (pollination prevented by bagging the spikes).
- (iv) Pollination with pollen from the breadfruit seedless.

The last mentioned treatment could not be carried out as the flowering period of jack and breadfruit did not synchronise during the season under report. However, a total number of 15 jack spikes were utilized at the rate of five each for the other three treatments. The development of fruits as a result of the above treatments was studied and the respective mean fruit and pulp weights recorded. From the data collected it was observed that the mean pulp weight was the heaviest in the open pollinated fruit being 9.6 lb. followed by the hand pollinated fruit recording a mean pulp weight of 6.6 lb. and the fruit developing from no pollination with 5.3 lb. The fruit weight was also the lowest in the last treatment being 19.7 lb. while the open pollinated and the hand pollinated fruits recorded 21.0 lb. and 21.6 lb. respectively. It is a matter of interest to note that the spikes even

under bagged conditions permitting no access of pollen were successfully developing fruits although the fruits so developed did not attain the normal size. This feature appears, therefore, to be a case of parthenocarpic fruit formation. Further observations were continued.

(b) *Cross between two types*: With a view to evolve a type combining the early bearing character of Singapore jack and the superior fruit quality associated with the jack selection known as Velipela at this Station, crossings between the two types were effected. Four spikes of Velipela jack were treated with the pollen of Singapore jack in February 1952. Of these only three developed into fruits but all the three were found to be very small weighing not more than 3 lb. The fruits were also not uniform in shape containing only 10 to 13 flakes in each, thereby indicating that Singapore jack might be an incompatible polliniser for the Velipela jack.

It would be of interest to note in this connection that reciprocal crossing of Velipela ♂ with Singapore ♀ however resulted in normal development of fruits at the Kallar Fruit Station the details of which are accounted in the report pertaining to that station.

(3) *Progeny trials*.—Besides the seedling and clonal progenies of the ten selections planted during August 1950, a search was made in June 1951 for the outstanding jack chance seedlings growing at different elevations on the Nilgiris with a view to include them in the progeny tests at this station. As a result, three trees were selected for their prolificity and superior fruit quality at Burliar (2,500 feet), Benhope (about 3,500 feet) and at lower Tiger Rock Estate (about 4,000 feet) on the Nilgiri Hills. The seedling progenies of these were raised and were planted in the field. Efforts were underway for raising clonal plants of these selected trees during the current propagation season.

The latest growth measurements recorded by the several progenies planted in August 1950 since the time of planting are presented in Table III.

TABLE III.—*Jack progeny trials.*

Growth performance of jack progenies (planted in August 1950). Measurements recorded in June 1952.

(Mean growth measurements made in 22 months).

Serial number and name of the progeny or selection.	Seedlings or grafts.	Mean growth (in inches).			
		Stem or stock girth.	Scion girth.	Height.	Spread.
(1)	(2)	(3)	(4)	(5)	(6)
1 Thyagarayanagar	Graft	1.86	1.50	26.29	18.20
2 Burliar No. 1 Estate	Do.	2.25	1.29	38.70	18.20
3 Coimbatore College Orchard ..	Do.	1.50	1.00	11.00	6.00
4 Burliar Velipala	Seedling	1.25	..	24.00	11.25
5 Taliparamba	Do.	1.03	..	33.00	18.25
6 Vriddhachalam	Do.	1.58	..	29.50	17.50
7 Olavakot	Do.	1.50	..	32.00	16.00
8 Puthur	Do.	2.02	..	41.00	23.00
9 Cuddalore	Do.	1.50	..	32.00	10.00
10 Burliar (Ordinary)	Do.	1.50	..	25.00	7.00

The initial growth recorded by the several plants in this trial revealed that among the seedling progenies the Puthur selection was leading the rest in all respects, viz., in height, spread and stem girth, followed by the seedlings of Vriddhachalam selection in stem girth, the Taliparamba selection in height and spread, while it recorded the least growth in stem girth. The Velipela and ordinary jack of Burliar Fruit Station recorded the least growth in height and spread respectively. Among the grafts, the Burliar No. 1 Estate selection recorded the maximum growth in stock girth, height and spread while, its mean scion

girth was less than that of Thyagarayanagar grafts which followed the former in the other two respects. The grafts of the Coimbatore College Orchard selection registered the least growth in respect of height and spread. The overall performance of the Puthur selection in initial growth was most promising among all the plants, clonal or otherwise.

Further attempts were pursued during the 1952 fruiting season to isolate superior chance seedlings located in the various jack growing regions of the state. As a result of this search, superior chance seedlings were isolated at Tanjore and Vidyapuram (Tanjore district), Pannikkuppam (South Arcot district), Puthur (South Kanara district), Yercaud (Salem district) and in Taliparamba. The Yercaud selection was particularly interesting in that it exhibited a unique feature of cropping practically all through the year unlike the other selections which were definitely seasonal in this respect. The tree and fruit characters of these selections were recorded and attempts were put under way to raise their seedling and clonal progenies.

3. *Durian*—*Propagation trials*—(a) *Cincturing and etiolation*.—A small scale trial to determine the possibility of propagating this fruit by cincturing was laid out from June 1951 to December 1951 utilizing five shoots per month for the operation. Although in the batch of shoots cinctured in June 1951 a 40 per cent success in rooting was observed all the other batches uniformly failed to root. This method therefore has not proved to be promising.

(b) *Inarching*.—A monthly trial commencing from October 1950 employing inarching as a method of propagation for durian on its seedling stocks was concluded in September 1951 and the final results thereof are presented in Table IV.

TABLE IV.—*Durian*—*Monthly inarching trials*.

Serial number and month.	Number of grafts raised.	Number of grafts successfully separated.	Month of separation.	Percentage of success.
(1)	(2)	(3)	(4)	(5)
1 October 1950	5	5	June 1951	100
2 November 1950	5	4	Do.	80
3 December 1950	5	3	August 1951	60
4 January 1951	5	4	October 1951	80
5 February 1951	5	..	..	..
6 March 1951	5	1	January 1952	20
7 April 1951	5	2	Do.	40
8 May 1951	5	2	Do.	40
9 June 1951	5	2	Do.	40
10 July 1951	5	3	April 1952	60
11 August 1951	5	2	Do.	40
12 September 1951	5	2	Do.	40

It may be seen from the above data that the maximum success of 100 per cent has been obtained in the October made inarches which were separated after eight months of the operation followed by those raised in November 1950 and January 1951. Excepting the grafts raised in February and March 1951, the rest have recorded 'takes' ranging from 40 per cent to 60 per cent. Therefore this method of propagation has proved to be a very promising one.

4. *Breadfruit (seedless)*—*Propagation trials*—(1) *By root cuttings*.—The normal method of production of plants has hitherto been by root cuttings, which in this fruit has uniformly yielded extremely low percentage of success ranging from 30 to 40 in addition to the considerably long time taken by the cuttings to root, viz., six to seven months. With a view to securing a higher percentage of success a modified method was adopted during the year in which 25 root-cuttings, one foot long, were dehydrated by keeping them under 50 per cent humidity for

about a week and then planted out in beds after the treatment. Twenty-five untreated cuttings were also planted along with the treated ones for comparison. The trial was commenced in November 1951. After about seven months of planting it was found that only 3 out of 25 untreated cuttings and 1 out of 25 dehydrated cuttings had sprouted. Further observations were in progress.

(2) '*Kaup*' method.—With a view to effect improvement over the present method of propagation which consists of selection of 6 to 8 inches long root cuttings planted horizontally, a modified technique which is in practice in a private nursery in South Kanara was tried. The technique consists in gootsetting the suckers at a height of about 6 inches from the ground level so that the buds below the gootied portion may be encouraged to produce fresh sprouts which can, in turn, be gootied, thus maintaining a constant production of plants. A total number of 25 suckers so treated have so far been separated by adopting this process. It has been found that when a sucker was gootied in this manner, three to four sprouts were observed to appear two to three months, after the separation of the gootied sucker. Among these sprouts, the topmost one became ready for gooteeing in 30 to 45 days, while each of the other successive sprouts took a fortnight more than the one above it. Leaving one of these sprouts for saving the mother plant, a continuous supply of rooted cuttings can thus be expected.

5. *Clove*—*Propagation trial*—*Inarching*.—The monthly trial of inarching on its own seedling stock initiated in October 1950 to determine the suitability of this method for vegetative propagation was concluded in September 1951. The final data of this trial is presented in Table V.

TABLE V.—*Clove inarching trial*.

Serial number and month.	Number of grafts raised.	Number of grafts successfully separated.	Month of separation.	Percentage of success.
(1)	(2)	(3)	(4)	(5)
1 October 1950	5	5	June 1951	100
2 November 1950	5	5	Do.	100
3 December 1950	5	4	August 1951	80
4 January 1951	5	4	Do.	80
5 February 1951	5	..	..	..
6 March 1951	5	..	Failed to unite.	..
7 April 1951	5	..	..	..
8 May 1951	5	..	Do.	..
9 June 1951	5	4	April 1952	80
10 July 1951	5	5	Do.	100
11 August 1951	5	3	Do.	60
12 September 1951	5	5	Do.	100

From the data presented it is seen that a maximum success up to 100 per cent has been recorded in the months from June to January which normally represent comparatively cooler and more wet season of the year at the station, whereas in the months of February to May the inarches totally failed to unite. Therefore the feasibility of this method as an improved nursery practice of plant production in clove is thus clearly indicated. The optimum period for inarching operations is adjudged to be from June to January under Burliar conditions.

In another small scale trial, *Eugenia uniflora* (Surinam-cherry) a more hardy ally of clove which has a more natural spreading and low statured habit of growth was tried as a rootstock. Ten grafts were raised on this rootstock in August and September 1951. It was observed that though the inarches united well, yet they succumbed soon after the separation obviously due to a case of delayed incompatibility. Efforts were put under way to collect other rootstocks of possible value, viz., *Eugenia calophyllifolia*, *E. smithii* and *E. arnotiana*.

6. *Nutmeg*—(a) *Propagation trial*—*Inarching*.—With a view to find out the suitability of inarching as a vegetative method of propagation of nutmeg on its

own seedling stock a monthly trial initiated in October 1950 was concluded in September 1951 and the results are presented in Table VI.

TABLE VI.—Nutmeg—Monthly inarching trial.

Serial number and month.	Number of grafts raised.	Number of grafts successfully separated.	Month of separation.	Percentage of success.
(1)	(2)	(3)	(4)	(5)
1 October 1950	5	5	June 1951	100
2 November 1950	5	3	Do.	60
3 December 1950. . . .	5	4	August 1951	80
4 January 1951	5	3	Do.	60
5 February 1951.. . . .	5	..	....	..
6 March 1951	5	3	October 1951	60
7 April 1951	5	3	November 1951	60
8 May 1951	5	..	....	..
9 June 1951	5	5	April 1952	100
10 July 1951	5	5	Do.	100
11 August 1951	5	5	Do.	100
12 September 1951 .. .	5	4	Do.	80

The data goes to show that inarching is a very satisfactory method of propagation recording uniformly high percentage of success ranging from 60 to 100 in all months excepting in the months of February and May. Higher success in 'take' has been recorded in the months from June to October and in December in particular which are normally the cooler months of the year in the station. In the absence of any other method of vegetative propagation, this method should be deemed to be of great value.

In another small scale trial, seedlings of a wild species of *Myristica*, viz., *M. beddomei* were used as a stock for inarching nutmeg. Four such grafts were raised in June 1952 of which only two could be successfully separated in November 1951, i.e., after five months of operation the remaining two having died. Encouraged by the success achieved in this direction, search was made for other wild *Myristica* species of possible rootstock value for nutmeg. Seeds of two such wild species, viz., *Myristica Malabarica* and *M. attenuata* were received from Valayar and Mangalore forests respectively and were sown for raising the seedlings.

(b) *Use of nutmeg leaf oil as a weedicide.*—With a view to verify the belief that the fallen nutmeg leaves have an inhibitory action on the growth of weeds, the essential oil of nutmeg was distilled for testing its efficacy as a weedicide. The oil was applied in the form of an emulsion in the proportion of one part of the oil to three parts of soap water, on three weeds, viz., *Oxalis*, *Binus* and *Tridax* and some grasses. It was noticed that one week after application, the leaves of *Oxalis* and grasses were found to have been scorched up and discoloured due to the action of the oil, while the *Binus* and *Tridax* weeds were not affected by the treatment.

7. *Litchi—Propagation trial—Air layering.*—Air layering in litchi has been determined to be a highly successful method of vegetative propagation at the station and this method of propagation was extended over the season under report. A total of 65 air layers were made in March to June 1951. Signs of root formation were noticed in the air layers in 45 to 50 days of the operation. Root formation was found to be rather slow and it took nearly five months for the layers for satisfactory production of roots so as to be fit for final separation. The layers raised during March to June 1951 were successfully separated in September to October 1951, recording a success of nearly 80 per cent. Based upon the results obtained in this preliminary trial, large scale propagation of litchi by this method was taken up. An important point to be observed, which attracted

special attention, was that if the moss material used for covering the injured portion became excessively moist, which happens in the rainy season, the root formation in the layers was hindered to a great extent, and the roots that had already formed were liable to get damaged due to rotting. Hence to secure optimum results this operation was best done during the less rainy months of the year.

8. *Pummelo (pink-fleshed)—(a) Selfing trials.*—Last year's trials in selfing of flowers of a pink-fleshed variety of pummelo to breed superior forms at the station led to no successful fruit development. Consequently the trials were repeated during the current year. Out of 60 flowers that were selfed in April 1952 a fruit set of 52 per cent was recorded. The fruits were developing satisfactorily and were not ready for sampling tests at the time of the preparation of this report.

(b) *Progeny tests.*—Three outstanding pummelo trees producing pink-fleshed fruits were selected from the estates round about this station and a complete record of the fruit characters was made. Seedlings and vegetative progenies of these selections were being raised in the nursery for future planting.

III. MISCELLANEOUS.

New introductions—(a) Passion fruit.—Seedlings of the purple variety of this fruit continued to exhibit a poor cropping behaviour at the station although the vegetative growth of the vines was found to be uniformly good.

Yellow passion fruit.—Two rooted cuttings of yellow passion fruit introduced originally from Ceylon were planted out in the field in April-1952. The vines were growing vigorously.

Giant granadilla (Passiflora quadrangularis).—Two rooted cuttings of *Giant granadilla (Passiflora quadrangularis)* introduced from Anamalais were planted out in June 1952. The vines were making vigorous growth.

(b) *Bilimbi (Averrhoa bilimbi).*—The four seedlings of this fruit planted in 1948 flowered and fruited for their second cropping year and recorded a mean tree yield of 30 fruits. Their growth continued to be satisfactory.

(c) *Banana—Variety Sirumalai.*—Two plants of Sirumalai variety of banana flowered for the first time after nearly four years of planting. Considering the long time taken for acclimatization, the thin size of the pseudostem, the poor suckering habit and the small bunch size it appears that this variety which is a recognized commercial fruit in other hills of South India may not prove promising under Burliar conditions. The fruits were not ready for judging the quality.

Musa Banksii.—Four suckers and four seedlings of this wild banana species from Singampatti hills were introduced at the station for trial and to serve as a pollen parent for banana hybridization work. While the suckers had established well, all the seedlings on the other hand failed to establish. The suckers had attained a height of nearly 3½ feet in three months after planting which appears to be a very quick pace of growth for any banana, cultivated or wild, in the collection of the station.

(d) *Tree-tomato.*—The growth of the plants which are in their second year of orchard life appeared to be satisfactory recording a mean tree yield of 40 fruits as against 30 fruits recorded last year. The performance, however, was not comparable to their growth and yield under Coonoor conditions.

(e) *Indigofera teysmanii.*—Seeds of this green manure plant introduced from Ceylon were sown at the station in December 1951. The seeds recorded 30 per cent germination. Forty seedlings were planted out in the field in March 1952 for further observations. The seedlings maintained very vigorous growth but are yet to flower.

(f) *Clover*.—Seeds of four species of clover, viz., *Trifolium pratense* (red clover), *T. repens* (white clover), *T. incarnatum* (Crimson clover) and *T. subterraneum* (subterranean clover) introduced from East Africa were sown in April 1952 after treating them with the bacterial culture and phosphate. The seeds had not germinated at the time of the report.

Other crops—Green manure and cover crops—(a) *Tephrosia voegelii* and *Peuraria phaseoloides*.—These two green manure crops were observed to be growing very well at the station. The area under both the crops was extended and over 52 lb. of *T. voegelii* and 8 lb. of *P. phaseoloides* were collected for sowing as well as for distribution.

(b) *Gliricidia*—*Propagation trial*.—A monthly trial on the propagation of *Gliricidia* an important green manure crop using five different kinds of shoot cuttings, viz., (1) single eye cuttings, (2) 3 inches long cuttings, (3) 6 inches long cuttings, (4) 9 inches long cuttings and (5) 12 inches long cuttings was commenced in March 1952. Twenty-five cuttings in each kind were planted out every month in two different media, viz., sand and charcoal dust in pans. The object of this trial was to find out the best plant material and the better medium to ensure the highest degree of success with the minimum loss of plant material. The results achieved in this trial over a period of four months from March to June 1952 are presented in Table VII below.

TABLE VII.—Results of monthly propagation trial of *Gliricidia maculata* by different kinds of shoot cuttings (from March to June 1952).

Serial number and month.	Percentage of success in rooting in 'sand' medium in					Percentage of success in rooting in 'charcoal dust' medium in				
	Single eye cuttings.					Single eye cuttings.				
	Single eye cuttings.	3" long cuttings.	6" long cuttings.	9" long cuttings.	12" long cuttings.	Single eye cuttings.	3" long cuttings.	6" long cuttings.	9" long cuttings.	12" long cuttings.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1 March 1952	..	72	100	80	76	..	36	56	60	76
2 April 1952	..	..	25	25	12	..	8	12	24	48
3 May 1952	..	..	..	16	28	..	..	..	8	..
4 June 1952	..	..	4	16	36	..	4	12	8	8

From the data presented above, it is seen that single eye cuttings have failed uniformly in all the months in either medium, while 3 inches long cuttings have recorded a maximum success of 72 per cent in sand and 36 in charcoal only in March 1952 plantings. Among the other treatments, the success in rooting has been rather low in April, May and June, which is attributed to the uncongenial weather which prevailed during these months. However the present data have indicated clearly that the longer cuttings, viz., 9 inches and 12 inches long ones are preferable to shorter ones for propagation and that sand medium is preferable to charcoal dust in that the former promotes better root development as can be seen from the generally higher success recorded in sand medium. Incomplete as the trial is, no other conclusive inferences could be drawn. Further observations were in progress. The performance of *Derris elliptica* continued to be satisfactory. The area under this crop was further extended by planting over 100 rooted cuttings in the uncovered patches of the station.

(c) *Bastard sago (Caryota urens)*.—Intensified collection of seeds was made and 13,000 seeds were distributed to the other hilly regions of South India through the district staff. Further collection of seeds was in progress

(d) *Ornamental plants*.—During the year large scale propagation of the three available croton types at the station by cineturing and etiolation and by cuttings was undertaken and the resulting plants were utilized for further plantings in the station as well as for distribution outside. This item of work is being attended to on an intensified scale to assemble a large collection of several types in the nursery.

(e) *Bee-keeping*.—Two bee colonies were newly established by introducing them from the Pomological Station, Coonoor, as a measure of increasing the revenue of the station by the sale of honey. The newly introduced colonies were working satisfactorily in the new surroundings and the scope for multiplying the colonies with this nucleus introduction appears to be promising.

IV. SUPPLY OF PLANTS AND SEEDS.

Plants and seed materials supplied during the year are listed in Table VIII.

TABLE VIII.—List of plants and plant materials supplied from Burliar Fruit Station during 1951-52.

Serial number and kind or variety of plant.		Grafts or budded plants.	Seedlings.	Cuttings and suckers.	Seeds.	
(1)		(2)	(3)	(4)	(5)	(6)
		NOS.	NOS.	NOS.	LB.	OZ.
1	Avocado	..	6	..	..	..
2	Areca nut	..	14	..	..	..
3	Allspice	..	3	..	..	..
4	Banana	..	..	90	..	..
5	Breadfruit—seedless	..	..	47	..	..
6	Breadfruit—seeded	..	245	..	..	..
7	Bull's heart	..	31	..	..	..
8	Cacao	..	93	1,892	..	..
9	Clove	..	2	367	1	8
10	Cinnamon	..	..	88	0	8
11	Cardamom	..	..	..	53	..
12	Citron	..	..	..	80	..
13	Cherimoyer	..	3	..	..	..
14	Carambola sweet	..	..	36	..	..
15	Durian	..	1	90	..	..
16	Grapefruit	..	..	3	..	..
17	<i>Gliricidia maculata</i>	..	..	450	..	..
18	Jack	..	29	506	..	..
19	Kolanut	..	..	19	..	..
20	Langsat	..	..	77	..	..
21	Mango	..	..	100	..	..
22	Litchi	..	6	87	..	..
23	Mangosteen	..	..	110	..	..
24	Malayan apple	..	..	22	..	..
25	Nutmeg	..	2	297	..	..
26	Pummelo	..	..	50	..	..
27	Passion fruit	..	..	8	..	..
28	Papaya	..	..	291	0	1
29	Pomegranate	..	..	18	2	..
30	Pepper	..	..	..	1	..
31	<i>Peuraria javanica</i>	..	..	..	100	5

Serial number and kind or variety of plant.	Grafts or budded plants.	Seedlings.	Cuttings and suckers.	Seeds.
(1)	(2)	(3)	(4)	(5)
	NOS.	NOS.	NOS.	LB. OZ.
32 Surinam-cherry	..	66	..	..
33 Tree-tomato	..	25	..	..
34 Vanilla	..	..	40	..
35 <i>Feijoa sellowiana</i>	..	6	..	..
36 Carambola (sour)	..	3	..	..
37 Bastard sago	..	..	..	19
38 <i>Tephrosia vogelli</i>	..	..	..	2 8
Total ..	136	4,990	333	23 14

Steps taken to step up the revenue.—As usual this station enjoyed adequate water supplies throughout the year. Plantings of green manure crops such as *Peararia phaseoloides* and *Gliricidia* and the short-term crops such as rainfed bananas were intensified with a view to supplement the normal receipts by sale of plants and fruits. In addition, two bee colonies were newly introduced with the object of establishing an apiary for systematic honey production which will in due course add to the revenue of the station. The year's receipts recorded an increase of Rs. 2,687 over those of the previous year as a result of these efforts.

COONOR,
14th August 1952.

COIMBATORE,
18th August 1952.

K. FAZLULLAH KHAN,
Assistant Fruit Specialist.

U. NARASINGA RAO,
Fruit Specialist.

APPENDIX I.

BRIEF HISTORY AND OBJECTIVE OF THE BURLIAR FRUIT STATION.

The Burliar Fruit Station was opened in 1871, by purchase, it is reported, of an existing orchard for Rs. 3,000. The station is situated at an elevation which ranges from 2,300 to 2,500 feet above mean sea level on the Mettupalayam-Coonoor Ghat Road. The orchard area extends to 11.83 acres of very steep land. It commands a fair supply of water all through the year. With a mean rainfall of about 60 inches per annum, distributed well all through the year, the atmospheric conditions tend to be humid for a good part of the year. These features are almost similar to those prevailing in parts of Lower Palnis, Wynad, Courtallam Hills and Anamalais.

The objectives of this station are more or less the same as those of Kallar Fruit Station, viz., the experimental cultivation of fruits and other crops suited to the humid tropic zone. The scope for work at this station is limited as the land exists on a very steep slope, making it hardly possible to lay out any large scale orchard trials.

At present the station is utilized as a source of promising scion materials in several fruits and spices, etc., and for trials in vegetative propagation. Among those that thrive here are, mangosteen, durian, banana, jack, pummelo, breadfruit, carambola, papaya, litchi, langsat and bilimbi. A number of spices have also given every indication of their suitability to this region, such as nutmeg, clove, cinnamon, cardamom and allspice; cacao, and arecanut are other crops which exist in the collection. Year after year, research work on all these horticultural crops has been adding more and more useful information.

APPENDIX II.

STATEMENT OF CHARGES AND RECEIPTS OF BURLIAR FRUIT STATION, METTUPALAYAM
(FROM JULY 1951 TO JUNE 1952).

Charges.	RS. A. P.
Pay of establishment—	
Permanent	792 11 0
Other compensatory allowances (House rent allowance)	36 0 0
Dearness allowance	264 0 0
Contingencies—	
Petty construction and repairs	130 12 6
Purchase of deadstock	15 8 0
Working expenses	3,966 0 6
Other contingencies	34 8 0
Dearness allowance to menials	512 1 0
Receipts.	
XXIX-A.—Agricultural Receipts—	
Agricultural Stations	*2,692 12 0
Miscellaneous	Nil.
XLV—Stationery and Printing	11 2 0
III. O.R. P.W.D.	24 0 0
XIII. O.T.	0 4 0

* Excludes value of free transfers to the extent of Rs. 1,126-4-0.

APPENDIX III.

STATEMENT SHOWING COSTS OF CULTIVATION AND RECEIPTS FOR THE MAJOR BULK CROPS AT THE BURLIAR FRUIT STATION DURING 1951-52.

I. Mangosteen—Area—1 acre—96 trees.			IV. Pummelo—Area—0.15 acre—12 trees.		
	RS.	A. P.		RS.	A. P.
Cultivation charges—			Cultivation charges—		
1. Cultural operations	99	14 0	1. Cultural operations	15	0 0
2. Irrigation charges	67	1 0	2. Irrigation charges	10	8 0
3. Manuring charges including manure costs	65	0 0	3. Manuring charges	1	8 0
4. Harvesting charges	123	0 0	4. Harvesting charges	19	8 0
Total ..	354	15 0	Total ..	46	8 0
II. Clove—Area—0.10 acre—10 trees.			V. Jack—Area—0.35 acre—21 trees.		
	RS.	A. P.		RS.	A. P.
Cultivation charges—			Cultivation charges—		
1. Cultural operations	10	0 0	1. Cultural operations	25	0 0
2. Irrigation charges	7	0 0	2. Irrigation charges	8	12 0
3. Manuring charges	3	10 0	3. Manuring charges	10	0 0
4. Harvesting charges	13	0 0	4. Harvesting charges	45	8 0
Total ..	33	10 0	Total ..	89	4 0
III. Nutmeg—Area—0.20 acre—21 trees.			VI. Durian—Area—0.50 acre—26 trees.		
	RS.	A. P.		RS.	A. P.
Cultivation charges—			Cultivation charges—		
1. Cultural operations	21	0 0	1. Cultural operations	25	0 0
2. Irrigation charges	14	0 0	2. Irrigation charges	5	0 0
3. Manuring charges	6	12 0	3. Manuring charges	3	10 0
4. Harvesting charges	25	0 0	4. Harvesting charges	25	0 0
Total ..	66	12 0	Total ..	58	10 0
I. Mangosteen.			IV. Grape fruit.		
	LB.			LB.	
Receipts—			Receipts—		
Total receipts during the year from 96 trees of different grades.	23,191 Nos.		Receipts from 1,103 lb. of fruits from 12 trees during the year.	1,103	
Receipts (value).		RS. A. P.	Receipts (value)—		RS. A. P.
23,191 fruits of different grades. ..		2,051 15 0	1,103 lb. of fruits		51 15 0
Cost of cultivation		354 15 0	Cost of cultivation		46 8 0
Net receipts		1,697 0 0	Net receipt		5 7 0
Net receipts per acre		1,697 0 0	Net receipts from one acre		38 4 0
Net receipt per tree		17 11 0	Net receipt from one tree		0 7 3
II. Clove.			V. Jack.		
	LB.			LB.	
Receipts—			Receipts—		
Receipts from 10 trees during the year as clove green and dry seeds.	46		Total receipts from 21 trees during the year.	3,647	
Receipts (value)—		RS. A. P.	Receipts (value)—		RS. A. P.
46 lb. green and dry clove		45 12 0	3,647 lb. of fruits		113 15 0
Cost of cultivation		33 10 0	Cost of cultivation		89 4 0
Net receipts		12 2 0	Net receipts		24 11 0
Net receipts from 1 acre		121 9 0	Net receipt from one acre		70 9 0
Net receipt per tree		1 3 0	Net receipt from one tree		1 3 0
III. Nutmeg.			VI. Durian.		
	LB.			LB.	
Receipts—			Receipts—		
Receipts from 21 trees during the year fruits green and mature.	10,166		Total receipt from 26 trees during the year.	582	
Receipts (value)—		RS. A. P.	Receipts (value)—		RS. A. P.
10,166 fruits green and mature		880 12 0	582 lb. of fruits		72 11 0
Cost of cultivation		66 12 0	Cultivation cost		58 10 0
Net receipts		314 0 0	Net receipt		14 1 0
Net receipts from 1 acre		1,570 0 0	Net receipt from acre		28 2 0
Net receipt from 1 tree		15 0 0	Net receipt from tree		0 8 8

ANNUAL REPORT OF THE KALLAR FRUIT STATION
FOR THE YEAR 1951-52 (FASLI 1361).

Season and rainfall.—The summary of weekly rainfall distribution for the year is presented in Table I.

TABLE I.—Weekly rainfall statement for the year 1951-52 (June 1951 to 1952) of the Kallar Fruit Station.

Month.	Week.	1951-52.		1950-51.		Average rainfall for the past 10 years.		Average rainfall for the past 38 years.	
		Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
South-west monsoon.									
June ..	7-13	0.41	2	0.02	..	0.40	1.6	0.40	1.43
	14-20	0.07	..	0.05	2	0.35	1.5	0.42	1.31
	21-27	..	..	..	..	0.25	1.6	0.43	1.87
June-July ..	28-4	0.09	..	0.20	..	0.15	1.2	0.46	1.90
	5-11	0.38	1	0.23	1	0.42	2.4	0.41	2.17
	12-18	0.32	1	..	..	0.49	2.2	0.39	2.62
	19-25	0.24	1	0.40	3	0.48	2.1	0.53	2.50
July-August ..	26-1	..	..	1.14	2	0.57	2.1	0.45	2.00
	2-8	..	..	0.31	1	0.74	1.8	0.75	2.49
	9-15	..	..	0.07	2	0.58	1.6	0.63	2.23
	16-22	0.32	1	2.01	2	0.85	2.0	0.80	2.38
	23-29	2.27	5	..	..	0.60	2.3	0.72	2.43
August-September ..	30-5	..	..	..	..	0.66	2.3	0.62	2.43
	6-12	1.14	2	0.23	2	0.54	2.1	0.56	1.61
	13-19	1.91	4	..	..	0.53	2.0	1.23	2.38
	20-26	4.31	4	..	..	0.75	2.3	1.01	2.93
Total ..		11.46	21	6.51	15	8.36	31.1	9.81	35.12
North-east monsoon.									
September-October	27-3	1.90	2	0.75	2	0.78	2.3	1.17	2.09
	4-10	..	..	0.80	1	1.19	2.9	1.40	3.37
	11-17	0.63	2	3.76	6	2.55	3.3	2.86	3.55
	18-24	0.67	3	0.24	2	2.64	3.5	3.83	4.21
	25-31	1.97	3	..	..	1.70	2.8	4.77	3.91
November ..	1-7	5.40	5	0.79	3	2.47	3.5	3.38	4.12
	8-14	7.31	4	9.05	6	3.86	3.8	3.25	3.59
	15-21	1.32	3	0.26	2	1.97	3.2	2.67	2.37
	22-28	5.41	2	..	..	3.06	2.8	2.15	2.61
November-December.	29-5	2.51	2	..	..	1.56	1.9	2.59	2.34
	6-12	..	..	1.44	1	1.43	1.5	1.24	1.47
	13-19	0.79	2	0.07	..	0.52	0.9	0.90	2.64
	20-26	0.22	1	0.22	1	0.98	1.9	0.59	1.09
December-January.	27-3	0.38	1	1.35	1	0.40	0.6	0.87	1.28
	4-10	..	..	..	..	1.15	1.3	1.04	1.33
	11-17	..	..	0.62	1	0.12	0.3	0.59	0.84
	18-24	..	..	..	..	0.61	1.1	0.59	0.94
	25-31	0.04	3	..	..	0.24	0.2	0.88	1.22
Total ..		29.23	32	20.25	26	27.32	37.8	34.77	42.97
Hot weather.									
February ..	1-7	..	..	..	..	0.66	0.7	1.82	1.38
	8-14	0.46	1	..	..	0.42	0.6	0.90	0.97
	15-21	1.78	1	..	..	1.00	1.0	0.68	0.37
	22-28	11.27	4	..	..	0.26	0.6	0.91	0.80
March ..	1-7	0.46	1	..	..	0.42	0.6	0.45	0.84
	8-14	..	..	..	..	0.25	0.4	0.80	0.78
	15-21	..	..	..	..	0.63	0.9	0.70	0.79
	22-28	0.23	1	0.94	2	0.54	0.8	0.49	0.73
March-April ..	29-4	..	..	0.18	1	0.69	1.0	0.35	1.10
	5-11	0.65	2	0.46	1	0.70	1.7	1.27	1.73
	12-18	1.95	2	6.23	4	1.74	2.1	0.77	1.08
	19-25	..	..	0.27	2	0.49	1.3	0.57	1.39
	26-2	0.10	1	0.22	2	0.32	1.0	0.14	1.46
April-May ..	3-9	..	..	0.70	1	0.49	1.1	0.78	2.00
	10-16	0.13	1	1.03	3	1.23	3.0	0.69	1.52
	17-23	..	..	0.92	3	0.63	2.5	0.65	2.20
	24-30	1.15	1	0.11	..	0.49	0.8	0.81	1.50
May-June ..	31-6	..	..	0.51	3	0.38	2.3	0.53	1.60
Total ..		18.18	15	11.57	22	11.48	22.3	13.01	22.75
Grand total ..		58.87	68	38.33	63	47.16	91.2	57.59	100.84

The year proved to be very favourable considering the total rainfall received. The total rainfall of the year under report was higher than that of the previous year by about 20 inches and also the average for the past 10-year and 39-year periods. The precipitation recorded during the north-east monsoon period which is the main rainy season of the station was also satisfactory and was almost equal to the average for the past 10-year period though it was less than the average for the past 39 years. The rains received during the south-west monsoon period were a little higher than the corresponding 10-year and 39-year averages. The hot weather period was also similarly better than the previous years' averages. The year, therefore, can be regarded as one among the few which received the benefit of uniformly distributed rains over all the three seasons with a total rainfall which was above average.

I.—ORCHARD.

A. New plantings and sowings.—The chief feature of this year was the increase in the area under cacao, an important beverage crop, at the station. As an initial step towards building up a sizable orchard of cacao at the station an area of nearly 2 acres was planted to over 260 plants consisting of seedlings, budlings and layers of the Criollo variety. All the new plantings established successfully.

Planting of short-term fruit crops like bananas, papaya, pineapples, etc., was also undertaken with the object of providing a means to enhance the normal revenue of the station. These plantings included 1,000 banana suckers of the chief commercial varieties such as Laden, Dorai Vazhai, Gros Michel and Red Banana. Five hundred seedlings of papaya and over 750 suckers of pineapple of the varieties Kew, Mauritius and Simhachalam were also planted. Of these all except 54 of the former 2 and 13 of the latter survived ultimately. The collection of banana species at the station was enriched by the addition of four suckers and four seedlings of *Musa Banksii*, a wild banana introduced from Singampatti hills. Forty-two seedlings of the precocious Singapore jack, eight plants of a bamboo variety received from Wynaad and 200 slips of water grass received from Central Farm, Coimbatore, were also planted out along the main irrigation channel of which the latter two failed to establish. Considerable attention on the extended cultivation of green manure crops was paid. Five hundred cuttings and 300 seedlings of *Gliricidia maculata* were planted all along the bunds, channel courses and orchard alleys. Similarly four hundred seedlings of *Sesbania speciosa* were also planted out. The *Gliricidia* cuttings recorded a 60 per cent rooting whereas seedlings of *Gliricidia* and *Sesbania* established with a very low percentage of success. Special efforts were put under way to assemble different types of cannas, Bougainvilleas and crotons.

The major sowings made during the year comprised 2,650 seeds of mangosteen, 3 pounds of *Artocarpus hirsuta* seeds, 4 ounces of *Mimusops hexandra* seeds, 4½ pounds of *Cullenia excelsa* seeds, 40 seeds of *Myristica beddomei*, 500 of *Myristica attenuata*, 250 of *Myristica malabarica*, 2,500 seeds of *Annona palustris*, 4½ ounces sweetlime seeds, 200 of clove and fairly large quantities of seeds of several Citrus fruits. From these sowings 1,010 healthy seedlings of mangosteen, 1,005 of *Artocarpus hirsuta*, 240 of *Mimusops hexandra*, 22 of *Cullenia excelsa*, 20 of *Myristica beddomei*, 150 of *Myristica attenuata*, 60 of *Myristica malabarica*, 1,200 of *Annona palustris*, 18 of sweetlime, 98 of clove and 5,000 of cacao were ultimately realized recording germinations of 50, 60, 60, 25, 20, 30, 30, 65, 12, 50 and 60 per cent respectively. Special efforts were made to raise a large stock of cacao seedlings to meet the growing demand for this new beverage crop and the total number of seeds sown in this alone amounted to over 8,500. Sowing of seeds of green manure crops requires to be specially mentioned. These sowings included 4 pounds of *Tephrosia vogelli*, 6½ pounds of *Peuraria phaseoloides* and 5½ pounds of *Calapogonium mucunoides*.

Manuring and cultural operations.—A total number of 73 trees of mangosteen, 90 of grapefruit, 100 of mandarin orange and 200 of other miscellaneous crops were manured during the year at the rate of 50 lb. of cattle manure, 5 lb. of groundnut cake and 2½ lb. of bone meal for each adult tree.

The cultural operations in the orchard consisted of two mamuti diggings followed by hand weeding or hoeing as and when necessary. Pruning of deadwood and removal of parasitic growth was done on a total number of 213 trees.

B. Harvest of orchard produce.—The summary of harvests of the several important crops during the year is presented in Table II.

TABLE II.—Summary of harvests in 1950-51 and 1951-52.

Serial number and name of produce. (1)	1950-51.		1951-52.	
	Number of trees which yielded. (2)	Yield. (3)	Number of trees which yielded. (4)	Yield. (5)
1 Mangosteen	60	17,104 Nos.	73	25,661 Nos.
		LB. OZ.		LB. OZ.
2 Mandarin orange	34	483 0	15	958 0
3 Grape fruit	95	2,615 4	75	5,430 0
4 Litchi	4	83 0	4	105 0
5 Mango	2	416 8	3	527 0
6 Avocado	6	60 8	3	102 0
7 Malayan apple	1	63 8	1	43 0
8 Carambola	19	1,925 0	18	1,653 0
9 Bull's heart	4	100 12	4	211 0
10 Rambutan	1	46 12	2	29 0
11 Papaya	12	48 8	6	20 0
12 Sapota	8	450 12	8	783 0
13 Bilimbi	6	30 0	6	15 0
14 Roseapple	2	2 8	6	8 0
15 Cacao	..	..	10	206 0
16 Arecannt	..	..	100	80,500 Nos.

The yields in mangosteen, mandarin orange, sapota and grapefruit have been appreciably higher during the year. The cropping in most of the fruit and other economic crops excepting Malayan apple, rambutan and bilimbi which appear to have suffered adverse weather during their preblossoming period has been uniformly better than the previous year's yields. The general improvement in cropping may be attributed to the favourable rains received during the year coupled with the systematic manuring practices adopted.

II.—FRUIT CROP.

A. Mangosteen—Progeny trial.—In order to study the comparative performance of seed and clonal progenies of seven selected parent trees noted for high low yields in summer and monsoon crops and for 'gamboge' resistance, twenty inarches on *Garcinia tinctoria* and twenty seedlings of each of seven selections were raised. The inarches however failed to survive after separation. The trial was therefore confined to seedling progenies alone of the above selections. The preliminary nursery observations have revealed that the seeds from tree No. 78 which is noted for heavy yield in the summer crop, recorded the highest percentage of germination of 95 per cent followed by 52 per cent recorded by tree No. 40 'gamboge' resistant type. In the other trees the germination percentage ranged from 17 to 34. The seedlings of the selected trees are proposed to be planted out in the field during the coming planting season.

B. Mandarin orange—(1) Progeny trial.—Seedling and clonal progenies of 23 selected parent trees, isolated from all over the main mandarin growing tracts in

and outside the State have been planted out in a trial for a study of their performance and chief varietal features with a view to evolve a key to classification of the mandarin oranges of South India. The annual growth increments made by the several progenies in this trial during the year are furnished in Table III.

TABLE III.—Mandarin orange (Progeny trial)—Growth performance of progenies of selected parents (recorded in June 1952).

(Mean growth increments between July 1951 and June 1952.)

Serial number and name of the progeny.	Month and year of planting.	Mean stem or stock girth increment (in inches).	Mean scion girth increment (in inches).	Mean height increment (in inches).	Mean spread increment (in inches).	Number of plants in each progeny (in inches).
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 Kookal—Main season graft.	Nov. 1947.	2.38	1.70	40.0	8.0	3
2 Kookal—Main season seedling.	Nov. 1948.	3.38	..	54.5	11.5	2
3 Kookal—Off-season seedling.	Do.	3.00	..	40.0	26.0	1
4 Shevroys—Main season seedling.	Do.	3.89	..	35.0	20.0	2
5 Wynaad—Main season seedling.	Do.	3.25	..	42.0	9.0	2
6 Kolakombay—Main season seedling.	Do.	3.25	..	56.0	20.0	1
7 Lower Palnis—Main season seedling.	Do.	2.50	..	58.0	6.0	1
8 Agency Tracts—Off-season seedling.	Do.	1.50	..	2.0	5.8	1
9 Agency Tracts—Main season seedling.	Do.	3.50	..	15.0	4.0	1
10 Kallar Tree No. 94—Best cropper-graft.	Do.	1.60	1.60	6.0	11.0	1
11 Kallar Tree No. 66—Poor off-season graft.	Do.	3.50	3.32	11.0	3.0	1
12 Kallar Tree No. 76—Poor off-season graft.	Do.	2.05	1.25	28.0	10.0	1
13 Kallar Tree No. 96—Best main season seedling.	Do.	1.75	..	57.0	12.0	1
14 Kallar Tree No. 50—Best off-season seedling.	Do.	1.50	..	35.0	8.0	1
15 Kallar Tree No. 76—Poor off-season seedling.	Do.	2.12	..	49.0	15.0	1
16 Kallar Tree No. 66—Poor off-season seedling.	Do.	1.50	..	40.0	11.6	1
17 Kallar Tree No. 13—Poor main season seedling.	Do.	2.12	..	27.0	3.0	1
18 Kallar Tree No. 23—Poor main season seedling.	Do.	2.60	..	19.0	3.0	1
19 Poona sangtra—Budded.	Dec. 1947.	5.25	4.74	24.0	1.0	2
20 Nagpur sangtra—Main season seedling.	Feb 1949.	2.50	..	34.5	16.0	2
21 Nagpur sangtra—Budded.	Dec. 1947.	2.75	2.25	32.0	12.0	1
22 Lower Palnis (Off-season seedling).	July 1950.	2.48	..	24.9	12.4	7
23 Kavakombay (Off-season seedling).	Do.	2.72	..	34.8	22.0	5

From the above data it would be apparent that among the clonal and seedling progenies, of the various selections of uniform age planted in November 1948, the growth performance of Kookal, Shevaroy and Kolakombay selections has been very satisfactory. Considering individual tree growth attained by the plants in 1948, Shevaroy's main season seedling led the rest in stem thickness, Lower Palnis main season seedling in height and Kookal off-season seedling in spread

respectively. Among the grafts planted in 1947 Poona Sangtra (budded) has recorded the most vigorous growth over others. None of the plants in this trial has come to bearing so far.

(2) *Rootstock trials.*—(a) The graft of a selected mandarin orange tree of Kallar raised on four different rootstocks, viz., Jamberi, Gajanimma, Pummelo and sweet lime, were planted out for a rootstock trial in July 1950. The mean annual growth increments made by the trees on each of the stocks are furnished in Table IV below. The latest observations on the performance of the grafts have indicated that, grafts on pummelo and sweet lime were stunted in growth, while those on Jamberi were relatively more vigorous. The grafts on the former stocks have also suffered early casualties which may be attributed to a case of incompatible stionic-combination.

TABLE IV.—Mandarin orange (rootstock trial)—Growth performance of grafts on four stocks (recorded in June 1952).

(Mean growth measurements between July 1951 and June 1952.)

Serial number and name of rootstock.	Mean measurements recorded during June 1952.				
	Number of trees on each stock.	Stock girth (in inches).	Scion girth (in inches).	Height (in inches).	Spread (in inches).
(1)	(2)	(3)	(4)	(5)	(6)
1 Gajanimma	6	1.83	1.25	24.40	11.50
3 Jamberi	6	2.35	1.50	35.40	15.74
2 Sweet lime	6	1.97	1.24	24.00	10.40
4 Pummelo	6	1.71	1.06	17.00	11.50

It may be seen from the above data, that jamberi has led the rest of the rootstocks in all aspects of tree growth. Last growth in all aspects, except in spread, has been recorded by pummelo while in respect of tree spread sweet lime has contributed for the least growth.

(b) *Mandarin orange on different rootstocks.*—A rough observational trial, besides the main rootstock trial, was laid out in July 1950 with both budlings and grafts of Kallar mandarin on four rootstocks, viz., jamberi, gajanimma, pummelo and sweet lime for a comparative study of the behaviour of each of these stionic-combinations. The latest annual growth increments made by these plants are tabulated in Table V.

TABLE V.—Mandarin orange on different rootstocks—Growth performance of grafts and budlings of mandarin on four rootstocks—recorded in June 1952.

(Mean growth increments recorded between July 1951 and June 1952.)

Serial number and kind of plant and rootstock.	Number of trees on each stock.	Stock girth (in inches).	Scion girth (in inches).	Height (in inches).	Spread (in inches).
(1)	(2)	(3)	(4)	(5)	(6)
1 Grafts on jamberi	23	1.35	0.22	14.77	1.20
2 Grafts on gajanimma	6	1.35	0.34	10.00	1.05
3 Grafts on pummelo	2	1.95	0.15	26.00	0.80
4 Grafts on sweet lime	2	0.27	0.15	2.66	0.40
5 Budlings on sweet lime	2	0.22	..	..	..

N.B.—THE BUDLINGS ON SWEET LIME FAILED TO SURVIVE.

The grafts on pummelo in this trial recorded the maximum increase in stock girth of 1.95 inches and height of 26 inches followed by those on jamberi and gajanimma in respect of stock girth and height. Considering the scion girth, grafts on gajanimma registered the maximum growth followed by those on jamberi

while in spread just the reverse was the case. Grafts and buddlings on sweetlime were observed to have made least growth and suffered from early casualties in the field. The performance of sweetlime, a stock used both in this trial as well as in the main rootstock trial has thus been unsatisfactory. The pummelo stock however appears to be promising in the case of grafts while in the main trial it was found to be inferior to Jamberi and Gajanimma taking tree vigour into consideration.

(c) *Mandarin orange budded on Jamberi*.—The trial was originally laid out in 1947 with 21 budded trees and the gaps which resulted subsequently were filled in July 1950, with the same plant material. Three of the older plants planted in 1947 however showed signs of die-back, splitting of the bark and oozing of gum. There appears to be some reason to suspect this stock, which is imparting greater tree vigour to the mandarin orange in the initial stages of orchard life, apparently to become increasingly susceptible to die-back of shoots and decline of the trees in the latter years. Two of the trees which showed symptoms of decline and extensive die-back early in October 1952 succumbed in May 1952 in spite of all precautionary measures.

(3) *Propagation trials*—(a) *Budding*.—In the previous year preliminary propagation trials on this fruit by shield budding (with a slight wood piece) on Jamberi recorded a success varying from 33.3 to 66.7 per cent in November and December operations. To find out whether the percentage of 'take' could be increased in this method of propagation in the months of February and March, the period which was adjudged to be the most optimum in Wynaad, 200 bud insertions were made in these two months. After a period of nearly three months it was found that only one bud inserted in February had sprouted, the rest having failed thereby presumably indicating the unsuitability of the period for similar operations in Kallar.

(b) *Cincturing and etiolation*.—In view of the repeated failures met with in propagating this fruit by budding a relatively less cumbersome and more feasible alternate method therefore had to be devised. With this object in view a small scale trial of cincturing and etiolation of shoots with and without the aid of proprietary root hormones was laid out in February 1952. Using ten one year old shoots, cincturing and etiolation by the application of moss with banana sheaths was done with and without application of the proprietary product Seradix B1, B2 and B3. The observations recorded at the end of four months after the operation showed that a total number of four shoots, had produced profuse rooting from the cinctured portions. The shoots which were separated and potted in June 1952 had established quickly. The untreated shoots as well as those treated with Seradix B1 failed to root even after six months of the cincturing operations. The trial appears to indicate the possibility of raising layered plants of this fruit quickly with the aid of the above proprietary products at Kallar conditions.

(4) *Hybridization*.—(a) Preliminary studies on anthesis, stigma receptivity and opening of the mandarin flowers were made during the previous year. According to the observations the flowers were found to be open in the cooler hours of the evening and take nearly 5 to 6 hours for full opening. The stigma continued to be receptive till about 10 a.m. next morning. Anthesis also was found to occur about the same period. Similar studies on aspects of floral morphology and anthesis, were made in grapefruit and lemon (Malta). In grapefruit the flowers were found to open in the morning between 6.45 and 7.10 a.m. while anthesis occurred a little later, i.e., between 7.20 and 7.30 a.m. The stigma was found to be receptive during the same period between 7.20 and 7.40 a.m. Under such circumstances the chances for self pollination in this fruit appeared to be greater. In Malta lemon too which develops fruits normally by cross pollination the opening of flowers was found to occur between 6.45 and 7.0 a.m. while anthesis occurred at about 2.20 a.m. The stigma was found to be receptive between 7.20 and 7.30 a.m.

A total of 98 reciprocal crosses between *Citrus reticulata*, *C. Limon*, *C. Paradisi* and *C. grandis* were made in the season. The resulting fruits were developing and were not ready for description at the time of this report.

(b) *Selfing trials*.—A trial for evolving outstanding selfed progenies of the Kallar mandarin was initiated in December 1951 and continued up to March 1952. Selfing of mandarin flowers was done at the rate of five in each month. A 100 per cent fruit set was recorded in the March operations while the flowers selfed in all the previous months failed to develop fruit. The seedlings of the selfed fruits will be raised and their performance studied.

C. *Other fruits*—(1) *Jack*—(a) *Varietal*—*Singapore jack*.—The existing eleven seedling plants of this fruit were growing satisfactorily. At the end of 4½ years of orchard life, the trees had attained a mean height of 17' 10" and a mean spread of 8' 2" recording thereby an increase of nearly 2 feet in height and one foot in spread during the course of the year under report. The pace of growth was therefore fairly vigorous when compared to the other jack types. Four of these trees blossomed in December 1950 for the first time, but only one of them produced three medium-sized fruits which were harvested in July—August 1951, after nearly 42 months of orchard life. During the flowering season of 1952 five trees came to flower including the one that produced fruits during the previous season. Two of them successfully matured fruits. One striking feature about fruiting in this type was the unusually long time taken for maturation of the fruit ranging from 160 to 180 days from flowering to fruit picking which is nearly a month more than in the other types of jack. But on the whole the performance of this new type of jack should be considered as highly satisfactory when compared to the seedlings of the local types of jack which take nearly eight to ten years to come to bearing. The fruits of this jack which recorded a mean weight of 15 pounds were medium in size, oval shaped containing sweet, crisp, firm and yellow carpels of good dessert quality. The quality of the fruit was comparable to any good quality fruit if not of a very superior standard.

(b) *Hybridization*.—To evolve a jack type combining the excellence in quality of the fruit of Velipela, a reputed jack selection of the Burliar Fruit station in one case and the size of another selection of the same station, with the precocity associated with the Singapore jack, two spikes of the latter were hand pollinated, one each using the pollen of the two jack trees of the former two selections in February 1952. The fruits developed satisfactorily and were ready for harvest in June 1951. The seeds thereof were sown for a study of the performance of the resulting seedling progenies. A comparison of the two crossed fruits with a fruit which developed under normal open pollinated conditions are presented in Table VI below:—

TABLE VI.—*Singapore jack hybridization—Comparison of crossed fruits of Singapore jack with the fruit under normal development.*

Serial number and fruit characters.	Crossed with.				Uncrossed fruit.
	Velipela.		Ordinary large fruited type.		
(1)	(2)		(3)	(4)	
1 Weight and size ..	19 lb. medium ..	..	32 lb. large ..	15 lb. medium.	
2 Shape ..	Oval ..	..	Oval with a few undulations ..	Oval and cylindrical.	
3 Surface ..	Uniform ..	..	Ununiform ..	Uniform.	
4 Eating quality ..	Sweet large flakes, crisp, soft-textured, slightly juicy, yellow with a strong aroma.	..	Sweet, moderately large flakes, crisp, thick, fibreless, firm, Reddish yellow with a fine aroma, leaving unpleasant taste at the end.	Sweet with fairly large sized flakes, crisp, with fairly strong aroma, glossy, firm and yellow.	
5 Seeds ..	100, medium and oval ..	..	150, medium and oval ..	90, medium and oval.	
6 Weight of individual flake ..	1.12 oz. ..	..	1.05 oz. ..	1.02 oz.	
7 (a) Weight of edible flesh ..	7.00 lb. ..	..	13.00 lb. ..	6.75 lb.	
(b) Percentage of pulp to fruit ..	38.9 per cent ..	..	40.6 per cent ..	45 per cent.	
8 Time taken for maturing the fruit ..	120 days ..	..	135 days. (Approximately) ..	180 days. (Approximately.)	

Though the data presented in the above table may not lend itself for valid comparison in view of the limited number of crosses effected, some points of

interest were obviously apparent. One important point gained by hand pollination of the fruit with foreign pollen was the effective acceleration of the process of fruit development and fruit maturity. In either case of crossing a period ranging from 45 to 60 days has been clearly gained by this technique. Besides this advantage, improvements in flake weight when combined with the Velipela type and in fruit size when crossed with the large fruited type are also manifest to an extent. However, the exact advantages derived in the resulting progenies can best be judged only after a study of the resulting seedling progenies.

(c) *Rootstock trial*.—With a view to determine the most optimum rootstock for this fruit, a trial comprising grafts of a selected tree raised on Rudrakshi, *Artocarpus hirsuta* and on own seedling stocks was laid out in September 1946 for comparison with the seedling progenies of the same parent, planted at the same time. The mean annual growth increments made by each of these grafts and the seedling are summarized in Table VII.

TABLE VII.—*Jack rootstock trial*—(Growth performance of seedlings and grafts of jack Velipela). (Mean growth increments between July 1951 and June 1952.)

Serial number and treatment.	Number of trees in each treatment.	Mean growth increments in inches.	
		Height.	Spread.
		IN.	IN.
1 Jack on Rudrakshi	2	59.00	52.50
2 Jack on jack seedling	4	47.30	33.30
3 Jack on <i>Artocarpus hirsuta</i>	8	53.63	19.00
4 Jack seedling	4	54.00	10.00

During the year jack on Rudrakshi continued to record maximum growth in height and spread while jack on jack seedling made the least growth in that respect. In tree spread the jack seedling made the least growth, while as a stock it compared favourably with *Artocarpus hirsuta*. The trees have not yet come to bearing.

(2) *Annonas*—(a) *Custard apple rootstock trial*.—As in jack a rootstock trial for custard apple with grafts raised on *Annona reticulata*, *A. muricata*, *A. palustris* and *A. squamosa* has been in progress since 1948. The plants on *A. palustris* and *A. muricata* suffered repeated casualties and in spite of gap fillings made several times, they failed to survive. Of the four stocks used the trees on bull's heart continued to be the most vigorous of all in respect of overall tree growth over a period of three seasons. This consistent encouraging performance of bull's heart as a stock, has indicated its general superiority as a stock for custard apple over the other stocks. The growth increments and yield data recorded since the planting of the clonal and seedling progenies included in this trial are presented in Table VIII.

TABLE VIII.—*Custard apple rootstock trial*—(Growth performance and yield of grafts on Custard apple and bull's heart and unworked scion seedlings.)

(Mean growth increments between October 1948 and June 1952.)

Serial number and variety.	Number of trees in each treatment.	Mean increments in inches.			Mean fruit yield in numbers.
		Stock girth.	Scion girth.	Height.	
		(3)	(4)	(5)	
1 Custard apple on bull's heart ..	4	8.3	7.75	101.5	12.2
2 Custard apple on custard apple ..	4	6.0	5.71	81.5	9.8
3 Custard apple seedlings	4	6.5	..	83.2	9.5

N.B.—The grafts on *A. muricata* and *A. palustris* failed to survive.

It would be observed from the above data that bull's heart has once again proved to be superior to the other stock considering overall tree growth and yield. The results of this trial were sufficiently decisive for popularising the use of bull's heart as a stock for custard apple.

(b) *Different annonas on bull's heart stock*.—Encouraged by the promising behaviour of bull's heart as a stock for custard apple, a trial was laid in 1945 employing this stock for the other two annonaceous fruits, viz., cherimoyer and soursop as well, to test its rootstock potentialities for the other fruits. The progress of the trial has revealed that the grafts of cherimoyer on bull's heart were found to have exhibited greater vigour than either the grafts of custard apple or soursop on the same stock. In respect of yield, however, the custard apple grafts recorded a mean yield of 40.2 fruits per tree with a maximum of 98 fruits in one tree, while the yield was much lower in the other two annonas. Cherimoyer grafts recorded only a mean of 19.8 fruits per tree with one tree bearing a maximum crop of 30 fruits, whereas soursop recorded a mean tree yield of 5.7 fruits per tree with maximum individual tree yield of seven fruits.

It is a matter of satisfaction to note that the performance of bull's heart in this trial has again confirmed its superior qualities as an optimum stock for custard apple among the three fruits tried.

(c) *Hybridization*.—With the object of evolving new types through hybridization by interspecific crossing to combine the desirable qualities of each of the parents, preliminary work on hybridization was taken on hand. Studies on floral mechanism, flower opening, anthesis, stigma receptivity, etc., were concluded in the previous season and based on these observations, 45 reciprocal crosses were effected in May and June 1951. Of these crosses two fruits of custard apple and one of cherimoyer ultimately became available for harvest. Complete descriptions of the fruits resulting from these crosses were recorded. During the course of the year under report 196 reciprocal crosses between *Annona squamosa*, *A. cherimolia*, *A. muricata* and *A. reticulata* were effected. The combinations and the percentage of fruit set in each are listed in Table IX.

TABLE IX.—*Statement showing the number of crosses made and the percentage of fruit set.*

Serial number and female parent.			Male parent.			Number of crosses made.	Percentage of fruit set.
(1)			(2)			(3)	(4)
1	<i>A. squamosa</i>	.. ..	<i>A. cherimolia</i>	..	..	46	8.7
2	<i>A. squamosa</i>	.. ..	<i>A. muricata</i>	..	..	41	4.9
3	<i>A. squamosa</i>	.. ..	<i>A. reticulata</i>	..	..	17	41
4	<i>A. cherimolia</i>	.. ..	<i>A. squamosa</i>	..	..	4	50
5	<i>A. cherimolia</i>	.. ..	<i>A. muricata</i>	..	..	4	50
6	<i>A. cherimolia</i>	.. ..	<i>A. reticulata</i>	..	..	4	25
7	<i>A. muricata</i>	.. ..	<i>A. cherimolia</i>	..	..	10	50
8	<i>A. muricata</i>	.. ..	<i>A. reticulata</i>	..	..	10	50
9	<i>A. reticulata</i>	.. ..	<i>A. squamosa</i>	..	..	30	20
10	<i>A. reticulata</i>	.. ..	<i>A. cherimolia</i>	..	..	10	40
11	<i>A. reticulata</i>	.. ..	<i>A. muricata</i>	..	..	20	50

The fruits thereof were developing and further observations were in progress.

(3) *Pineapple*—(a) *Hybridization*.—The trial as for its object evolving a new fruit which will combine the large fruit size of the Kew variety as well as the juicy aromatic crispness of the pulp of the Mauritius with a view to meet the consumer's

and the canner's interests together. A total number of 250 Mauritius suckers and 420 Kew suckers were secured from Wynaad and planted out for the trial. Crossing operations were awaiting flowering in the two varieties.

(b) *Trial on forcing of pineapple with hormones.*—With the object of regulating the fruiting period in pineapple by inducing earlier flowering and delayed fruiting beyond the normal season of cropping by the application of a hormone product "Planofix" in varying concentrations, employing three plants for each treatment, this trial was initiated in March 1952. The following three treatments were used for inducing earlier flowering by the application of "Planofix" which is said to contain 4.5 per cent of alpha-naphthalene acetic acid. The applications were made at weekly intervals in three concentrations of 0.001 per cent, 0.003 per cent and 0.006 per cent, of the substance for six weeks commencing from four months prior to normal differentiation of inflorescence of the plants thus constituting three treatments in six replications.

Similarly to delay flowering beyond the normal period, application of the same substance but in different concentrations of 0.01 per cent, 0.05 per cent and 0.10 per cent was made commencing from one month prior to normal differentiation of inflorescence at bi-weekly intervals for an equal period of six weeks. The latter operations therefore constituted three treatments with twelve replications. The trial was laid out in a simple fashion. After three and a half months of the application it was observed that among the former three treatments the application of 0.003 per cent of the substance had induced 86 per cent of the plants to flower in advance of others, while the other two concentrations induced 33 per cent of the treated plants to develop flowers. The untreated plants on the other hand had not flowered so far.

(4) *Banana*—(a) *Varietal.*—During the year one new variety Puttu Vazhai, besides those which have been already adjudged as promising at the station was found to have performed satisfactorily. One bunch of this variety weighed nearly 58 pounds containing 17 hands and 264 fruits with a mean weight of about three and a half ounces per fruit. It proved a very promising variety for cultivation on the hill stations.

(b) *Hybridization.*—Hybridization work in bananas was further pursued. A total number of nine inter-varietal crosses were made from January 1952 to June 1952 using varieties which were predetermined to be good pollen yielders as male parents. But none of these crosses produced any seeded fruits and as such no seedlings could be secured by this process. In view of the repeated failures met with in securing the seedling progenies by the above process an inter-specific breeding work was taken on hand. As a preliminary to this work one other wild species of *Musa*, viz., *Musa banksii* was added to the three existing seeded bananas, viz., *Musa textilis*, *M. acuminata* and *M. balbisiana*. Crosses between seven promising varieties as female parents and *Musa acuminata* and *M. balbisiana* as male parents were successfully effected. Of these only two crosses with Laden and Enna Baniyan as female parents and *Musa acuminata* as the common male parent yielded seeded fruits. There was practically no difference between the selfed and crossed fruit excepting seediness in the latter. Each crossed fruit had developed seeds ranging from one to four in number. The seeds of the crosses were sown for raising the seedlings thereof. Further crossing operations using the other wild species were in progress.

(5) *Avocado*—*Varietal.*—Among the new introductions made in 1949, the budded plants of the three varieties from Ceylon, viz., Pollock, Fuerte and Peradeniya Purple Hybrid were found to have made very vigorous growth recording a mean tree height of 15' 3", 14' 8" and 15' 11" and a mean tree spread of 3' 10", 11' 11" and 6' 7" respectively during the year. All the varieties flowered for the first time in December 1951, roughly two and a half years after planting, indicating thereby the high precocity of these clones of avocado. The fruit set was also found to be fairly high considering the first year's cropping. A count of the fruit set in March 1952 revealed that while Peradeniya Purple Hybrid carried a mean crop of 190 fruits per tree, Fuerte and Pollock were found to have recorded

a mean crop of 30 and 9 respectively per tree. The low fruit set in the last mentioned variety was attributed to its late flowering and its consequent lack of conditions for cross pollination with other varieties, a factor said to be very essential for normal fruit set. The fruits of the three varieties had not attained maturity by the close of the year for recording their respective eating qualities and other fruit characters. Thus these new introductions have proved to be promising in growth and yield behaviour at Kallar conditions.

The plants of Duke and Feurte introduced from United States of America the seedlings of off-season selection from Shembaganoor and the unnamed variety from Ceylon planted in 1950 were growing satisfactorily but were yet to flower.

(6) *Litchi*—*Varietal.*—Of the six new varieties planted in 1942 one tree of variety Rose Scented and three of Deshi put forth stray blossom crops during March 1952. The former failed to mature any fruits successfully where as the latter produced only a small crop of 4 pounds per tree in the season.

(7) *Other miscellaneous fruits*—(a) *Bilimbi* (*Avverohoa bilimbi*).—The seedlings planted in 1948 were though growing well produced a small crop of nearly four pounds per tree in April-May 1952.

(b) *Spondias mangifera*.—The single seedling, also introduced in 1948 was making satisfactory growth but had not come to flowering.

(c) *Lemons.*—Three layers of Seville lemon planted in 1950 came to bearing for the first time during the year recording a mean crop of four fruits per plant. The growth of this variety continued to be slow. Among the seven other varieties planted in September 1950, Italian lemon layers flowered for the first time in January 1952 after 16 months of orchard life and recorded a mean yield of three fruits per plant. The layers of another lemon variety Lucknow Seedless planted in September 1950 produced a stray blossom crop in February 1952 after 17 months of orchard life, but failed to set fruits. The layers of Malta lemon planted in 1947, produced a moderate crop for the second year of its bearing, recording a mean tree yield of 40 fruits.

Among the seven varieties tried so far at the station Malta lemon proved to be promising both in respect of precocity and yield.

(d) *Muntingia calabura*.—The plants introduced from Mangalore and planted in December 1949 continued to make vigorous growth and was yielding fairly good crops.

(e) *Rambutan*.—The yield performance of the single adult tree at the station was not quite satisfactory during the year having recorded only 29 pounds of fruits between August and December.

(f) *Passion fruit* (*Passiflora edulis*).—The seedlings of the purple fruited type planted in 1948 were making vigorous growth although they failed to flower even after four years of planting in spite of ringing the stem.

Two rooted cuttings in each of yellow passion fruit (introduced from Ceylon and of giant granadilla *Passiflora quadrangularis*), obtained from Anamalais were planted out for trial in the field in June 1952. The vines in both the cases were making vigorous growth.

(g) *Aegle marmelos*.—The seedlings planted in 1950 continued to make slow progress in the field.

(h) *Cassimiroa edulis* (*White sapote*).—The single seedling, introduced from United States of America and planted in 1950 was making very vigorous growth having attained a height of five feet in two years of planting.

(i) *Fig*.—The single plant of variety Mission obtained from United States of America and planted in July 1950 recorded very vigorous growth and produced a sparse crop of fruits for the first time. The plant was found to be highly susceptible to the infestation of stem borers, and as such its performance was rather unsatisfactory at the station.

(j) *Queensland nut*.—The single tree at the station was observed to be giving only a sparse crop year after year though the flowering was profuse in all

seasons. Preliminary hand pollination trials in this crop revealed that cross pollination might improve the fruit set.

(k) *Jujub* (Ber).—Seeds of a reputed variety of ber for its size and quality were received from Tuni and plants were raised which were awaiting planting.

(l) *Indian gooseberry*.—Seeds of a reputed greenish white variety of Indian gooseberry noted for its fairly large size were received from Kodaikanal and the plants were under trial.

(m) *Collection of wild mango types*.—A search was maintained for the collection of wild mango types in the neighbourhood of the station as a result of which three distinct fruits were isolated and are being studied.

III.—SPICES, BEVERAGE AND OTHER ECONOMIC CROPS.

(1) *Cacao*.—*Seed germination trials*.—A small scale observational trial with cacao beans revealed that beans which were extracted from ripe pods as indicated by the pinkish yellow colour of the pod surface were alone good as they recorded nearly 86 per cent germination. The seeds from immature pods suffered from low germination.

(2) *Malayan oil palm*.—The seedlings planted in October 1950 were rather slow in growth.

(3) *Pejibaye palm* (*Bactris utilis*).—The single plant, planted in December 1950 was found to be growing slowly.

New introductions—(1) *Indigofera teysmanii*.—Seeds of this green manure crop sown in January 1952 recorded about 30 per cent germination. The seedlings which were transplanted in March 1952 were found to have made very vigorous growth.

(2) In a trial of some varieties of vegetables specially obtained from Chicaco, Arlington White Spine a variety of cucumber proved to be suitable for cultivation.

(3) *Ornamental plants*.—A total number of fifteen types of croton, five types of Bougainvillea and three types of cannas were being multiplied on a large scale for beautifying the station and for distribution to other agricultural stations.

Other miscellaneous economic plants.—Among the green manures, *Tephrosia vogelli*, *Peuraria phaseoloides* and *Gliricidia maculata* continued to be the best under Kallar conditions. The area under these two crops, viz., *Peuraria* and *Gliricidia* was further increased by planting seedlings and cuttings. A monthly trial of rooting *Gliricidia* cuttings to determine the most suitable planting material and the medium for propagation, was laid out during the year using 25 cuttings for each treatment. The cuttings used were, single eye cuttings, 3 inches, 6 inches, 9 inches and 12 inches long cuttings and the media were pure sand and charcoal dust. The observations recorded over four months of this trial revealed, that normally the longer cuttings, viz., 6 inches, 9 inches and 12 inches long cuttings tended to record higher success in rooting than the shorter and single eye cuttings. Pure sand was found to favour better root development than charcoal dust. A summary of the rooting of cuttings is presented in Table X.

TABLE X.—Showing the rooting of *gliricidia maculata* by shoot cuttings.

Month of planting.	Percentage of rooting in sand.					Percentage of rooting in charcoal dust.				
	Single eye cuttings.	3 inches long cuttings.	6 inches long cuttings.	9 inches long cuttings.	12 inches long cuttings.	Single eye cuttings.	3 inches long cuttings.	6 inches long cuttings.	9 inches long cuttings.	12 inches long cuttings.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
March 1952	..	24	68	32	32	..	8	..	..	..
April 1952	..	..	20	16	20	..	..	24	16	36
May 1952	..	..	4	8	12	..	..	4	..	14
June 1952	..	..	..	20	28	..	..	..	..	..

Drug and insecticidal plants.—The growth of *Derris elliptica* and *Milletia pachycarpa* continued to be satisfactory. The area under the former was increased by planting rooted cuttings in an additional area of one acre. Among the drug plants, *Myroxylon toluifera* continued to record vigorous growth.

IV.—MISCELLANEOUS.

Plant dissemination.—A total number 4,471 plants, cuttings, etc., of fruits and other crops and 8 lb. 10 oz. of seed was distributed.

Steps taken to step up the revenue.—Irrigation water has been adequate at the station as usual. The cultivation of short-term remunerative fruit crops such as rainfed bananas, pineapple, papaya and Singapore jack was intensified with the primary object of increasing thereby the revenue of the station. Patches of land which were unsuitable for regular field trials as was well as channel courses, bunds and alleys were utilised for growing green manure crops such as *Peuraria phaseoloides*, *Gliricidia maculata* and *Sesbania speciosa*. These crops served to meet the manurial requirements of the station to an extent. As a result of these efforts an increased revenue amounting to Rs. 1,406 over that of the previous year was realised.

COONOR,
14th August 1952.

K. FAZLULLAH KHAN,
Assistant Fruit Specialist.

COIMBATORE,
18th August 1952.

U. NARASINGA RAO,
Fruit Specialist.

APPENDIX I.

BRIEF HISTORY AND OBJECTIVES OF THE KALLAR FRUIT STATION.

This station which is situated at an elevation of 1,400 feet above the sea-level and at the foot of the Nilgiris lies about half a mile from the first hair-pin bend where the Mettupalayam-Ootacamund road enters the Ghat section and is 22.36 acres in extent. It came into existence in 1900 when forest land, which was originally a mahogany plantation was handed over to this department for work on fruits.

From the preliminary work till 1941, it became evident that the region was eminently suited for the cultivation of a large number of crops such as mangosteen, mandarin orange, annonaceous fruits, litchi, avocado, grape fruit, banana, pineapple, papaya, sapota, carambola, rose and Malayan apples among fruits, clove, cardamom, cinnamon among spices, cacao among beverages and *Derris elliptica* and *Milletia pachycarpa* among drug plants.

Since 1942, the horticultural problems connected with these crops have been receiving attention. The place being less steep than Burliar, provides facilities for some experimental work. Propagation trials, rootstock investigations and progeny tests with mandarin, mangosteen, jack and annonaceous fruits form the main activities in the field of research at this station, under the Hill Fruit Scheme, sanctioned in G.O. Ms. No. 2254, Development, dated 26th May 1944 and inaugurated with a view also to determine the most profitable fruits and other economic crops for regions where conditions similar to those at Kallar exist.

APPENDIX II.

STATEMENT OF CHARGES AND RECEIPTS OF KALLAR FRUIT STATION, METTUPALAYAM.
(FROM JULY 1951 TO JUNE 1952.)

Charges.	RS.	A.	P.
Pay of establishment—Permanent	4,438	6	0
Other Compensatory allowances—			
(House rent allowance)	183	2	0
Dearness allowance	1,432	12	0
Travelling allowance	958	1	0
Contingencies—			
Petty construction and repairs	199	14	0
Purchase of Deadstock	145	8	1
Woring expenses	10,893	14	0
Other contingencies	6,264	11	9
Dearness allowance to menials	965	6	0

Receipts.

XXIX-A.—Agricultural receipts—			
Agricultural stations	4,001	2	0*
Miscellaneous	266	6	0
XLV. Stationery and Printing	44	5	3
III. O.R. P.W.D.	22	0	0
XIII. O.T.	0	9	6

* Excludes value of free transfers to the extent of Rs. 2,213-3-3.

APPENDIX III.

STATEMENTS SHOWING COSTS OF CULTIVATION AND RECEIPTS FOR TWO OF THE MAJOR
FRUIT CROPS AT KALLAR FRUIT STATION DURING 1951-52.

1. Mangosteen.—Area 1 acre—70 trees.

Cultivation charges—	RS.	A.	P.	Receipts—	NOS.
1 Cultural operation charges (like weeding, hoeing, etc.).	148	0	0	Yield during the year from 70 trees.	38,623
2 Irrigation charges ..	120	0	0	Receipts (value)—	RS. A. P.
3 Manuring charges including cost of manures.	73	6	0	38,623 fruits at 1 anna each fruit on an average.	2,413 15 0
4 Harvesting and other charges.	109	11	0	Deduct cost of cultivation.	451 1 0
Total ..	451	1	0	Net from 70 trees ..	1,962 14 0
				Net return per tree ..	28 1 0
				Net return per acre ..	1,962 14 0

APPENDIX III—cont.

Grape fruit—Area 1 acre—92 trees.

Cultivation charges—	RS.	A.	P.	Receipts—	LB.
1 Cultural operation charges (like weeding, hoeing, etc.).	75	0	0	Yield during the year from 92 trees.	5,383
2 Irrigation charges ..	100	0	0	Receipts (value)—	RS. A. P.
3 Manuring charges including cost of manures.	120	0	0	5,383 lb. at 3 annas per lb.	1,009 5 0
4 Pruning charges ..	15	0	0	Cost of cultivation ..	403 2 0
5 Spraying charges ..	15	2	0	Net receipts from 92 trees.	606 3 0
6 Harvesting and other charges.	78	0	0	Net return per tree ..	6 9 0
Total ..	403	2	0	Net return per acre ..	606 3 0

ANNUAL REPORT OF THE FRUIT RESEARCH STATION, KODUR, P.O.,
CUDDAPAH DISTRICT, FOR THE YEAR ENDING 30TH JUNE 1952
(FASLI 1361).

This forms the seventeenth annual report of the Fruit Research Station, Kodur.

Season.—The following table summarises the seasonal rainfall distribution during the period from 7th June 1951 to 6th June 1952 along with the average distribution for the past ten years. The statement of weekly rainfall data is given below:—

Statement of rainfall.

Season and month.	Weeks.	Fasli 1361 (1951-52).		Fasli 1360 (1950-51).		Average rainfall for the past ten years.	
		Rainfall in inches.	Num- ber of rainy days.	Rainfall in inches.	Num- ber of rainy days.	Rainfall in inches.	Num- ber of rainy days.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
South-west monsoon.							
June	7-13	0.05	..	..	..	0.44	1.20
	14-20	..	..	0.11	1	0.53	1.30
	21-27	..	..	0.20	1	0.57	0.80
June-July	28-4	0.08	..	1.11	2	0.48	1.00
	5-11	1.00	3	0.52	1	1.80	2.20
	12-18	2.30	2	..	..	0.72	1.50
July-August	19-25	0.57	3	..	..	0.79	2.40
	26-1	..	..	2.30	3	0.78	1.50
	2-8	0.18	1	0.43	1	1.80	2.30
August-September	9-15	1.62	1	..	..	0.92	1.60
	16-22	1.53	2	1.17	2	0.76	1.20
	23-29	0.33	1	0.30	2	1.18	2.20
August-September	30-5	0.92	3	0.14	1	0.43	1.50
	6-12	0.17	1	1.10	3	1.30	2.30
	13-19	..	..	0.07	..	0.95	1.50
	20-26	..	..	1.37	3	1.32	2.00
Total ..		8.75	17	8.91	20	14.74	27.90
North-east monsoon.							
September-October	27-3	2.17	3	0.70	1	0.56	1.40
	4-10	0.53	1	3.57	2	3.36	3.00
	11-17	0.10	1	3.74	2	1.25	2.10
November	18-24	0.03	..	0.20	1	1.29	2.30
	25-31	0.98	1	0.06	..	1.11	1.50
	1-7	0.13	1	0.47	2	1.47	2.20
November-December	8-14	1.13	2	2.31	4	2.26	3.10
	15-21	2.03	3	0.16	1	2.63	3.30
	22-28	0.15	1	..	..	1.60	2.20
November-December	29-5	..	..	..	..	1.75	1.40
	6-12	..	..	..	..	1.55	1.10
	13-19	..	..	0.03	..	1.15	1.50
December-January	20-26	..	..	..	..	0.48	1.30
	27-3	..	..	..	..	0.31	0.07
	4-10	..	..	..	..	0.38	0.40
December-January	11-17	..	..	..	..	0.02	0.20
	18-24	..	..	..	..	0.03	0.20
	25-31	..	..	..	..	0.05	0.20
Total ..		8.26	13	11.34	13	21.30	27.47
Hot weather.							
February	1-7	..	..	..	..	..	..
	8-14	..	..	..	..	..	..
	15-21	..	..	..	..	0.03	0.10
March	22-28	0.21	1	..	..	0.03	0.10
	or 29	..	..	..	..	..	..
	1-7	..	..	..	..	0.39	0.30
March-April	8-14	..	..	..	..	0.05	0.30
	15-21	..	..	..	..	..	..
	22-28	..	..	..	..	..	..
March-April	29-4	..	..	0.22	1	0.09	0.50
	5-11	..	..	0.06	..	0.08	0.30
	12-18	..	..	..	..	0.03	0.30
	19-25	..	..	0.14	1	0.03	0.20

Statement of rainfall—cont.

Season and month.	Weeks.	Fasli 1361 (1951-52).		Fasli 1360 (1950-51).		Average rainfall for the past ten years.	
		Rainfall in inches.	Num- ber of rainy days.	Rainfall in inches.	Num- ber of rainy days.	Rainfall in inches.	Num- ber of rainy days.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Hot weather—cont.							
April-May	26—2	..	..	0·11	1	0·22	0·40
	3—9	..	..	..	..	0·27	0·50
	10—16	..	..	..	..	0·16	0·30
	17—23	7·99	4	0·04	..	1·64	1·00
	24—30	0·13	1	0·55	1	0·39	0·80
May to June	31—6	0·49	2	2·85	3	0·84	1·40
Total ..		8·82	8	4·07	7	4·30	6·50
Grand total ..		25·83	38	24·32	40	40·35	61·87

Period.	Fasli 1361 (1951-52).		Average rainfall for the past ten years.	
	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.
South-west monsoon	8·75	17	14·74	27·90
North-east monsoon	8·26	13	21·30	27·47
Hot weather	8·82	8	4·30	6·50
Total ..	25·83	38	40·34	618·7

The year once again recorded successively a poor rainfall of 25·83 inches only as against an average rainfall of 40·34 inches for the past ten years. Both the south-west and north-east monsoons recorded only about half and one-third of their normal precipitations respectively. However, towards the close of the fasli year during the hot-weather period, particularly in the month of May an unexpected rainfall of 8·82 inches was recorded. This rainfall came to the rescue of a large number of fruit trees which suffered much during the continued drought periods. The cumulative effect of the adverse weather conditions was reflected in practically no renewal growth both in mango and citrus. The blossoming in mango was abnormally heavy while in citrus it was erratic and below normal. The heavy flowering in mango did not result in proportionate amount of fruit set due to the severe drought that followed.

The water-supply in the wells was affected adversely by the continuous drought periods necessitating the deepening and boring of the wells to augment the water resources. With the help of increased water resources, judicious irrigations given to citrus plots mitigated the harmful effects to some extent. The Gairangam (October-November) flowering in this fruit was normal while the Angam (January-February) flowering was not only subnormal but was also delayed for the second successive year.

I. CITRUS.

2. *Rootstock trial for Sathgudi (old).*—With a view to determine the most suitable rootstock for Sathgudi, trees of a single selected scion budded on nine different rootstocks were planted in 1938 in randomised replicated plots. Seedling trees of the same parent were also planted alongside of these for comparison. On account of various vitiating factors confronted in this trial, statistical analysis of the data has been discontinued for some years past. Growth measurements which were being recorded hitherto for arriving at mean values were also discontinued during the year. However, observations of growth behaviour of the Sathgudi scion on different rootstocks have revealed that trees on acid lime, Gajanimma, Jamberi and Kichili continued to lead both in respect of height and spread over others.

The trees on pummelo continued to occupy the last position. Smooth bnd union forms the feature in a greater number of trees on Sathgudi, pummelo and Gabbuchinee than on other rootstocks.

With respect to yield by number, the trees on Heralo occupy the first rank closely followed by acid lime but on the basis of yield by weight acid lime followed by Gajanimma lead all other treatments. Only 3 out of 18 unworked seedlings bore an average of four fruits per tree during the year though they are 14 years' old.

Representative samples from every bearing tree from each rootstock were taken and analysed for the size, weight of the fruit, weight of the juice content, brix and acidity. The data indicated that Gajanimma rootstock had produced the largest sized fruits as judged by weight and diameter while the fruits on Heralo were the smallest. The juice content from the fruits on Gajanimma rootstock was appreciably lower while it was much higher in those on Sathgudi rootstock. On the basis of the brix/acid ratio, the data revealed that the fruits on Sathgudi rootstock top the list in respect of quality while those on Gajanimma rank last. Though Gajanimma produces larger sized fruits which are mostly thick rinded yet the poor quality makes them unfit for marketing.

The summary of yield and analysis of fruits is presented in Table I.

TABLE I.—Summary of the yield and analysis of fruits from "Sathgudi" rootstock trial for 1951-52.

Serial number and variety of rootstock.	Total of trees.	Number of trees fruited.	Mean fruit yield per tree.				Mean diameter of fruit in inches.
			Number.		Weight.		
			Number.	Rank.	lb.	Rank.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1 Jamberi	14	14	154	7	73·4	7	3·48
2 Gajanimma	18	18	167	4	96·4	2	3·63
3 Acid lime	14	13	189	2	99·4	1	3·32
4 Pummelo	15	12	160	6	76·8	5	3·17
5 Heralo	16	15	210	1	85·1	4	3·11
6 Kichili	15	14	168	3	88·1	3	3·34
7 Billikichili	18	14	108	9	52·8	9	3·38
8 Sathgudi	18	16	161	5	75·4	6	3·49
9 Gabbuchinee	18	17	153	8	65·6	8	3·25
10 Seedling unworked). (Sathgudi	18	3	4	10	2·0	10	..
	Mean weight of fruit in oz.	Mean weight of juice per fruit in oz.	Percentage of juice per fruit by weight.	Brix value.	Acidity in juice per cent.	Brix and acid ratio.	Rank.
	(9)	(10)	(11)	(12)	(13)	(14)	(15)
1 Jamberi	10·27	3·86	37·58	9·0	0·68	13·24	7
2 Gajanimma	10·83	2·08	27·51	7·7	0·61	12·62	9
3 Acid lime	9·29	2·91	31·32	8·3	0·56	14·82	3
4 Pummelo	8·90	3·12	35·05	9·0	0·64	14·08	4
5 Heralo	7·88	3·12	39·59	9·5	0·68	13·97	5
6 Kichili	9·75	3·65	37·43	8·7	0·57	15·28	2
7 Billikichili	9·82	4·10	41·75	8·9	0·65	13·69	6
8 Sathgudi	9·97	5·12	51·35	8·9	0·58	15·34	1
9 Gabbuchinee	9·22	3·68	39·92	9·5	0·73	12·01	8
10 Seedling unworked). (Sathgudi	..	..	..	..	..	..	..

The maintenance cost of the area from the time of preparation of land in 1938 has amounted to Rs. 9,773-0-3. The production costs of major items are summarised in Table II.

TABLE II.—Showing the production cost of Sathgudi Orange rootstock trial.

Area—4.44 acres. Method of propagation—Budding.
Variety and number of trees—Sathgudi, orange, Rootstocks—Jamberi, Kichili, Gajanimma, Acidlime, 180 trees. Pummelo, Gabbuchinee, Sathgudi, Heral and Billi-kichili.
Date of planting—18th October 1938.

Particulars.	Production cost.					
	Preparatory cultivation in 1938.		From 1938 up to 1950 (12 years).		Total.	
	(1)	(2)	(3)	(4)	(5)	(6)
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
1 Manual labour	98 10 9	2,349 6 9	204 13 0	262 11 0	2,975 9 6	
2 Bullock labour	145 9 1	523 3 6		79 0 0	747 12 7	
3 Irrigation		1,604 0 2	440 10 0	504 0 0	2,548 10 2	
4 Manures		1,590 0 8	440 12 0	492 11 0	2,523 7 8	
5 Other expenses	8 9 0	694 7 4	74 4 0	57 4 0	834 8 4	
Total	252 12 10	6,761 2 5	1,220 7 0	1,395 10 0	9,630 0 3	
Cost of plants					143 0 0	
Total					9,773 0 3	

Remarks.—Manual labour.—Digging channels, forming bunds, digging with *mumuties* around trees, weeding, hoeing, etc.

Bullock labour.—Ploughing, working *guntaka*, bund former, etc.

Manures.—Cost of manures and application.

Irrigation.—Irrigation by engine, mhoite and guiding water.

Other expenses.—Watch, care of plants, spraying against diseases, pruning dead shoots, etc.

	RS. A. P.
Total expenditure from 1938 to 1952 for 4.44 acres	9,773 0 3
Total expenditure from 1938 to 1952 for 1.0 acre	2,201 2 0
Average expenditure per acre per year	157 3 7
Gross income for 4.44 acres from 1938 to 1952 yield 22,106 lb. at 0-3-0	4,144 14 0
per lb.	296 1 0
Gross income from 1938 to 1952 for one acre	66 10 10
Gross income per acre per year	90 8 9
Loss per acre	

* The income was calculated from 1938 to 1952. Most of the trees have not yet reached the full bearing stage and hence the loss.

3. Rootstock trial for acid lime.—The trees have grown so wide that they have become interlocked. The recording of growth measurements was, therefore, discarded. The statistical analysis of the yield records obtained during the year has revealed no significant difference between the treatments either by number or weight of fruits (vide Tables III and IV).

TABLE III.—Rootstock trial for acid lime.

Object.—To test the influence of three rootstocks and unworked seedlings on tree performance.
Area of each plot—0.0275 acre or 1197.9 sq. ft.
Seeds sown on—23rd November 1935.
Date of budding—14th July 1937.
Date of planting—20th and 21st October 1938.
Date of collecting initial records for working out adjusted values—April 1940.

Date of collecting final data—31st May 1951.
System of lay out—Randomized blocks replicated six times with three trees of each treatment in one block.
Treatments—A = Jamberi; B = Gajanimma; C = Acidlime; D = Unworked seedlings.

Summary of analysis of variance—Fruit yield in number during 1951-52.

Particulars.	A.	B.	C.	D.	General mean.
Mean yield (number of fruits)	4942	4804	4554	4476	4694
Mean yield as percentage on control (unworked seedlings)	110.41	107.33	101.74	100.00	..
Significance by 'F' test (P = 0.05)	9.03	Not significant.			
Co-efficient of variation	1.038.95				
Standard error					

TABLE IV.—Showing the analysis of fruit yields (by weight) in acid lime rootstock trial—1951-52.

Summary of analysis of variance.					
Particulars.	A.	B.	C.	D.	General mean.
Mean yield (by weight in lb.)	356.98	360.13	346.03	322.43	346.41
Mean yield as percentage on control (unworked seedlings)	110.72	111.69	107.33	100.00	..
Significance by 'F' test (P = 0.05)	14.17	Not Significant.			
Co-efficient of variation	120.23				
Standard error					

The average yield per tree (346.41 lb.) has increased over two-fold during the year compared to that in the previous year (126.09 lb.). The individual tree average in the trial is 4,694 fruits weighing 346.41 lb. One tree (third block—4/1) on Gajanimma rootstock has given a record maximum yield of 7,584 fruits weighing 537.3 lb.

The maintenance cost of this one acre experimental plot from the time of preparation of the land in 1938 is given in Table V from which it is seen that there is a cumulative net profit of Rs. 6,828-0-9.

TABLE V.—Showing the production cost of acid lime rootstock trial.

Area—1.00 acre. Method of propagation—Budding.
Variety and number of trees—Acid lime, 72 trees. Rootstocks—Jamberi, Gajanimma and acid lime.
Date of planting—20th and 21st October 1938.

Particulars.	Preparatory cultivation 1937-38.			From 1938 to 1950 (12 years).			1950-51.			1951-52.			Total.			Remarks.
	(2)			(3)			(4)			(5)			(6)			
	RS.	A.	P.	RS.	A.	P.	RS.	A.	P.	RS.	A.	P.	RS.	A.	P.	
1 Manual labour.	118	14	2	417	8	0	27	10	0	57	15	0	621	15	2	Manual labour.—Digging channels forming bunds digging with <i>mumuties</i> around trees, weeding, hoeing, etc.
2 Bullock labour.	53	10	2	21	0	0	..	..	..	..	..	..	75	0	2	Bullock labour.—Ploughing working <i>guntaka</i> , levelling board, bund former, etc.
3 Irrigation ..	1	15	0	860	9	4	270	0	0	253	12	0	1,386	4	4	Manures.—Cost of manures and application.
4 Manures ..	..	..	..	603	14	4	316	7	0	125	13	0	1,048	2	4	Irrigation.—Irrigation by engine, mhoite and guiding water.
5 Other expenses.	0	10	0	567	7	7	9	0	0	51	1	4	628	2	11	Other expenses.—Watch, care of plants, spraying against diseases pruning dead shoots, etc.
Total ..	175	1	4	2,470	13	3	623	1	0	488	9	4	3,757	8	11	
Add cost of plants.	..	..	..	..	..	..	..	..	..	..	..	..	27	0	0	
Grand total ..	..	..	..	..	..	..	..	..	..	..	..	..	3,784	8	11	
													RS.	A.	P.	
													Receipts.			
													Receipts up to May 1951	7,092	9	8
													Receipts during 1951-52	3,520	0	0
													Total receipts	10,612	9	8
													Expenditure	3,784	8	11
													Net profit	6,828	0	9

4. Trial with Sathgudi orange on rootstocks of different grades.—To determine the influence of different grades (sizes) of root-stocks on the growth and performance of Sathgudi, a trial was laid out in 1938, employing the following root-stocks with a single selected tree as the scion—

(i) Big-sized rootstocks with an average stem-thickness of 1.40 cm. at the time of budding.

(ii) Medium-sized rootstocks with an average stem thickness of 1.15 cm. at the time of budding.

(iii) Small-sized rootstocks with average stem thickness of 0.88 cm. at the time of budding.

(iv) Rootstock material used.—Kichili and Jamberi.

(v) Date of planting.—2nd November 1938.

Showing mean tree yields of Sathgudi on different grades of rootstocks.

Particulars.	Kichili.			Jamberi.		
	Small.	Medium.	Big.	Small.	Medium.	Big.
	(2)	(3)	(4)	(5)	(6)	(7)
1 Number of trees in each treatment.	5	5	6	4	6	4
2 Mean fruit yield in number.	175	230	268	112	61	112
3 Mean fruit yield in weight in lb.	88.81	112.50	148.41	36.06	29.43	60.87

All the 30 trees in the plot fruited during the year. In general trees on Kichili rootstocks in all the three grades have yielded more fruits than those on Jamberi rootstocks. A maximum individual tree yield of 648 fruits was also recorded on tree No. III-2/2 budded on Kichili rootstock (big grade).

5. *Performance of Sathugudi trees on rootstocks germinated on different dates and on apogamic rootstocks.*—To determine the influence of seedling rootstocks that germinated on different dates and also of apogamic seedling stocks on the performance of Sathugudi, a trial was laid out in 1939 using the following kinds of rootstocks.

A = Seedlings that germinated singly within ten days after the first day of germination (early batch).
 B = Those that germinated singly later on (latter batch).
 C = Seedlings that germinated at the rate of more than one per seed (apogamic).
 Rootstocks used—Jamberi.
 Date of planting—24th April 1939.

Particulars.	A	B	C
1 Number of trees in the experiment	12	12	10
2 Mean yield of fruits in number	86	60	41
3 Mean yield of fruit by weight in lb.	36.81	26.25	17.81
4 Number of plants fruited in each treatment during the year.	12	12	10

The yield in general is poor, though the Sathugudi trees on Jamberi rootstocks which had germinated early have recorded the maximum mean tree yield. It is proposed to divert this plot for laying out an exploratory manurial trial from December 1952 to ascertain (1) the optimum dosage of fertilizers or manures in terms of nitrogen, (2) the optimum period of application of fertilizers or manures and (3) the optimum period for blooming of trees for the angam (main season) and Gairangam (off-season) crops, so as to regulate the crop size and harvest for each season.

6. *Performance of Sathugudi trees on different rootstocks.*—With a view to test the performance of Sathugudi trees budded on 15 different rootstocks, a rough observational trial was laid out in 1938. The data recorded during the year revealed that the trees on grape fruit rootstock were found to lead the rest in respect of fruit yield by number and weight, while the trees on Santra and on lime recorded the lowest yield by number and those on Kichili by weight. The mean tree yield data are presented in Table VI.

TABLE VI.—Showing the mean fruit yield for trees on each rootstock in Sathugudi on different rootstocks in 1951-52.

Serial number and name of rootstock.	Number of trees on each rootstock.	Number of trees fruited.	Yield.			
			Average yield by number.	Rank.	Average yielding weight in lb.	Rank.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 Sour orange	4	1	86	5	34.50	6
2 Grape fruit	8	7	158	1	73.56	1
3 Gajanimma	7	6	116	2	50.12	3
4 Lemon	5	5	38	10	17.50	11
5 Kichili	8	8	36	11	15.18	13
6 Pummelo	10	9	67	6	34.31	7
7 Jamberi	7	6	87	4	40.75	4
8 Country orange	4	4	66	7	35.70	5
9 Lime	6	5	35	12	20.16	10
10 Sathugudi	8	6	45	9	22.06	9
11 Santara	3	3	35	12	17.31	12
12 Naradabba	1	1	54	8	27.50	8
13 Mandarin	2	2	96	3	52.75	2

7. *Progeny test for Sathugudi orange.*—Clonal progenies of 15 individual tree selections, propagated on four different rootstocks were planted out for a progeny test in 1937 and the yield performance of each of these recorded over a number of years. A total harvest of 11,072 fruits was made during the year with an average yield of 205 fruits per tree. Trees on Kichili rootstock have given an average yield of 244 fruits, followed closely by those on Khatta recording an average of 219 fruits while trees on Jamberi and Gajanimma have given an average

of 175 and 169 fruits respectively. On the basis of cumulative yields from the commencement of bearing, Sathugudi trees on Khatta continued to lead the rest followed by those on Jamberi. The yield data from the commencement of bearing of the trees on these four rootstocks are given in Table VII.

TABLE VII.—Showing the fruit yields in Sathugudi progeny test.

Serial number and name of rootstock.	Number of trees planted.	Number of trees which fruited in										
		1942.	1943.	1944.	1945.	1946.	1947.	1948.	1949.	1950.	1951.	1952.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1 Jamberi	15	4	6	4	8	15	14	15	15	15	15	13*
2 Kichili	15	3	3	4	9	12	13	14	14	15	15	15
3 Khatta	15	5	6	6	10	12	13	15	15	15	14	15
4 Gajanimma	15	7	10	8	7	12	12	12	12	12	11	11†

* Two trees have not fruited this year.

† Four trees died since planting due to gummosis.

	Number of fruits harvested in the year.											Total.
	1942.	1943.	1944.	1945.	1946.	1947.	1948.	1949.	1950.	1951.	1952.	
	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
Jamberi	22	144	119	129	1,396	448	710	2,834	5,695	4,057	2,273	17,827
Kichili	6	5	60	256	1,123	302	436	1,978	4,040	2,911	3,656	14,779
Khatta	11	278	293	143	1,651	518	1,424	2,873	4,864	3,664	3,280	18,999
Gajanimma	194	181	372	686	2,061	523	827	2,787	3,042	1,773	1,863	14,309

	Number of fruits harvested per tree in the year.											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
1 Jamberi	5.50	24.00	29.75	16.12	93.06	31.57	47.33	188.91	379.66	270.46	174.85	
2 Kichili	2.00	1.87	16.50	28.44	93.58	23.07	31.86	141.28	269.33	194.06	243.73	
3 Khatta	2.20	46.33	48.83	14.30	137.58	39.84	94.93	191.53	324.26	261.71	218.66	
4 Gajanimma	27.21	18.10	46.50	9.80	171.75	43.58	68.91	232.16	253.50	181.18	169.33	

8. *Sathugudi orange on non-citrus rootstocks.*—With a view to test the behaviour of Sathugudi on non-citrus rootstocks like *feronia elephantum* and *Atalantia monophylla*, a few trees were raised on these two rootstocks and planted out in the field in 1939 and 1940. The growth and yield data were recorded over several years. Two trees on *feronia elephantum* continue to be dwarf in nature yielding superior quality fruits. But the trees do not appear to be healthy. The precocity induced by the rootstock on the scion, coupled with marked incompatibility at the bud union, appear to be responsible for the rapid exhaustion of the scion making it susceptible to diseases. One tree on *Atalantia monophylla* died during the year owing to the incidence of dry rootrot and gummosis. These rootstocks do not seem to hold out much promise in commercial orchards.

9. *Acid lime pruning trial.*—To find out the effect of pruning on the growth and yield of acid lime trees a trial was initiated in 1942, wherein 18 trees were pruned to shape (and also to facilitate intercultural operations) and an equal number left unpruned as controls. Statistical analysis of the data collected during the year in respect of yield by number and weight revealed that the unpruned trees are once again significantly superior to pruned ones. The growth measurements of these trees could not be recorded owing to the crowded nature of the tree due to close spacing (Tables VIII and IX).

TABLE VIII.—Acid lime pruning trial—Analysis of yield (number) for 1951-52. Summary of analysis of variance.

Object—To determine the influence of pruning for shape on the performance of acid lime trees.
 Date of sowing of seed—23rd November 1935.
 Date of planting—15th November 1938.
 Date of commencement of pruning—13th October 1942.
 Treatments—A=Pruned; B=Unpruned.
 System of layout—AB; RA Method.

Particulars.	A.	B.	General mean.
Mean yield by number	40.11	4291	4151
Mean yield as percentage on control (unpruned).	93.47	100.00	..
Significance by 'T' test	..	Significant.	..
Critical difference	..	75.84	..
Co-efficient of variation	..	7.93	..
Conclusion—B, A.	..	..	..
Standard error	..	1057.8	..

TABLE IX.—*Acid lime pruning trial—Analysis of yield (by weight) for 1951-52.*

Particulars.	A=Pruned.		B=Unpruned.		General mean.
	A.	B.	A.	B.	
Mean yield in weight (lb.)	292.85	315.63	292.85	315.63	304.24
Mean yield as percentage on control (unpruned).	92.81	100.00	92.81	100.00	96.40
Significance by 'T' test	..	..	Significant.	..	..
Critical difference	..	..	4.17	..	..
Coefficient of variation	..	..	7.57	..	..
Conclusion	..	..	B	A	..
Standard error	..	..	58.40	..	..

10. *Citrus variety collection.*—Out of a total number of 89 varieties maintained on the station, 101 trees in 56 varieties fruited during the year as against 127 trees in 70 varieties which fruited in the previous year. The performance of all the kinds and varieties of citrus in general was not satisfactory. However, four varieties in sweet oranges, two in each of lemon and pummelo and marmalade orange among other citrus were found to be good performers during the year. Individual yields of all the trees that fruited during the year are furnished in Table X.

TABLE X.—*Showing the yields of different varieties of Citrus that fruited during 1951-52.*

Tree number. (1)	Variety. (2)	Yield in		Tree number. (1)	Variety. (2)	Yield in	
		Number. (3)	Weight. (4)			Number. (3)	Weight. (4)
			LB. OZ.				LB. OZ.
<i>(a) Tight Jacket Oranges.</i>				<i>(b) Loose Jacket Oranges.</i>			
1/1	Melita Ruby ..	29	13	17/1	Mandarin Miscelate ..	20	2
1/2	Navel Orange ..	18	10	21/1	Tangerine Daney ..	3	0
2/1	Washington Navel ..	6	3	21/2	Do. ..	50	3
2/3	Do. ..	1	0	<i>Grape fruit.</i>			
3/1	Buck Eye Navel ..	159	76	22/2	Marsh Seedless ..	1	0
3/2	Do. ..	108	48	22/3	Do. ..	1	1
4/1	Valencia Late ..	30	13	23/1	Grape fruit Poona ..	29	18
4/2	Do. ..	11	4	23/2	Do. ..	21	13
5/1	Do. ..	58	23	23/3	Fosters grape fruit ..	14	28
5/2	Do. ..	43	17	24/1	Grape fruit Poona ..	1	0
5/3	Orange Jaffa ..	21	9	30/5	Grape fruit Saharanpur ..	19	19
5/4	Do. ..	55	24	27/4	Grape fruit ..	244	133
6/1	Calcutta Orange ..	249	94	27/5	Grape fruit Marsh Seedless ..	6	3
6/2	Common Malta ..	13	5	24/3	Fosters grape fruit ..	9	20
6/3	Orange Levelle ..	19	12	<i>Pummelo.</i>			
7/1	Orange Mediterranean ..	5	4	26/1	Pummelo Seedless ..	72	197
7/2	Sweet Orange ..	21	10	27/2	Pummelo Apparajupet ..	7	10
7/3	Do. ..	92	39	28/1	Pummelo Red ..	78	203
7/4	Orange Queen ..	1	0	28/2	Do. ..	4	6
8/1	Orange Paramatta ..	11	5	32/1	Do. ..	9	7
8/2	Do. ..	17	7	28/4	Gilljelicote Pummelo ..	17	20
8/3	Orange Michael ..	42	17	26/4	Blood Pummelo ..	3	2
9/2	Common Malta ..	4	2	<i>Lemon.</i>			
9/3	Davaian Orange ..	26	12	33/1	Genoa Lemon ..	191	52
10/2	Mozambique ..	167	60	33/2	Nepali Oblong ..	56	21
10/3	Do. ..	2	0	34/1	Lemon Eureka ..	86	18
11/3	Orange Blood ..	312	102	34/2	Italian Lemon ..	14	5
11/4	Do. ..	36	17	34/3	Do. ..	276	75
12/1	Bloodred Orange ..	21	9	35/1	Lemon Villaranca ..	294	100
12/2	Do. ..	36	17	35/2	Do. ..	156	37
13/2	Gujaranwalla ..	12	8	35/3	Do. ..	155	39
13/3	Do. ..	55	22	35/4	Lemon Sicily ..	82	22
13/4	Tenariffe ..	46	20	36/1	Lemon Lisbon ..	24	7
14/1	Do. ..	33	51	36/2	Do. ..	1624	524
14/2	Malta Golden Nugget ..	39	23	36/3	Do. ..	6	2
14/3	Orange Dulcis ..	9	4	36/4	Lemon Rajahnundry ..	251	62
37/2	Panyam Orange ..	28	12	36/5	Do. ..	115	23
37/3	Do. ..	38	24	35/5	Do. ..	97	20
37/4	Do. ..	13	6	27/6	Malta Lemon ..	247	46
37/5	Do. ..	40	18	5/2	Addanmma ..	1912	161
37/6	Do. ..	5	2	<i>Limes.</i>			
<i>Citrus Variety Collection (West).</i>				31/3	Kagzi Lime ..	1403	106
1/1	Sathgudi ..	32	14	31/4	Lime Selection ..	212	16
2/1	Malta Excelelor ..	42	17	<i>Miscellaneous Citrus.</i>			
3/1	Do. ..	18	10	3/3	Vadlapudi Mutant ..	125	62
7/1	Sathgudi ..	13	5	3/4	Do. ..	427	113
7/2	Do. ..	8	9	35/2	Sweetlime ..	45	8
8/1	Do. ..	106	74	12/3	Marmalada Orange ..	22	2
9/2	Sathgudi Angam Selection ..	24	13	13/1	Do. ..	543	111
9/3	Malta Orange ..	3	1	33/5	Kumquat ..	375	8
10/2	Sathgudi Angam Selection ..	54	43	32/5	Bengal Citron ..	174	185
10/3	Mediterranean Sweet ..	3	1	32/4	Do. ..	78	66
11/1	Sathgudi Angam Selection ..	274	175	31/6	Mahalung ..	1	1

11. *Nomenclature and classification of citrus.*—The study and recording the detailed descriptions of all the types and species of citrus collected and planted in an exclusive plot was completed and a draft paper on the nomenclature and classification of citrus along with a key for the identification of the species and types of

citrus was prepared and submitted to the Fruit Specialist, Coimbatore, for scrutiny.

12. *Top-working in citrus.*—Past experience has shown that top-working of old citrus trees by shield budding and cleft grafting is not feasible under Kodur conditions. Therefore, the trial was modified as detailed below. The trees for top-working were selected from the citrus seedling collection plot, after completing their taxonomic study.

Since sathgudi may not prove a compatible scion in top-working to all kinds and varieties of citrus (some of which are believed to be hybrids in origin) only such scions as are likely to prove compatible from the past experience were utilized for the subsequent trials. In this manner, Sathgudi for Jamberi and Gabbuchinee, lemon for lime Sadaphal (believed to be a natural hybrid between sour orange and lemon) and acid lime for Gajanimma were utilized for the purpose.

Eight trees comprising four of Jamberi, one of Gabbuchinee, two of Gajanimma and one of Lime Sadaphal were accordingly selected for the trial, the age of the trees being 13 years. Of these, Jamberi and Gabbuchinee were top-worked with Sathgudi, Gajanimma with acid lime and Lime Sadaphal with lemon. The selected trees were first pruned, removing such of those branches which were found necessary to open up the top slightly and permit the operator to work freely. Six to eight well-spaced limbs with a diameter of 2 inches to 4 inches were chosen for inserting the buds from the selected scion. On each limb two buds were shield budded side by side, about one inch apart and 12 inches to 18 inches from the central limb. Since the bark of the limbs was thick, it was slightly thinned by scarping to prevent too great a pressure on the bud and the air space in between. After the insertion of the bud, bandage was done with waxed cloth. The trunks of the trees were whitewashed to prevent sun scald. Although the time of operation was August to November, which is considered to be the optimum period for budding, the buds inserted failed to unite owing to the exudation of gum at the seat of bud insertion. Therefore, this method was also found to be unsuitable under Kodur conditions.

13. *Hybridization in citrus.*—With the object of evolving new types with desirable qualities of high yield, good taste and seedlessness combined together, hybridization in sweet oranges and in lemons was taken up. Before effecting cross-fertilization among the selected parents, a study of the flower mechanism and anthesis was made and the following are the salient features of the observations recorded:—

Floral mechanism and anthesis in sweet oranges and lemons.—Flowers of sweet orange are white in colour and are borne in small racemes or singly in the axils of leaves with usually 5 calyx lobes and 5 petals. Stamens vary in number from 25 to 28; ovary subglobose with 10-13 locules; style slender and clearly delimited. Flowers of lemon are pinkish in colour and are borne in short axillary corymbose racemes with usually 5 calyx lobes and 5 petals. Stamens vary in number from 33-40; ovary subcylindric or barrel shaped, tapering into the thick deciduous style.

Preliminary field observations indicated that the flowers of both lemon and Sathgudi usually begin to open from 7 a.m. and continue to do so till about 9 a.m. in lemon and about 10 a.m. in Sathgudi. Anthesis in both these classes of fruits usually synchronizes with the opening of the flowers and attains its peak period between 9 and 10 a.m. depending upon prevailing weather conditions. The mode of dehiscence of anthers is longitudinal from the tip downwards and the pollen is shed through the marginal slits.

Rough observations in the field indicated that the viability of pollen usually lasts for about 72 hours from the opening of the flowers while the stigmas continue to be receptive for about five days from opening. For want of proper facilities, more accurate data could not be collected. Similarly the exact duration for fertilization could not be determined accurately but it was generally observed that indications of fruit set were evident from about tenth day after fertilization.

Pollination technique.—Separation of petals of fully developed flowers and removal of anthers gently with slender forceps was found to be the most efficient method of emasculation. The retention of paper bags for a long period after crossing was found to be detrimental to the fruit-set owing to the artificial atmosphere created inside the bag. Therefore, the paper bags were removed as soon as the abscission of the style took place.

Cross-pollinations done.—(a) *Lemons.*—The following are the details of cross-pollinations done during the year:—

LEMONS—Details of cross pollinations done during—1951-52.

Parental combination Female × Male.	Number of flowers crossed.	Number of fruits set.	Percentage of fruits set.	Number of fruits dropped immature.	Number of fruits harvested.	Number of days taken from the date of crossing to fruit harvest.	Number of fruits which contained seeds.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1 Italian lemon × Rajahmundry lemon.	52	14	26.92	2	12	109 to 178	5
2 Italian lemon × Pollen of Italian lemon and Rajahmundry lemon mixed and pollinated.	26	16	61.54	5	11	126 to 184	10
3 Nepali Oblong × Rajahmundry lemon.	26	2	7.69	1	1	142	1

Remarks.—(a) Italian lemon and Nepali Oblong are generally seedless and rarely seeded but contains less juice. Rajahmundry lemon is very juicy but seeded.

(b) As the intervarietal crossing leads to immature fruit drop in polycarpic many seeded fruits, the pollen of the mother and the male parent were mixed and dusted with a view to prevent fruit drop and also to induce the setting of seed.

The following are the details of germination and progress of the lemon hybrid seedlings obtained during the year:—

Parental combination.	Number of seeds sown.	Number of days taken for germination.	Number of seeds germinated.	Percentage of germination.	Polyembryony.	Number of seedlings developing.
1 Italian Lemon × Rajahmundry Lemon.	87	21 to 23	46	52.87	Only one seed produced two seedlings.	37
2 Italian Lemon × Pollen of Rajahmundry Lemon and Italian lemon mixed and pollinated.	104	20 to 21	57	54.80	do.	39
3 Nepali oblong × Rajahmundry lemon.	38	20	6	17.14	Nil.	6

It is seen from the above data that the percentage of fruit-set was higher in the case where mixed pollen (pollen of both the parents mixed and dusted) was used than in the case where only the male pollen was used.

It is seen that the percentage of germination was higher in the combination of Italian lemon × Rajahmundry lemon than in that of Nepali oblong × Rajahmundry lemon. Only two seeds out of 109 germinated, produced two seedlings, each indicating very poor percentage of polyembryony.

(b) *Sweet oranges.*—Cross-fertilization in sweet oranges was done during the second week of February 1952 in the main flowering season and following are the details of the crosses made:—

Parental combination. Female × male.	Number of flowers crossed	Number set.	Number dropped.	Number of fruits developing.
1 Sathgudi × Buckeye Navel ..	50	34	15	8
2 Buckeye Navel × Sathgudi ..	50	31	15	16
3 Sathgudi × Valencia Late ..	50	32	15	17
4 Valencia Late × Sathgudi ..	50	38	24	14

14. *Selfing in lemons and Sathgudi.*—The parents selected for cross-pollination in the above work were selfed with a view to obtain the progenies for determining the extent of variation that could be normally expected and also to spot out superior forms if any. In this case, the stigmas of the fully developed flowers were dusted with the pollen of the same parent with all care and bagged. The following are the details of the work done in this direction:—

Parent tree.	Number of flowers pollinated.	Number of flowers set.	Percentage of set.	Number of fruits dropped.	Number of fruits harvested or developed.	Number of fruits which contained seeds.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 Italian Lemon	26	7	26.92	2	5	{ All were seedless.
2 Nepali Oblong	26	7	26.92	2	5	{ do.
3 Sathgudi	50	6	12.00	2	4	{ The fruits are still developing.

The above data reveal that the Italian lemon and Nepali oblong are completely self-sterile as the pollen of the same parent failed to produce any seed in the fruit. On the other hand when these two varieties of lemon were crossed with Rajahmundry lemon, they have set seeds.

15. *New rootstock trials.*—The planting of experimental trees was taken up and completed in July-August 1951. The first complete set of growth measurements of the trees were recorded in February 1952 after the plants had established in the field and the analyses of the data pertaining to each of the three trials are set out in detail in Tables XI to XIII.

TABLE XI.—Sathgudi Rootstock trial.

Summary of analysis of variance.

Object—To determine the rootstock most suitable for Sathgudi scion variety—Sathgudi.
Date of planting—4th and 5th August 1951.
Date of measurement—15th February 1952.
Treatments—Rootstocks—A. Acid lime; B. Sathgudi; C. Jamberl and D. Kichili.

Particulars.	A.	B.	C.	D.	General mean.
(a) Stock girth (diameter) one inch below the bud union.					
Mean girth in cm.	1.53	1.42	1.73	1.45	1.53
Significant or not ($P = 0.05$) ..	Significant.				
Critical difference	0.08				
Co-efficient of variation	9.36				
Standard error	0.078				

Conclusion—C, A, D, B.

Particulars.	A.	B.	C.	D.	General mean.
(b) Scion girth (diameter) one inch above bud union.					
Mean girth in cm.	1.34	1.18	1.47	1.07	1.27
Significant or not ($P = 0.05$) ..	Significant.				
Critical difference	0.08				
Co-efficient of variation	13.6				
Standard error	0.08				

Conclusion—C, A, B, D.

Particulars.	A.	B.	C.	D.	General mean.
(c) Height of tree—					
Mean height in cm.	72.47	65.86	78.00	68.03	71.09
Significant or not ($P = 0.05$) ..	Significant.				
Critical difference	3.98				
Co-efficient of variation	8.22				
Standard error	5.07				

Conclusion—C, A, D, B.

Particulars.	A.	B.	C.	D.	General mean.
(d) Spread of trees—					
Mean spread in cm.	34.39	29.04	33.21	29.44	32.75
Significant or not ($P = 0.05$) ..	Significant				
Critical difference	4.37				
Co-efficient of variation	15.38				
Standard error	5.56				

Conclusion—C, A, D, B.

TABLE XII.—*Acid lime rootstock trial.*

Summary of analysis of variance.

Object—To determine the rootstock most suitable for acid lime. Scion variety—Local.
 Treatments—Rootstock—A. Jamberi; B. Gajaninma; C. Acid lime.
 Date of planting—22nd to 24th July 1951.
 Date of measurement—18th February 1952.

Particulars.	A.	B.	C.	General mean.
(a) Stock girth (diameter) one inch below bud union—				
Mean girth in cm.	1.91	1.86	1.54	1.77
Significant or not ($P = 0.05$)	Significant.			
Critical difference	0.18			
Co-efficient of variation	12.12			
Conclusion—A, B, C.				
(b) Scion girth (diameter) one inch above bud union—				
Mean girth in cm.	1.64	1.51	1.37	1.51
Significant or not ($P = 0.05$)	Significant.			
Critical difference	0.13			
Co-efficient of variation	10.24			
Conclusion—A, B, C.				
(c) Height of trees—				
Mean height in cm.	74.89	75.69	60.47	70.35
Significant or not ($P = 0.05$)	Significant.			
Critical difference	8.06			
Co-efficient of variation	13.47			
Conclusion—B, A, C.				
(d) Spread of trees—				
Mean spread in cm.	65.30	67.05	51.65	61.33
Significant or not ($P = 0.05$)	Significant.			
Critical difference	7.02			
Co-efficient of variation	17.12			
Conclusion—B, A, C.				

TABLE XIII.—*Lemon rootstock trial.*

Summary of analysis of variance.

Object—To determine the rootstock most suitable for lemon. Scion variety—Nepali Oblong.
 Treatments—Rootstock—A. Jamberi; B. Gajaninma; C. Acid lime.
 Date of planting—26th and 28th July 1951.
 Date of measurement—20th February 1952.

Particulars.	A.	B.	C.	General mean.
(a) Stock girth (diameter) one inch below bud union—				
Mean girth in cm.	2.37	2.36	2.32	2.35
Significant or not ($P = 0.05$)	Not significant.			
Co-efficient of variation	5.63			
(b) Scion girth (diameter) one inch above bud union—				
Mean girth in cm.	1.98	1.84	1.99	1.94
Significant or not ($P = 0.05$)	Not significant.			
Co-efficient of variation	7.12			
(c) Height of trees—				
Mean height in cm.	137.26	123.02	130.36	131.21
Significant or not ($P = 0.05$)	Not significant.			
Co-efficient of variation	7.77			
(d) Spread of trees—				
Mean spread in cm.	91.06	86.93	89.46	89.15
Significant or not ($P = 0.05$)	Not significant.			
Co-efficient of variation	11.40			

The statistical analysis of the data revealed that in sathgudi rootstock trial, plants on Jamberi rootstocks have led the rest in respect of spread, height and girth measurements, closely followed by those on acid lime. In the acid lime rootstock trial, plants on Jamberi led the rest in respect of scion-stem circumference, while those on Gajaninma led in respect of both spread and height. In the lemon rootstock trial, the difference among the various treatments were not significant in any of the growth measurements.

In addition to the above experimental plantings, certain promising material collected was utilized for planting in the odd bits of lands for trial and observations. The list of varieties and types so planted is given below:—

Valencia orange (Nagpur).
 Sathgudi selection No. 1 (clonal progeny of a suspected bud sport).

Bibile orange (Ceylon).
 Tangelo Siminole (Nagpur).
 Tangelo yaloha (Nagpur).
 Sour orange (Nagpur).
 Lime Seedless (Ceylon).
 Kagzi Lime selection (Clonal progeny of suspected bud sport).
 Lemon hybrid (Ceylon).
 Rajahmundry lemon (Clonal progeny of a suspected bud sport).

16. *Exploitation of citrus bud sports.*—Clonal progenies of three suspected bud sports one in Sathgudi orange, one in Kagzi lime and another in Rajahmundry lemon, spotted out previously, were planted in the miscellaneous Citrus collection plot at the new rootstock trial station. During the year under report, two more suspected bud sports in Sathgudi orange were located on the station one bearing seven fruits on a twig and another bearing six fruits. Buds from these twigs have been taken and propagated.

17. *Cost of cultivation of citrus.*—A detailed statement of cost of cultivation of the different kinds of citrus is presented in Table XIV. Another statement showing profit and loss at a glance is presented in Table XV.

TABLE XIV.—*Detailed statement of cost of cultivation of citrus fruits kindwise for 1951-52.*

Crop (kind).	Area.	Cultural operations.	Irrigation.	Manuring.	Pruning.
(1)	(2)	(3)	(4)	(5)	(6)
ACS.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
Acid limes including lemons—					
1 Acid lime rootstock trial	1.23	57 15 0	253 12 0	125 13 0	37 6 0
2 Acid lime pruning trial	0.60	27 2 0	235 0 0	207 14 0	14 4 0
3 Acid limes from citrus variety collection including lemons.	0.17				
Total	2.00	85 1 0	488 12 0	333 11 0	51 10 0
Sathgudi and other sweet oranges—					
1 Sathgudi on grades	0.54	33 8 0	70 0 0	153 4 0	6 0 0
2 Sathgudi on kinds including American hybrids.	0.45	41 7 0	121 0 0	126 9 8	
3 Angam Gairangam selection plot.	0.92	42 2 0	96 0 0	107 15 0	3 8 0
4 Sathgudi rootstock trial	4.44	341 11 0	504 0 0	492 11 0	32 10 0
5 Sathgudi on different taxonomical progenies.	1.00	100 5 0	224 0 0	292 5 0	2 8 9
6 Sathgudi progeny test plot.	1.07	125 3 0	314 0 0	238 7 0	10 14 0
7 Citrus variety collection excluding lemon and acid lime.	5.58	270 0 0	526 0 0	467 0 0	44 6 0
Total	14.00	954 4 0	1,855 0 0	1,878 3 8	99 14 9
		Pests and diseases, spraying, etc.	Harvesting.	Total cost.	Cost of cultivation per acre.
		(7)	(8)	(9)	(10)
		RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
Acid limes including lemons—					
1 Acid lime rootstock trial	13 11 4		488 9 4		
2 Acid lime pruning trial			484 4 0		
3 Acid limes from citrus variety collection including lemons.					
Total	13 11 4		972 13 4	486 6 8	
Sathgudi and other sweet oranges—					
1 Sathgudi on grades	4 8 0		267 4 0		
2 Sathgudi on kinds including American hybrids.	2 4 0		291 4 8		
3 Angam Gairangam selection plot.	2 10 0		252 3 0		
4 Sathgudi rootstock trial	24 10 0		1,395 10 0		
5 Sathgudi on different taxonomical progenies.	13 14 0		633 0 9		
6 Sathgudi progeny test plot	7 15 0		696 7 0		
7 Citrus variety collection excluding lemon and acid lime.	17 18 0		1,325 3 0		
Total	73 10 0		4,861 0 5	347 3 5	

The area under citrus taxonomical seedling was not included as no regular cultural operations were done to the plot and yield of the trees was also very irregular.

TABLE XV.—Showing the profit and loss account for citrus for 1951-52.

Crop.	Area.	Total cost of cultivation.	Total produce		Cost of cultivation per acre.	Auction amount (Total.)	Amount realized per acre.	Profit per acre.
			By number.	By weight.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
				lb. oz.				
Acid lime—								
Acid lime root-stock trial including guard rows.	1-23	..	630,987	..	..	..	..	..
Acid lime pruning trial including guard rows.	0-60	..	249,768	..	..	..	..	..
Acid limes and lemons from citrus variety collection plot.	0-17	..	7,294	..	..	..	..	..
Total ..	2-00	972 13 4	888,049	..	486 6 8	4,000 0 0	2,000 0 0	1,513 9 4
Sweet oranges—								
Sathgudi progeny plot.	1-07	..	11,003	6,230 10	..	..	..	..
Angam and Galrangam plot.	0-92	..	4,562	1,882 8	..	..	..	..
Sathgudi on grades.	0-54	..	4,898	2,461 7	..	..	..	..
Sathgudi on kinds.	0-45	..	2,161	934 0	..	..	..	..
Sathgudi root-stock trial including guard rows.	4-44	..	30,957	15,492 14	..	..	..	..
Sathgudi on different progenies.	1-00	..	4,984	2,450 2	..	..	..	..
Citrus variety collection plot.	5-58	..	2,632	1,545 8	..	..	..	..
			62,097	30,997 1				
Miscellaneous fruits—								
Pummelo, grape fruit, citron marmalade, etc.	..	..	7,536	1,161 1	..	..	..	..
Total ..	14-00	4,861 0 5	..	..	347 3 5	1,750 0 0	125 0 0	222 3 5*

* Most of the sweet orange trees are just entering their full bearing stage now and hence the yields are not normal. Further the fruit yield was considerably lowered owing to the adverse climatic conditions which prevailed during the year 1951-52.

II. MANGO.

18. *Propagation methods in relation to tree performance.*—Analysis of annual data in respect of growth has revealed no significant differences among the various treatments in respect of spread girth and height. As regards yield, no significant difference was found among the various treatments when fruit yield by weight was taken into consideration. In respect of fruit yield by number, however, though double grafting in Neelum has led the rest of the treatments both in Neelum and Bangalora, the differences among the three treatments in each variety, viz., Neelum and Bangalora are not significant. It appears, therefore, that the influence of the method of propagation either in yield or growth in the same variety is practically not significant, as the tree reach their full bearing age (vide Table XVI).

TABLE XVI.—Mango—Propagational methods in relation to tree performance—Data for 1951-52.

Object—To determine the relative performance of mango raised by different propagational methods. Layout—Randomized blocks replicated six times with three times of each treatment in one block. Area of each plot—240' × 120'. Date of graftings—4th to 14th July 1939. Date of planting—1st December 1939. Date of collection of data for 1952—March 1952.

Treatments—A = Neelum inarched; B = Neelum root-graft; C = Neelum/Bangalora/Seedlings; D = Bangalora inarched; E = Bangalora root-graft; F = Bangalora/Neelum/Seedling.

Summary of analyses of variance.

Particulars.	A	B	C	D	E	F	General mean.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(A) Scion stem circumference—							
Mean circumference in cm (18 trees).	91-22	95-25	86-94	97-06	96-78	88-39	92-81
Percentage girth on general mean.	98-50	102-85	93-88	104-81	104-50	85-44	100-00
Significance by "F" test (P = 0-05.)	Not significant.						
Co-efficient of variation ..	10-62	..	..	..	..	..	..
(B) Spread measurements—							
Mean spread in cm (18 trees.)	758-42	811-44	795-13	807-66	315-22	781-72	794-93
Percentage spread on general mean.	95-41	102-08	100-03	101-60	102-55	98-34	100-00
Significance by "F" test (P = 0-05.)	Not significant.						
Co-efficient of variation ..	8-47	..	..	..	..	..	..
(C) Height measurements—							
Mean height in cm (18 trees.)	460-16	474-08	496-55	515-33	502-23	487-05	489-25
Percentage height on general mean.	94-05	96-88	100-51	105-33	102-66	99-55	100-00
Significance by "F" test (P = 0-05.)	Not significant.						
Co-efficient of variation ..	9-82	..	..	..	..	..	..
(D) Fruit yields in number—							
Mean yield in number (18 trees.)	363-80	366-20	437-10	160-50	185-20	162-10	279-10
Percentage yield on general mean.	130-35	131-21	156-61	57-51	66-36	58-08	100-00
Significance by "F" test (P = 0-05.)	Significant.						
Critical difference ..	185-50	..	..	..	..	..	..
Co-efficient of variation ..	56-21	..	..	..	..	..	..
Conclusion—C B A E F D							

Summary of analysis of variance.

Particulars.	A	B	C	D	E	F	General mean.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fruit yield by weights—							
Mean yield in weight in lb (18 trees).	109-00	169-40	130-80	114-70	122-20	103-90	115-00
Percentage yield on general mean.	94-78	95-13	113-74	99-74	106-26	90-35	100-00
Significance by "F" test	Not significant.						
Co-efficient of variation ..	55-46	..	..	..	..	..	..

The cost of production of this trial area together with the income are given in Table XVII. It is seen that a net profit of Rs. 65-7-3 was obtained during 1951-52, while the net total income from the beginning up to 30th June 1952 is 744-15-5.

TABLE XVII.—Showing the production in cost of mango propagational trial.

Area—4.33 acres.				Method of propagation—Inarching, root-grafting and double-working.		
Variety and number of trees— <i>Neelum</i> and <i>Bangalora</i> 107 (1 died during 1950).				Rootstock—Country seedling.		
Date of planting—1st December 1939.						
Serial number and Particulars.	Total from 1939 to 1950-51.	1950-51.	1951-52.	Progressive Total.	Remarks.	
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.		
1 Manual labour	459 3 7	13 0 0	37 3 0	496 6 7	<i>Manual labour.</i> —Digging channels, forming bunds, digging with <i>mammatties</i> around the trees and weeding.	
2 Bullock labour	547 0 9	40 14 0	61 13 0	608 13 9	<i>Bullock labour.</i> —Ploughing, working <i>guniakas</i> , leveling board, bund-former, etc.	
3 Irrigation	37 9 2	..	..	37 9 2	<i>Irrigation.</i> —By engine, and guiding water.	
4 Manures	80 6 0	..	..	80 6 0	<i>Manures.</i> —Cost of manures and application.	
5 Other expenses	181 5 9	14 6 0	29 14 0	211 3 9	<i>Other expenses.</i> —Watch, care of plants, spraying against diseases, pruning dead wood, etc.	
6 Cost of plants	49 8 0	..	..	49 8 0		
Total	1,346 1 6	68 4 0	128 14 0	1,474 15 3		

Income by cost of fruit at (Re. 0-0-9 per lb.).

During 1950-51.			Total income from beginning up to 1950-51.			During 1951-52.			Total income from the beginning up to 1951-52.		
RS.	A.	P.	RS.	A.	P.	RS.	A.	P.	RS.	A.	P.
176	0	0	2,025	9	5	194	5	3	2,219	14	8
Average expenditure per acre per year Rs. 28-5-10.											
Average income per acre per year Rs. 42-11-1.											
Net profit per acre per year Rs. 14-5-3.											
The above figures are based on cumulative yields from the time of bearing.											

19. *Trial on green manuring versus cultural practices mango*.—Since the futility of preferring the aged rootstocks for producing large sized mango grafts with a view to get better yields in orchards was established by the results obtained in the plot "Mango on rootstocks of different ages", up to 1950-51 further collection of annual data in this plot was discontinued and the plot was taken up for a trial of green manuring in mango orchards. This trial consists of the following treatments:—

(a) *Sowing pillipesara* in July–August with the receipt of south-west monsoon rains, at 50 lb. per acre and ploughing down the same in October–November.

(b) Ploughing ones in the south-west monsoon (July–August) and another in October–November.

(c) Control without ploughing and without green manuring.

To start with, soil samples from the experimental area were taken as per instructions of the Government Agricultural Chemist and sent to him for analysis.

20. *Mango double-working trial*.—Once again this year's data too revealed no significant differences either in growth measurements or yield among the treatments (vide Table XVIII).

TABLE XVIII.—Mango double working trial—Data for 1951-52.

Object—To determine if any bearing trees can be made to crop better by double working on a prolific stem.
Treatments—A = Humayuddin/Neelum seedling.
B = Jehangir/Neelum seedling.
C = Alampur Baneshan/Neelum seedling.
Layout—Randomized blocks replicated eight times with one tree of each treatment in one plot.
Date of first inarching—July 1939.
Date of second inarching—January 1940.
Date of planting—30th May 1940.

Summary of analysis of variance.

Particulars.	A.	B.	C.	General mean.
(A) Height measurements—				
Mean height in c.m. (8 trees)	408.30	332.50	391.00	377.30
Percentage height on general mean	108.22	88.13	103.63	100.00
Significance by 'F' test (P = 0.05)	Not significant.			
Co-efficient of variation	18.01			
(B) Scion-stem circumferences—				
Mean scion-stem circumference in c.m. (8 trees)	62.10	55.10	59.00	58.70
Percentage circumference on general mean	105.79	93.87	100.51	100.00
Significance by 'F' test (P = 0.05)	Not significant.			
Co-efficient of variation	15.02			
(C) Spread measurements—				
Mean spread in c.m. (8 trees)	624.10	508.40	575.90	569.50
Percentage spread on general mean	109.59	89.27	101.12	100.00
Significance by 'F' test (P = 0.05)	Not significant.			
Co-efficient of variation	17.12			
(D) Yield in number—				
Mean yield in number (8 trees)	10.09	4.09	16.10	10.80
Percentage yield on general mean	102.83	46.23	151.89	100.00
Significance by 'F' test (P = 0.05)	Not significant.			
Co-efficient of variation	96.39			
(E) Yield in weight—				
Mean yield in pounds (8 trees)	6.69	3.45	8.25	6.13
Percentage yield on general mean	109.12	56.28	134.58	100.00
Significance by 'F' test (P = 0.05)	Not significant.			
Co-efficient of variation	84.37			

21. *Mango on polyembryonic rootstocks*.—The yield data recorded in this observational trial are given in Table XIX. It is seen that on Pahutan rootstock, both the varieties, Neelum and Baneshan have recorded a maximum average yield of 1,104 fruits and 82 fruits respectively, per tree, during the year.

TABLE XIX.—Fruit yield in number from mango trees on polyembryonic rootstocks.

Name or the rootstock.	Number of trees in each variety.		Yield up to 30th June 1951.		Yield in 1951-52.		Total yield from the beginning.		Total average yield per tree from the first bearing.	
	Baneshan.	Neelum.	Baneshan.	Neelum.	Baneshan.	Neelum.	Baneshan.	Neelum.	Baneshan.	Neelum.
Kurukkan	10	1	1,857	448	329	1,104	2,186	1,552	318.60	1,552.00
Pahutan	4	1	1,118	448	327	1,104	1,445	1,552	361.25	1,552.00
Mylopelian	1	1	73	685	84	912	73	1,597	73.00	1,597.00
Goa	3	1	829	685	84	912	913	1,597	304.33	1,597.00
Nilashwar Dwarf	3	1	690	151	151	841	841	280.33	280.33	280.33
Olour	3	4	670	3,344	138	375	808	3,719	269.33	929.75
Salem	1	1	120	126	126	246	246	246	246.00	246.00

In the case of the total average yield per tree obtained from the commencement of bearing again Pahutan rootstock influenced Baneshan to yield the maximum number of fruits, while in the case of Neelum Goa rootstock has induced the maximum yield of fruits.

22. *Mango variety collection*.—Out of 98 varieties maintained on the station, 167 trees in 88 varieties fruited during the year. This year's record tree yield is only 927 lb. 4 oz., which was obtained from Bangalora tree No. 2/1. A list of promising trees and varieties in respect of yield of fruits by weight as well as by number is given in Table XX.

TABLE XX.—Showing the promising individual performers in the mango variety collection, 1951-52.

Serial number.	Tree number.	Variety.	Fruit yield.		Average weight of fruits.	Average percentage of marks awarded on eating quality. (standard = 100).
			Number.	Weight.		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
				LB.	OZ.	
1	1/2	Neelum	1,704	708	66.5	50
2	1/3	Bangalora top-worked to Neelum	886	535	9.66	45
3	1/7	Neelum	586	236	6.44	50
4	1/8	Neelum	549	208	5.12	50
5	2/1	Bangalora	1,703	927	8.70	45
6	2/2	Bangalora	1,064	662	9.95	45
7	2/3	Neelum top-worked to Bangalora	780	100	4.10	50
8	2/4	Do.	608	177	4.66	50
9	2/5	Bangalora	707	359	8.07	45
10	2/6	Do.	703	430	9.79	45
11	2/7	Do.	829	635	12.25	45
12	2/8	Do.	585	411	11.58	45
13	5/4	Chinna Suvarnaksha	650	250	6.15	60
14	5/5	Do.	608	204	5.37	60
15	6/7	Dupasand	1,240	250	3.23	50
16	7/5	Gundu Salem	1,142	430	6.02	55
17	8/7	Trichur Rumani (Neelum)	1,450	286	3.16	45
18	9/1	Pairi	602	247	6.57	50
19	9/2	Nadusalai	1,356	565	6.67	50
20	9/4	Do.	504	203	6.44	50
21	10/1	Mundappa	612	423	11.06	60
22	12/1	Phirangiludva	495	216	6.98	60
23	14/1	Panchadara kalasa	728	416	9.14	60
24	15/2	Kolanka Goa	661	237	5.64	45
25	17/1	Goa Kodur	437	197	7.21	45
26	19/3	Pulihora	1,200	276	3.66	45
27	19/4	Do.	1,080	270	4.00	45
28	20/3	Swarapadu	670	525	12.54	45
29	20/4	Do.	525	267	8.14	45
30	20/5	Sakkargutti	800	204	4.08	45
31	22/1	Hamlet Trichur	435	474	17.44	45
32	23/3	Chandrakarava	2,790	345	1.99	40
33	23/4	Do.	1,980	243	1.96	40
34	23/5	Pacharisi	6,400	580	1.45	40
35	23/6	Do.	3,520	320	1.46	40
36	26/1	Vellai Kolamban	1,112	336	4.84	50
37	26/4	Chembutan	662	173	4.64	45
38	26/5	Karutha Kolamban	467	154	5.28	50

N.B.—Mean tree yield in the plot was 430 fruits weighing 225 lb.

Among the varieties that fruited during the year, the choicest in respect of quality are furnished below :—

Juicy varieties.	Table varieties.	Dual purpose varieties.
(1)	(2)	(3)
Panakalu.	Jehangir.	Chinna Swarnarekha.
Kothapalli Kobbari.	Himayuddin.	
Panchadara Kalasa.	Alampur Baneshan.	
Phirangiludwa.	Mulgoa.	Rajamanu.
Cherukurassam.	Langra.	Nazukpasand.
	Baneshan.	
	Shendria.	
	Mundappa.	
	Khader.	
	Hamlet (Salem).	

23. *Mango seedling collection.*—Six trees in the polyembryonic seedling collection plot died during the year due to the adverse soil and severe drought conditions. Only one tree of Muvandan 8/1, and Kurukkan 9/2 fruited during the year. Eleven gaps in the plot were filled with the seedlings of the varieties Kurukkan (2), Muvandan (6) and Olour (3).

Out of the 29 monoembryonic seedling trees in the windbreaks, 18 trees fruited during the year. Among those that fruited, tree No. 16 which was assessed to be one of the eight promising trees in respect of quality of fruit, gave a record yield of 1,824 fruits weighing 215 lb. Besides the eight trees which were already assessed to bear quality fruits during the previous years, tree No. 15 bore 85 good quality fruits weighing 58 lb. for the first time after planting. Thus the collection of good change seedlings is enriched by another tree, producing good quality fruits. A brief description of the fruit from this tree is given below :—

Tree No. 5.—Fruit medium to large; very shallow cavity at the base; shoulders unequal; flesh fibreless, sweet, juicy and with pleasant flavour. Eating quality marks obtained 60.

24. *Controlled pollinations in mango.*—With a view to evolve new types possessing desirable characters such as good quality fruits, high cropping behaviour, etc., the following parental combinations were utilized for cross-pollination during the year with the success noted against each :—

Serial number and female parent.	Male parent.	Number of fruits obtained through successful combination.
1 Jehangir—3/8	× Neelum—1/8	..
2 Do.	× Bangalora—2/1	..
3 Do.	× Pacharsi—23/6	..
4 Himayuddin—4/6	× do.	..
5 Do.	× Bangalora—2/1	..
6 Mulgoa—8/2	× Neelum—1/8	..
7 Do.	× Bangalora—2/1	..
8 Do.	× Pacharsi—23/6	..
9 Al. Baneshan—24/2	× do.	..
10 Neelum—1/8	× Al. Baneshan—24/2	1
11 Al. Baneshan—24/2	× Bangalora—2/1	..
12 Jehangir—3/8	× Janardhanapasand—11/4 ..	..
13 Do.	× Willard—26/3	..
14 Do.	× Pulihora—19/3	..
15 Himayuddin—4/6	× Janardhanapasand—11/4 ..	..
16 Do.	× Willard—26/3	2
17 Chinna Suvannarekha—5/4	× Himayuddin—4/6	1
18 Mundappa—10/1	× Bangalora—2/1	..
19 Do.	× Hamlet—22/1	..

Serial number and female parent.	Male parent.	Number of fruits obtained through successful combination.
20 Mundappa—10/1	× Neelum—1/8	..
21 Cherukurassam—12/3	× Phirangiludwa—12/1	3
22 Phirangiludwa—12/1	× Rajamanu—13/5	..
23 Do.	× Panchadarakalasa—14/1 ..	..
24 Al. Baneshan—24/2	× Cherukurassam—13/3	1
25 Cherukurassam—13/3	× Al. Baneshan—24/2	1
26 Panchadarakalasa—14/1	× Al. Baneshan—24/2	2
27 Neelum—1/8	× Padiri	1
28 Bangalora—2/1	× Padiri	..
Total ..		13

The crossed fruits resembled the mother parents entirely.

As a result of previous year's work in this direction, five F. 1 seedlings were added to the existing hybrid collection.

Among the old mango hybrid seedling trees, 56 trees bore fruit during the year. Of these, 16 trees bore fruit for the first time after planting. Out of these 16 trees, fruits from the following four combinations were assessed to be of good quality. However, their performance require further observations, before they can be perpetuated :—

- 12/12—Neelum × Alampur Baneshan.
- 5/5—Baneshan × Jehangir.
- 3/13—Neelum × Panchadarakalasa.
- 3/16—Neelum × Alampur Baneshan.

The following are the brief descriptions of these fruits :—

12/12—Neelum × Alampur Baneshan.—Fruit medium to small with extended base and unequal shoulders; flesh moderately juicy; fibreless and pleasant in flavour. The fruit is more inclined towards Neelum, the female parent.

5/5—Baneshan × Jehangir.—Fruit medium, oblong with extended base, unequal shoulders, flesh fibreless, sweet with abundant juice and pleasant flavour. The fruit is more inclined towards Baneshan, the female parent.

3/13—Neelum × Panchadarakalasa.—Fruit medium with round base and equal shoulders; flesh slightly fibrous, sweet, abundantly juicy with delightful flavour. The fruit possesses qualities of both the parents.

3/16—Neelum × Alampur Baneshan.—Fruit medium with tapering base and equal shoulders; beak mammiform; flesh fibreless, sweet, moderately juicy with pleasant flavour.

25. *Blossom biology.*—Data on blossom biology in mango collected over a number of years has shown that number of perfect flowers in a panicle varies from panicle to panicle, variety to variety and in the same variety from season to season and tree to tree. Further it was also observed that the fruit set of a tree or variety though depends largely on the percentage of perfect flowers, it is also influenced by the physiological condition of the tree as well as the external influence, like weather. Hence these studies were discontinued as instructed by the Headquarters Deputy Director of Agriculture (Research).

26. *Shoot growth studies in mango in relation to yield.*—To study the cropping potentialities of the different kinds of shoots in mango, two varieties, viz., Neelum and Bangalora were taken up for study during 1950-51. The following classes of shoots in both the varieties were brought under observation :—

- Class 1.—Shoots that flowered but did not carry fruits to maturity in 1950.
- Class 2.—Shoots that carried fruits to maturity in 1950.

did not fruit well during the year. A maximum of 249 cashew nuts could be got from tree No. 90 while many trees did not yield any fruit. The performance of the best promising fruit trees in the miscellaneous collection is given in Table XXIII.

TABLE XXIII.—Showing the best individual performers in miscellaneous fruit plot 1951-52.

Serial number.	Tree number.	Kind of fruit and variety.	Yield of fruit in number.	Remarks.
<i>Sapota.</i>				
1	5/1	Kirthibharathi small	1,221	Mean tree yield of the plot = 536 fruits.
2	5/2	Do. big	1,076	
3	1/1	Gede	1,135	
4	1/2	Gede	790	
<i>Guava.</i>				
5	1/2	Benarsi	808	Do. = 537 fruits.
6	1/1	Red Fleshed	1,014	
7	12/5	Guava No. 49	701	
8	12/4	Guava No. 40	700	
9	15/2	Allahabad	688	
10	16/5	Smooth White	644	
<i>Pomegranates.</i>				
11	2/1	Paper Shell	120	Do. = 29 fruits.
12	2/4	Musket Red	119	
13	4/3	Uthukull	109	

31. *Hybridization in guava.*—In the guava collection at this station, there are seeded, seedless and red fleshed varieties. The seedless forms are generally shy bearers with excellent quality of fruits. In order to evolve new types with desirable qualities of low seed content, size and attractiveness, hybridization in guava was undertaken during the year. In the previous year, the flower mechanism, anthesis, etc., was studied and recorded. With the knowledge so gained 41 crosses were effected involving three parental combinations as detailed below:—

Serial number and Parental combinations Female × Male.	Number of crosses made.	Number set.	Number dropped.	Number of crosses obtained.	Number of seeds sown.	Percentage of germination.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1 Red-fleshed × Saharanpur Seedless.	8	5	3	2	16	6.25	Only one germinated.
2 Saharanpur Seedless × Red Fleshed.	4	3	1	2	14	14.3	Only two seeds germinated.
3 Red-fleshed × Chittidar.	10	4	4	..	..	..	..
4 Chittidar × Red-fleshed.	10	2	2	..	..	..	..
5 Smooth Green × Nagpur Seedless.	4	4	1	3	480	82.3	395 Seeds germinated.
6 Nagpur Seedless × Smooth Green.	5	2	2	..	..	..	..
Total ..	41	20	13	7	510	..	..

The seedlings germinated are progressing well and will be transplanted in a separate plot in November-December 1952 for the study of their performance.

32. *Pruning trial in Guava.*—With a view to remedy the irregular activation of buds at different times, to keep the bearing region of the tree down so as to facilitate, easy harvest, to increase the current seasons' growth which bears the entire crop and to provide adequately for renewal of vegetative wood, a pruning trial was initiated in January 1952.

Two varieties, viz., Guava No. 49, (tree No. 12/5) and Red fleshed (tree No. 1/2) were selected for the trial. The treatments consisted as follows:—

(a) Heading back to half the length of the vegetative shoot of the previous season.

(b) Heading back to one fourth the length of the vegetative shoot of the previous season and (c) No pruning (control).

Twenty selected shoots were taken up under each treatment and on each tree and labelled carefully. The pruning was done on 9th and 10th January, 1952. Measurements of new extension growths and counts of floral buds produced along with fruits set are being recorded monthwise. The data gathered over a period of five months, since the commencement of the trial indicated that the pruned shoots generally produced a larger number of flowers and fruits over the unpruned ones in either of the two varieties. Among the two classes of pruned shoots, those that were pruned to half their length appear to lead in both blossom and fruit production over the heavier pruned ones. However, the period of observation being small, it appears too premature to draw any definite conclusions in this respect. The data are presented in Table XXIV.

TABLE XXIV.—Guava pruning trial showing the mean number of shoots, flowers and fruits produced (From February 1952 to ending June 1952.)

Variety and treatments.	February.			March.			April.		
	Number of shoots pruned.	Number of flowers pruned.	Number of fruits set.	Number of shoots pruned.	Number of flowers pruned.	Number of fruits set.	Number of shoots pruned.	Number of flowers pruned.	Number of fruits set.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
A	Nil.	Nil.	Nil.	Red-fleshed.	Nil.	Nil.	3.85	0.50	Nil.
B	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	2.70	0.65	Nil.
C	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	0.20	Nil.	Nil.
A	Nil.	Nil.	Nil.	Guava No. 49.	Nil.	Nil.	2.05	0.25	Nil.
B	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	1.50	Nil.	Nil.
C	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	0.35	Nil.	Nil.
May.									
June.									
Mean values.									
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
A	3.85	4.05	Nil.	Red-fleshed.	0.45	0.50	2.00	4.30	5.05
B	0.05	1.95	Nil.	Nil.	0.05	0.05	1.40	2.80	3.10
C	1.20	0.25	Nil.	Nil.	2.20	0.25	3.60	2.45	0.25
A	0.45	0.05	Nil.	Guava No. 49.	0.95	0.15	3.45	0.45	Nil.
B	0.45	0.25	Nil.	Nil.	0.20	0.15	2.15	0.40	Nil.
C	0.55	0.10	Nil.	Nil.	0.95	0.05	1.85	0.15	Nil.

A = Pruned to half the length of the shoots.
B = Pruned to one fourth the length of the shoots.
C = No pruning = control.

33. *Singapore jack.*—Six seedlings of Singapore jack planted in 1947-48 are progressing normally with height ranging from 58.5 c.m. to 230.0 c.m. None of them have shown so far any precocity attributed to them elsewhere.

34. *Dates.*—Fifty seedlings of five varieties of dates from Hyderabad, planted in the previous year along the fence line in the nursery area are progressing satisfactorily. Besides these, 18 suckers of the variety Commercial, six suckers of Persian variety from Hyderabad were obtained and planted during the year.

35. *Zizyphus.*—Six seedlings raised from seeds obtained from a selected tree in Tuni were planted along the fence line in the Nursery area. These have established and are coming up satisfactorily.

36. *Sweet tamarind.*—Two seedlings raised from seeds obtained from a selected sweet tamarind tree, through the Director of Agriculture were planted in the wind-breaks at the New Rootstock Trial Station, Kodur. These have established well and are growing satisfactorily.

IV. VEGETABLES.

37. *Cucumber*.—Out of the 16 seeds of cucumber (Chicago sown on 15th June 1951, only 14 germinated. But ultimately only four vines reached bearing stage producing five fruits in all. The vine began flowering 40 to 42 days after sowing and fruits were ready for harvest in 80 days after sowing. The maximum weight of a fruit obtained was 2 lb. 4 oz. The average yield per vine worked out to only about a pound and a half which was very poor.

38. *Roselle*.—Seeds of Roselle were sown in separate beds in April 1952. The germination of seeds was good and seedlings are progressing satisfactorily.

39. *Colocasia and yam*.—A local variety of colocasia planted in a plot of five cents yielded 36 lb. of tubers which worked out to an acre yield of 720 lb., while yam failed to produce any crop.

40. *Cowpea and lady's-fingers (seed multiplication)*.—Twenty lb. of seeds of cowpea, 419 and eight and half pounds of lady's-finger seeds were produced and supplied to the district staff.

41. *Steps taken to increase the revenue of the station*.—The well in the northern block was deepened by 10 feet to ensure adequate water-supply and thus help to maintain the perennial fruit trees during the severest drought period avoiding loss of revenue. Another well in the New Rootstock Trial station was bored and a good spring obtained ensuring adequate supply of water to the new area. In the Nursery area a 10 inch bore is being drilled to ensure adequate water-supply to the nursery even in periods of drought. A comparative statement of the increase in receipts realized during the year along with that of the previous year is furnished below :—

Nature of receipts.	1950-51.			1951-52.		
	from 1st July 1950 to 30th June 1951.			from 1st July 1951 to 30th June 1952.		
	(1)	(2)	(3)	(4)	(5)	(6)
		RS.	A. P.	RS.	A. P.	
1 Actual cash receipts		12,389	6 3	18,934	7 6	
2 By departmental transfers ..		1,022	12 11	4,064	7 10	
Total ..		13,412	3 2	22,998	15 4	

FRUIT RESEARCH STATION,
KODUR P.O., CUDDAPAH DISTRICT,
28th July 1952.

C. BHUJANGA RAO,
Superintendent.

AGRICULTURAL RESEARCH INSTITUTE,
COIMBATORE,
15th December 1952.

U. NARASINGA RAO,
Fruit Specialist, Coimbatore.

APPENDIX.

A BRIEF HISTORY AND OBJECT OF THE FRUIT RESEARCH STATION, KODUR P.O.
(CUDDAPAH DISTRICT).

With the diverse soil and climatic conditions, the State of Madras possesses facilities within itself most suitable for the cultivation of a very large number of varieties and kinds of fruits. The Government of Madras have for some time past been alive to the necessity of giving an impetus to the fruit industry in the plains, which in recent years has assumed increasing importance as one of the most remunerative agricultural industries.

2. In response to a scheme submitted in 1939, the Indian Council of Agricultural Research sanctioned a grant of Rs. 69,474 spread over a period of five years to the Madras Government to enable to give a practical shape to their desire of furthering the fruit industry of the Presidency. The grant was supplemented by the Madras Government to the tune of Rs. 11,261 towards the cost of land and Rs. 19,020 towards the work on taxonomy of fruits. A nursery for supply of reliable plants from choice trees of reputed varieties of fruits was also started towards the closure of 1939 at the expense of the Local Government. An area of eight acres was specially acquired for this purpose and the work of propagation and sale of plants was actually taken up during 1939.

3. With the close of the first five-year period on 31st March 1940, the Indian Council of Agricultural Research agreed to extend the Fruit Research Scheme for a further period of two years at a total cost of Rs. 26,760 of which the Local Government were to bear the expenditure to an extent of Rs. 8,920. On the termination of this period, another extension for a period of two more years was granted by the Council at a total cost of Rs. 20,490 to be shared in the ratio of 2:1 by the Council and the Local Government, respectively. A further extension of two years till 31st March 1946 was accorded at a total cost of Rs. 26,350 to be shared in the ratio of 1:1 by the Council and Local Government. On the further period of five years up to 31st March 1951, the total amount sanctioned by the Council and Provincial Government being Rs. 61,440 and Rs. 98,264, respectively.

4. The site for the Fruit Research Station was finally acquired and taken over on 1st March 1935 and the preliminary work of surveying and well testing was carried on before the actual research was commenced in the beginning of the following August, when the Superintendent took over charge of the station.

5. The Fruit Research Station at present comprises of an area of 50-53 acres and is situated in the village of Anantarajupet, Rajampet taluk, Cuddapah district. It is 3½ miles from Kodur Railway station in the Southern Railway in a northerly direction adjacent to the Cuddapah-Tirupati road. It possesses the advantage of being only about 100 miles away from Madras and of being located in the heart of citrus and mango tracts of Rajampet taluk, representing to some extent the typical fruit-growing conditions of at least four districts, viz., Chittoor, Cuddapah, Kurnool and North Arcot.

6. A new site of 15.59 acres intended for carrying out rootstock trials for sathgudi, lemon and lime as per G.O. Ms. No. 1606, Development, dated 15th April 1947, was acquired and taken over on 20th October 1948 and the preliminary work connected with layout was taken up during the beginning of the year 1949.

7. The soils of the station are fairly typical of the surrounding area containing patches of deep red loam, stiff block clay and lighter loam. The whole area is classed as dry irrigable land depending on the wells for water-supply. A general soil analysis of a part of the station allotted for variety collection indicated that the soils in certain parts have a high alkaline reaction (pH being well over 9.0). Lower layers are clayey and have a high pH with an accumulation of sodium carbonate. The soil analyses of plots reserved for citrus rootstocks trial and mango field trials on the other hand showed that these areas form suitable plots for field experiments. The soil in these plots is red sandy loam with about 7.5 pH and with a low content of water soluble salts and uniformly fair water-holding capacity and pore space. As the present site is found to be suffering from certain defects which are not conducive to the proper conduct of the various experiments now, a new site extending to about 15.59 acres has been acquired.

8. The rainfall of this tract is estimated to be about 38 inches per year and is received more or less in equal quantities from south-west and north-east monsoons during six to seven months in the year. From January to June, the season is considered dry even though light summer showers may be recorded in April or May. April and May are the hottest parts of the year but the temperature is usually about five to six degrees lower than that of Cuddapah, the headquarters of the district.

9. Though the aim of the station is to tackle problems involving all aspects of fruit-growing, it is manifestly impossible to carry them out all simultaneously for various reasons. Among the major problems dealt with are, the introduction and trial of almost all the varieties of citrus, mango and other fruits of proved merit and acknowledged importance in the fruit trade, with a view to find out the most suitable and commercially profitable ones to the region. Side by side experiments on the cheapest and most convenient methods of raising trees with the ultimate object of stocking gardens with healthy, vigorous, pre-cocious and most productive trees, budded or grafted, as the case may be, on most desirable rootstocks have been taken up. Beside these, problems like cultivation, manuring and irrigation, and diseases and pest control of fruit-trees have also to be investigated with a view to standardize cultural practices.

**ANNUAL REPORT OF THE SUGARCANE RESEARCH STATION,
GUDIYATTAM, NORTH ARCOT DISTRICT, FOR THE YEAR 1951-52
(FASLI 1361).**

Season and rainfall.—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 falls short of the 36-year average of 33·64 inches by 9·70 inches due to the failure of the south-west monsoon and summer showers. The low-precipitation during the year following as it did, a year of poorer rainfall affected the timely agricultural operations as well as the cropping scheme on the farm. The south-west monsoon started off well, though late and good showers were received by the second week of July. Subsequently it did not improve and ended with only 7·07 inches on 12 days as against the 36-year average of 15·65 inches. The Gudiyattam tank, which is the source of flow-irrigation for the farm, did not receive any supplies and consequently the area under paddy had to be reduced to 2 acres as against 7 acres proposed for the season.

The north-east monsoon recorded a rainfall of 13·74 inches as against 13·23 inches being the average for the previous 36 years. Though the precipitation was normal, it was ill-distributed with over 7·08 inches received on two days in November. With this, the tank received just a month's supply of water and the water-table in the wells improved a little. Over six acres of paddy ASD. 5 was planted with the help of these rains, but great difficulty was felt in maintaining this area by lift irrigation till February.

Hot weather rains aggregated to 2·53 inches which was again very insufficient even for sowing the green manure crops.

In short, the year under review was very trying with scarcity of rains and ever receding water-table in the wells. In spite of the very adverse seasonal conditions, sugarcane yields were kept up well above the average by timely irrigations, though paddy yields were not quite up to the mark.

A detailed statement of rainfall for the year is furnished in Table I.

TABLE I.—Statement of rainfall.

Season and month.	Week days.	Rainfall, 1951-52.		Rainfall, 1950-51.		Average for ten years.		Average for 36 years.
		Days.	Rain.	Days.	Rain.	Days.	Rain.	
South-west monsoon.								
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
June	7-13	..	..	..	0·02	1	0·52	2·43
	14-20	..	..	1	0·12	1	0·52	..
	21-27	..	..	..	..	1	0·43	..
June-July	28-4	..	..	1	0·23	1	0·46	3·38
	5-11	3	3·03	1	0·14	2	1·16	..
	12-18	2	0·97	..	..	2	0·59	..
	19-25	1	0·23	..	..	2	0·73	..
July-August	26-1	..	..	2	0·43	2	0·77	4·18
	2-8	..	..	..	..	2	0·71	..
	9-15	1	0·16	1	0·10	2	1·04	..
	16-22	..	..	2	3·45	1	0·71	..
	23-29	2	1·35	2	0·41	2	1·84	..
August-September	30-5	1	0·22	1	0·29	2	1·07	5·71
	6-12	1	0·25	2	1·20	2	0·95	..
	13-19	1	0·86	..	..	1	0·60	..
	20-26	..	..	3	2·41	2	0·77	..
Total for the season ..		12	7·07	16	8·30	26	12·85	15·65

Season and month.	Week days.	Rainfall, 1951-52.		Rainfall, 1950-51.		Average for ten years.		Average for 36 years.
		Days.	Rain.	Days.	Rain.	Days.	Rain.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
North-east monsoon.								
September-October ..	27-3	2	1.66	1	0.58	3	1.68	5.67
	4-10	2	0.77	2	0.65	3	2.44	..
	11-17	2	0.28	2	1.23	3	1.22	..
	18-24	1	0.15	1	0.18	2	0.82	..
	25-31	2	3.77	..	..	1	0.83	..
November ..	1-7	..	..	1	0.46	2	0.84	5.25
	8-14	1	0.33	3	0.34	2	0.72	..
	15-21	4	6.75	1	0.65	3	1.92	..
	22-28	..	..	..	..	3	0.89	..
	29-5	..	..	..	..	1	0.73	1.55
November-December ..	6-12	..	..	..	..	1	0.71	..
	13-19	..	..	..	0.06	1	0.33	..
	20-26	..	..	..	..	1	0.17	..
	27-3	..	..	..	..	..	0.13	0.76
	4-10	..	..	..	..	1	0.32	..
December-January ..	11-17	..	..	..	..	..	0.01	..
	18-24	..	..	..	..	..	0.14	..
	25-31	..	..	..	..	..	0.04	..
	..	..	..	..	..	..	..	..
	..	..	..	..	..	..	..	..
Total for the season ..	..	14	13.74	11	4.70	26	14.06	13.22
Hot weather period.								
February ..	1-7	..	..	..	..	..	..	0.78
	8-14	..	..	..	..	..	0.20	..
	15-21	..	..	..	..	..	0.01	..
	22-28	..	..	..	..	..	..	..
	29-5	..	..	..	..	..	0.19	..
March ..	6-12	..	..	..	..	..	0.02	..
	13-19	1	0.10	..	..	..	0.01	..
	20-26	..	..	..	..	..	..	..
	27-3	..	..	1	1.25	..	0.22	0.77
	4-10	..	..	2	1.34	..	0.10	..
March-April ..	11-17	..	..	1	1.34	..	0.17	..
	18-24	..	..	1	0.30	..	0.07	..
	25-31	..	..	..	..	..	..	..
	..	..	..	2	0.82	1	0.25	2.97
	..	..	..	1	0.46	1	0.35	..
April-May ..	..	..	..	..	..	1	0.36	..
	..	..	..	..	..	2	1.63	..
	..	..	..	1	0.26	..	..	..
	..	..	..	1	0.10	1	0.75	..
	..	..	..	..	..	..	..	..
May-June ..	..	..	..	..	..	2	0.70	..
	..	..	..	..	..	..	..	..
	..	..	..	..	..	..	..	..
	..	..	..	..	..	..	..	..
	..	..	..	..	..	..	..	..
Total for the season ..	..	7	2.53	10	4.89	8	5.02	4.76
Grand total for the year ..	..	33	23.34	37	18.19	60	31.93	33.64

A. SUGARCANE.

2. (1) Sugarcane was the main crop on which research work was in progress on this station. The main items of study during the year were varietal study in canes, (2) main yield trials with promising early and late varieties, (3) maturity observations in promising late and early varieties, (4) time of planting and harvesting trial with Co. 419 and Co. 449 and (5) March and May planting trial of cane.

An area of 8.43 acres was under sugarcane experiments and 0.95 acre under short crop for seed multiplication. The average yield of millable cane per acre was 41.63 tons as against 34.95 tons recorded during the previous year.

3. *Varietal study plots.*—Seedling canes released every year from the Sugarcane Breeding Institute, Coimbatore, and elsewhere are studied in the study plots along with three standard varieties Co. 419, Co. 449 and Co. 527 for late, mid and early

seasons, respectively. The plots were randomized and replicated twice. The following 112 varieties were under study during this year:—

Third year of study—

Co. 660 to Co. 668, Co. 670 to Co. 678, Co. 680 to Co. 688. 27

Second year of study—

Co. 689 to Co. 692, Co. 694 to Co. 715, Co. 717, Co. 718, Co. 720, Co. 721, Co. 722, Co. 724, Co. 725, Co. 726, Co. 731, Co. 732, Co. 735, Co. 740, Co. 742, Co. 743, Co. 744, B.O. 10, B.O. 11, B.O. 15, B.O. 21, B.O. 24, and Mys. Ray. 130. 54

First year of study—

Co. 669, Co. 679, Co. 693, Co. 730, Co. 734, Co. 741, Co. 747, Co. 750, Co. 751, Co. 755, Co. 758, Co. 759, Co. 761, Co. 771, Co. 776, Co. 777, Co. 782, Co. 792, Co. 795, Co. 799, Co. 800, Co. 804, Co. 805, Co. 807, Co. 810, Co. 813, Co. 818 and I.C. 214. 31

Total .. 112

Planting was done on 17th and 20th to 25th March 1951.

The crop was grown under normal conditions of manuring and irrigation. The manure consisted of 100 lb. nitrogen two-third as groundnut cake and one-third as ammonium sulphate in two equal doses at the time of planting and earthing-up over a basal dressing of 10 tons of farm yard manure per acre.

Economic characters such as germination, tillering, field habit, growth, resistance to drought and susceptibility to insect pests and diseases, arrowing and juice quality were studied. The following are the indications from the study: The average percentage of germination in the study plots was 66.8 per cent. The following varieties recorded more than 80 per cent germination:—

Co. 660, Co. 663, Co. 666, Co. 667, Co. 668, Co. 670, Co. 671 to Co. 676, Co. 678, Co. 680, Co. 682, Co. 684, Co. 686, Co. 696, Co. 704, Co. 705, Co. 706, Co. 712, Co. 717, Co. 722, Co. 729, Co. 731, Co. 735, Co. 736, Co. 739, Co. 751, B.O. 11, Co. 419, Co. 449 and Co. 527.

The growth in general was fair except in the following varieties which were comparatively stunted. These varieties have been eliminated from further trials and study:—

Co. 669, Co. 679, Co. 689, Co. 690, Co. 693, Co. 695, Co. 698, Co. 699, Co. 700, Co. 701, Co. 702, Co. 704, Co. 713, Co. 721, Co. 742, Co. 755, Co. 804, Co. 813, B.O. 21, B.O. 24 and Mys. Ray. 130.

A maximum growth up to 142 inches of millable cane in Co. 678 and 118 inches of millable cane in Co. 682, 116 inches of millable cane in Co. 782, 115 inches of millable cane in Co. 684 and 112 inches of millable cane in Co. 703 were recorded in the month of March. The growth is quite good considering the severe drought conditions which prevailed throughout the entire growth period.

Susceptibility to drought as evidenced by scorching of leaves was noted in Co. 668, Co. 702, Co. 723, Co. 726, Co. 728, Co. 747, Co. 771, Co. 776, Co. 777 and Co. 818.

Arrowing commenced somewhat late, i.e., only by end of October.

The following varieties only arrowed:—

Co. 660, Co. 661, Co. 664, Co. 666, Co. 667, Co. 668, Co. 670, Co. 671, Co. 672, Co. 674, Co. 676, Co. 677, Co. 678, Co. 681, Co. 686, Co. 691, Co. 692, Co. 694, Co. 695, Co. 697, Co. 699, Co. 702, Co. 703, Co. 705, Co. 707, Co. 708, Co. 711, Co. 713, Co. 715, Co. 718, Co. 721, Co. 725, Co. 726, Co. 732, Co. 735, Co. 740, Co. 746,

Co. 747, Co. 755, Co. 758, Co. 759, Co. 761, Co. 771, Co. 776, Co. 777, Co. 779, Co. 782, Co. 792, Co. 795, Co. 799, Co. 800, Co. 801, Co. 804, Co. 805, Co. 807, Co. 810, Co. 813, Co. 818, I.C. 214 and Co. 527.

The arrowing was late and also very much suppressed evidently due to the drought conditions which prevailed. A large number of varieties did not arrow and even in varieties that arrowed the extent of arrowing was low. The average percentage of arrowing for the varieties was 16.46 as against 28.16 during last year. The extent of arrowing in the standards Co. 419, Co. 449 and Co. 527 was nil, nil and 45.72 per cent, respectively.

The juice quality of the varieties was exceptionally very high. A large number of varieties recorded very high percentage of sucrose in their juices. Drought condition at the maturity phase seemed to favour improvement in juice quality of the cane varieties.

Based on the results of the chemical analysis of juices of all the varieties conducted once in every month from November to May, the varieties are tentatively classified as suitable for crushing in the early, mid and late seasons as follows:—

Early maturing varieties—Sixteen per cent sucrose and 85 per cent purity in December-January.—Co. 666, Co. 674, Co. 703, Co. 711, Co. 727, Co. 729, Co. 747, B.O. 15, B.O. 21, Co. 795, Co. 662, Co. 665, Co. 667, Co. 668, Co. 671, Co. 681, Co. 688, Co. 691, Co. 692, Co. 694, Co. 697, Co. 699, Co. 700, Co. 702, Co. 705, Co. 712, Co. 714, Co. 717, Co. 724, Co. 732, Co. 740, Co. 746, Co. 750, Co. 751, B.O. 10, B.O. 11, B.O. 24, Mys. Ray. 130, Co. 693, Co. 730, Co. 734, Co. 741, Co. 758, Co. 761, Co. 779, Co. 782, Co. 792, Co. 799, Co. 804, Co. 805, Co. 810 and Co. 813.

Mid-season varieties.—Co. 664, Co. 678, Co. 689, Co. 695, Co. 704, Co. 706, Co. 708, Co. 709, Co. 710, Co. 713, Co. 718, Co. 728, Co. 732, Co. 744, Co. 669, Co. 679, Co. 776, Co. 660, Co. 670, Co. 672, Co. 676, Co. 677, Co. 682, Co. 684, Co. 685, Co. 690, Co. 696, Co. 698, Co. 715, Co. 723, Co. 729, Co. 730, Co. 731, Co. 735, Co. 736, Co. 737, Co. 739, Co. 755, Co. 769, Co. 800 and Co. 818.

Late varieties—Fifteen per cent sucrose and 85 per cent purity in April-May.—Co. 661, Co. 663, Co. 678, Co. 683, Co. 685, Co. 701, Co. 720, Co. 721, Co. 722, Co. 743, Co. 771, Co. 777, Co. 801 and I.C. 214.

Based on the juice quality, yield and field habit promising varieties for the early, mid and late seasons were selected and the same are furnished separately with the data in the Table II.

TABLE II.—Yield of cane and C.C.S. per acre.

Serial number and variety.	Average yield in tons/acre.	Average population per acre.	C.C.S. per cent.	C.C.S. in tons per acre.
(1)	(2)	(3)	(4)	(5)
Early season group.				
1 Co. 691	52.50	78,500	12.18	6.38
2 Co. 703	35.50	45,500	12.37	4.39
3 Co. 740	46.40	44,000	12.79	5.93
4 Co. 747	49.10	54,000	12.23	5.99
5 Bo. 15	33.70	44,500	12.83	4.32
6 Co. 683	47.30	37,500	10.61	5.23
7 Co. 682	46.00	44,500	11.32	5.02
8 Co. 799	43.70	48,500	12.06	5.27
9 Co. 527 (control)	24.58	40,700	12.77	3.14

Serial number and variety.	Average yield in tons/acre.	Average population per acre.	C.C.S. per cent.	C.C.S. in tons per acre.
(1)	(2)	(3)	(4)	(5)
Mid-season group.				
1 Co. 670	41.5	53,000	13.91	5.78
2 Co. 672	51.3	45,000	14.30	7.19
3 Co. 673	42.4	46,000	14.25	6.03
4 Co. 684	47.5	35,500	13.76	6.58
5 Co. 688	44.4	39,000	13.98	6.21
6 Co. 710	47.9	57,000	13.82	6.62
7 Co. 712	40.9	51,000	14.17	5.79
8 Co. 726	43.2	42,000	13.68	5.91
9 Co. 727	45.0	40,500	15.36	6.91
10 Co. 731	42.9	32,000	14.51	6.23
11 Co. 732	49.1	42,000	14.83	7.28
12 Co. 750	47.5	45,000	15.05	7.15
13 Co. 758	47.3	53,000	14.93	7.06
14 Co. 776	41.9	49,500	13.95	5.85
15 Co. 779	50.6	50,500	14.38	7.28
16 Co. 782	51.5	42,500	14.25	7.34
17 Co. 801	55.8	41,000	13.35	7.45
18 Co. 449 (control)	29.6	34,950	14.55	4.31

Late season group.				
1 Co. 676	46.0	54,000	12.17	5.60
2 Co. 677	55.4	49,500	13.02	7.21
3 Co. 678	59.8	31,500	11.76	7.03
4 Co. 705	43.5	57,500	12.45	5.42
5 Co. 709	46.4	52,000	12.83	5.95
6 Co. 746	43.7	39,500	14.30	6.24
7 Co. 751	47.2	54,500	13.37	6.31
8 Co. 761	45.5	51,000	13.61	6.19
9 Co. 771	58.0	43,000	12.11	7.02
10 Co. 782	42.7	35,500	12.49	5.33
11 Co. 799	40.4	35,500	12.30	4.97
12 Co. 800	42.4	30,000	13.13	5.57
13 Co. 810	46.4	46,000	13.69	5.35
14 Co. 419 (control)	41.9	32,800	12.06	5.05

Except for the early shoot-borer (*Argyria steicticraspis*) pest and disease incidence was negligible. The percentage of dead hearts caused by this pest was maximum in Co. 742 (61.53 per cent). Varieties Co. 729 (50.48 per cent), Co. 679 (39.83 per cent), Co. 800 (37.67 per cent), Co. 699 (35.83 per cent), Co. 698 (33.83 per cent) and Co. 667 (31.52 per cent) are some of the others which recorded high incidence of pest. Among the varieties Co. 691, Co. 740 and Co. 747 for the early crushing Co. 672, Co. 732, Co. 779, Co. 782 and Co. 805 for mid-season and Co. 677, Co. 678 and Co. 771 for the late crushing were of outstanding merit.

4. *Main yield trials.*—Promising sugarcane varieties, selected from the varietal study plots, are first tested for yield in a preliminary way for one year, in small-scale plots. Varieties that recorded high yields as compared to the controls, are studies in the main yield trials with regular randomized layout in standard sized plots for three consecutive seasons before the final selection of a variety for release. Varieties belonging to a particular maturity group are tested against the standard varieties of that particular group in these yield trials.

(a) *Early varieties (first year).*—Three varieties Co. 626, Co. 630 and Co. 669 were compared with Co. 419 and Co. 449 (controls) to select the best early variety. The results indicated that the three new varieties were significantly inferior to the controls, Co. 419 and Co. 449 in respect of yield. The summary of results is furnished in the Table III.

The details of layout and summary of results are furnished in Table III.

TABLE III.—*Sugar cane—Main yield trials with early maturing varieties—1951-52.*

Soil—Loam.	Replications—Six.
Previous crop—Paddy.	Layout—5 × 8 randomized block.
Manures—Ten tons of farm yard manure as basal dressing, and 200 lb. of nitrogen two-thirds as groundnut cake and one-third as sulphate of ammonia.	Dates of planting—17th and 18th December 1950.
Spacing—2" × 8" or 4 links between cane rows.	Date of harvest—26th December 1951 to 22nd January 1952.
Seed rate—15,000 three budded setts per acre.	Size of plot—
Variants—Five: Co. 620, Co. 630, Co. 659, Co. 419, and Co. 449 (controls).	Gross—112 5 links × 32 links = 3.6 cents.
	Net—104.0 links × 24 links = 2.5 cents.

Summary of results.

	Co. 419.	Co. 449.	Co. 630.	Co. 620.	Co. 659.	Standard error of treatment mean.	Whether significant or not.	Critical difference at P = 0.05.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Mean yield of cane in tons/acre.	46.70	44.73	38.92	36.59	35.54	1.009	Yes.	2.19
As percentage on control.	100.0	95.6	83.3	78.3	76.1	2.160	..	4.70

Conclusion—Co. 419, Co. 449, Co. 630, Co. 620, Co. 659.

None of the varieties proved superior in yield to the controls Co. 419 and Co. 449 which were on a par.

Maturity observations (juice quality).—Periodical data pertaining to juice analysis are recorded in the Table IV below:—

TABLE IV.—*Results of juice analysis.*

Variety.	October.		November.		December.	
	Sucrose.	Purity.	Sucrose.	Purity.	Sucrose.	Purity.
	(2)	(3)	(4)	(5)	(6)	(7)
	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.
Co. 419	8.83	66.31	10.88	73.52	10.87	72.67
Co. 449	9.15	67.23	12.12	77.00	10.96	73.35
Co. 620	10.00	72.51	12.98	78.68	13.44	79.14
Co. 630	8.28	63.65	10.58	72.46	10.58	71.48
Co. 659	13.42	78.91	14.81	83.51	13.49	78.12
	January.		February.		March.	
	Sucrose.	Purity.	Sucrose.	Purity.	Sucrose.	Purity.
	(8)	(9)	(10)	(11)	(12)	(13)
	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.
Co. 419	13.23	79.23	15.56	83.39	15.75	88.60
Co. 449	13.90	84.76	17.39	85.80	19.32	72.28
Co. 620	15.35	84.33	19.44	92.98	18.81	90.69
Co. 630	14.95	88.94	15.16	81.68	16.68	84.48
Co. 659	11.93	74.50	17.70	87.36	18.39	91.79

(b) *Jaggery.*—Periodical recovery of jaggery and its quality every month from October to March were studied and results indicated that—

(1) February-March were the best months for jaggery manufacture.

(2) Jaggery from Co. 449 was of good colour and consistency. Co. 620 and Co. 659 gave jaggeries of good consistency and colour was dark brown.

The monthwar recovery of jaggery from the varieties is recorded in Table V.

TABLE V.—*Recovery per cent on cane weight and yield of jaggery.*

Variety.	October.	November.	December.	January.	February.	March.	Jaggery in tons/acre.
Co. 419	6.62	7.89	8.62	8.88	8.59	10.98	3.99
Co. 449	7.24	8.27	8.63	8.80	8.72	11.10	4.29
Co. 620	6.30	7.93	9.38	9.77	8.74	11.34	3.54
Co. 630	7.38	7.47	7.15	9.74	10.28	9.60	3.23
Co. 659	..	7.66	7.77	8.63	8.50	11.08	3.86

5. *Late maturing varieties.*—Varieties Co. 467, Co. 471, Co. 475 and Co. 615, were tested against the controls Co. 419 and Co. 449 for the third year in the experiment. Maximum cane yield was recorded by Co. 467 which was on par with Co. 449 and Co. 475 but was superior to Co. 419 the control in yield. The details of layout and summary of results are furnished in Table VI.

TABLE VI.—*Sugarcane—Main yield trials—Late maturing varieties (1951-52).*

Details of layout.

Soil—Loam.	Seed rate—15,000 three budded setts per acre.
Previous crop—Paddy.	Variants—Six varieties—Co. 467, Co. 471, Co. 475, Co. 615, Co. 419 and Co. 449.
Manures—Ten tons of farm yard manure per acre as basal dressing and 100 lb. nitrogen two-thirds as castor cake and one-third as ammonium sulphate.	Replications—Six.
Date of planting—22nd April to 6th May 1952.	Layout—6 × 6 randomized blocks.
Dates of harvest—22nd April to 6th May 1952.	Size of plot—
Spacing—2" × 8" or 4 links between cane rows.	Gross—112 1/2 × 32 links = 3.6 cents.
	Net—104.0 × 24 links = 2.5 cents.

Summary of results.

	Co. 467.	Co. 449.	Co. 475.	Co. 419.	Co. 471.
(1)	(2)	(3)	(4)	(5)	(6)
Mean yield of cane in tons per acre ..	43.24	41.74	39.58	37.70	36.16
As percentage on control	114.6	110.6	104.9	100.0	95.9

	Co. 615.	Standard error of treatment mean.	Whether significant or not.	Critical difference at P=0.05.
(7)	(8)	(9)	(10)	
Mean yield of cane in tons per acre ..	33.22	1.61	Yes.	4.70
As percentage on control	88.1	4.271	..	12.47

Conclusion—

Co. 467, Co. 449, Co. 475, Co. 419, Co. 471, Co. 615.

Maturity observations—(a) Juice quality.—Periodical data pertaining to progress of maturity from December 1951 to May 1952 are recorded in table below. Variety Co. 471 recorded 19.32 per cent sucrose in April and maintained over 17 per cent sucrose in May. Co. 449 and Co. 475 recorded over 17 per cent sucrose in April at harvest. Table (VII).

TABLE VII.—*Results of chemical analysis of juices.*

Variety.	December.		January.		February.	
	Sucrose.	Purity.	Sucrose.	Purity.	Sucrose.	Purity.
	(2)	(3)	(4)	(5)	(6)	(7)
	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.
Co. 467	6.98	62.33	12.31	79.47	14.68	83.75
Co. 471	5.53	58.53	10.33	72.63	15.77	84.63
Co. 475	5.97	52.63	8.62	67.30	13.20	80.44
Co. 449	4.52	46.59	8.15	65.21	13.18	78.77
Co. 419	3.02	32.40	8.30	65.88	12.74	79.77
Co. 615	4.01	51.51	10.08	67.30	13.23	77.80
Variety.	March.		April.		May.	
	Sucrose.	Purity.	Sucrose.	Purity.	Sucrose.	Purity.
	(8)	(9)	(10)	(11)	(12)	(13)
	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.	PER CENT.
Co. 467	15.83	83.92	15.65	83.58	14.28	72.63
Co. 471	18.93	91.28	19.32	88.35	17.55	88.35
Co. 475	16.16	85.76	18.36	86.71	13.92	75.50
Co. 449	15.71	84.65	17.44	87.62	13.42	77.31
Co. 419	13.92	81.70	14.26	79.14	12.83	74.33
Co. 615	14.02	78.27	14.31	78.61	12.30	64.76

(b) *Jaggery.*—Periodical recovery of jaggery and its quality every month from December to May were studied and the results indicated that—

(1) March-April were the best months for jaggery manufacture;

(2) The jaggery from Co. 475 was the best in colour and consistency followed by that of Co. 449. From Co. 467 jaggery was waxy and dark. From variety Co. 615 very low quality jaggery was obtained.

The month-wise jaggery recoveries are recorded in the Table VIII below :—

TABLE VIII.—Jaggery recovery per cent on cane weight.

Variety.	December.	January.	February.	March.	April.	May.	Yield of jaggery in tons per acre.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1 Co. 467	..	..	7.90	9.35	10.65	11.69	4.87
2 Co. 471	..	..	8.27	8.26	12.13	12.63	4.66
3 Co. 475	..	..	6.85	9.13	11.62	11.39	10.40
4 Co. 615	..	..	7.32	9.33	10.35	10.70	3.24
5 Co. 449	..	..	6.85	6.23	9.92	10.09	8.97
6 Co. 419	..	..	6.53	8.40	9.65	10.05	10.28

This trial was concluded after three years of trial and the average data are presented in the Table IX.

TABLE IX.—Average data for three seasons.

Variety.	Population per acre.	Yield of cane in tons per acre.	Juice quality at harvest.		Calculated O.C.S. per acre in tons.	Yield of jaggery in tons per acre.
(1)	(2)	(3)	sucrose. PERCENT.	purity. PERCENT.	(6)	(7)
1 Co. 419	..	30,895	37.83	14.01	78.22	3.54
2 Co. 449	..	34,135	37.79	17.19	83.24	4.53
3 Co. 467	..	36,140	42.07	15.66	83.80	4.55
4 Co. 471	..	41,170	36.64	18.79	87.30	4.88
5 Co. 475	..	34,086	39.33	18.33	83.36	5.13
6 Co. 615	..	34,410	36.40	15.11	80.38	3.77

Considering the yield of cane and juice quality Co. 475 and Co. 449 were found to be of outstanding merit when planted in May to obtain canes for late crushing. But Co. 475 is highly susceptible to smut and hence it is not desirable to issue it for general cultivation.

The main yield trial with late maturing varieties completed the three-year period and the review of results indicated that Co. 467 gave the highest amount of tonnage per acre (42.67 tons) followed by Co. 475 (39.38 tons). The yield data for the three years are furnished below :—

Yield of cane in tons per acre.

Year.	Co. 467.	Co. 475.	Co. 615.	Co. 471.	Co. 449.	Co. 419.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1949-50	..	..	40.60	39.44	39.00	38.21
1950-51	..	..	42.36	39.13	36.97	35.54
1951-52	..	..	43.24	39.58	33.22	36.66
Average	..	..	42.07	39.38	36.40	36.64

6. *Time of planting and harvest experiment.*—The object of this experiment is to study the possibility of extending the present period of crushing in this tract and also to find out the best time of planting and the correct age for harvesting the cane to get maximum yield of cane of good juice quality. Plantings were done in the third week of January, May and September. These crops were harvested at 10, 12 and 14 months age. Co. 419 and Co. 449 were included in the experiment. Details of layout and yield data are presented in Tables X and XI.

As the harvest of the January planting alone has been completed the yield data and juice quality for the same are furnished :—

TABLE X.—Time of planting and harvest experiment.

Details of layout.

Soil—Loam.	Times of Harvest—Three—harvesting at the age of 10, 12 and 14 months after planting.
Previous crop—Paddy.	Layout—18 × 4 randomized blocks.
Manures—Ten tons of farm yard manure per acre as basal dressing and 100 lb. nitrogen two-third as castor cake and one-third as ammonium sulphate.	Size of plot—Gross—73' 6" × 13' 4"—2.25 cents. Nett—6' 6" × 8' 0"—1.25 cents.
Spacing—2' 8" between cane rows.	Dates of planting—January—20th and 21st January 1951. May—22nd and 23rd May 1951. September—18th to 21st September 1951.
Seed rate—15,000 three budded setts per acre.	
Treatments :—	
Varieties—Two Co. 419 and Co. 449.	
Times of planting—Three Months of January, May and September.	

Yield and population data.

Month of planting	Age at harvest.	Co. 419.		Co. 449.	
		Average yield in tons per acre.	Average population per acre.	Average yield in tons per acre.	Average population per acre.
(1)	(2)	(3)	(4)	(5)	(6)
January	10	52.84	45,120	48.11	47,420
	12	55.06	43,520	53.94	46,340
	14	52.95	37,530	51.72	43,200

TABLE XI.—Juice analysis.

Months.	Co. 419					Co. 449.				
	Brix. PER CENT.	Sucrose. PER CENT.	Purity. PER CENT.	C.C.S. PER CENT.	C.C.S. in tons per acre.	Brix. PER CENT.	Sucrose. PER CENT.	Purity. PER CENT.	C.C.S. PER CENT.	C.C.S. in tons per acre.
January—										
10 months	15.41	11.54	76.37	8.39	4.42	17.11	14.07	82.22	11.93	5.74
12 months	17.99	14.60	81.16	9.93	5.47	19.79	17.60	88.92	14.12	7.62
14 months	19.70	16.65	84.50	13.86	7.34	19.80	16.40	82.91	13.88	7.15

The following inferences may be drawn from the results available.

- Co. 419 yielded better than Co. 449.
- Maximum yield was obtained by harvesting the cane at the age of 12 months.
- There was reduction in yield when the crop was harvested at 14 months age.
- The juice quality in Co 419 kept on steadily increasing from 10 months to 14 months.
- Though the juice quality was better in Co. 449 than in Co. 419, the peak was attained at the age of 12 months and there was deterioration at the age of 14 months.
- Co. 419 seemed better suited than Co. 449 for earlier planting and keeping in the field for 14 months and thus prolonging the crushing period.

7. *March-May trial 1950-52.*—This experiment was laid out in 1948-49 and completed three years of trial with this season. The object was to compare and study the economics of taking a plant crop and its ratoon with growing a long duration crop of 20 months.

The two standard varieties Co. 419 and Co. 449 were planted in two different months, i.e., March and May of 1950. The March planted crop was harvested in February 1951 and ratooned and the ratoon harvested in December 1951. The May planted crop was in the field for over 19 months and was harvested in December 1951 along with the ratoon of March crop.

As the long duration May crop lodged badly and resulted in considerable damage by way of breakage and dryage of cane individual plot yields could not be recorded. The crop was harvested as bulk and yields recorded.

The adjoining March ratoon also suffered due to the lodging of the May crop over this and these plots also were harvested as bulk. The yield data could not be statistically interpreted for the above reasons.

The details of lay out and the yield obtained are noted in Table XII.

TABLE XII.—March-May trial.

Details of layout.

Soil—Loam.	Layout—6 × 2 × 2 split plot design.
Previous crop—Paddy.	Replications—Six.
Manures—Ten tons of farm yard manure as basal dressing both for plant crop and ratoon crops.	Treatments—Major—Two—(1) Planting in March 1950; harvest in February 1951. Allowed to ratoon and harvest of ratoon in December 1951.
Concentrated manures—March plant crop—Total dose of 200 lb. nitrogen per acre two-third as ground nut cake and one-third as ammonium sulphate in two equal doses one at the time of planting and the other at the time of earthing up in July.	(2) Planting in May 1950; harvest in December 1951.
May planted crop—Total dose of 200 lb. nitrogen per acre as above, in two equal doses half at the time of planting in May and the other at the time of earthing up in September.	Minor—Two varieties—Co. 419 and Co. 449.
Ratoon—Total dose of 200 lb. nitrogen per acre as above in two equal doses, one at the time of breaking ridges in March and the other at the time of earthing up in May.	Size of plot—Gross 74' 6" × 13' 4"—2.23 cents. Nett 68' 6" × 8' 0"—1.25 cents.
	Seed rate—15,000 three budded setts per acre.
	Spacing between cane rows—2' 8".
	Dates of harvest—March crop—8th to 14th March 1951. March ratoon—5th to 10th December 1951. May crop—19th to 16th December 1951.

Time of planting.	Variety.	Yield Data.	
		Yield of cane in tons- per acre.	Yield of cane in maunds per acre.
March planting ..	Co. 419—Plant crop	43.14	1,173
	Co. 419—Ratoon crop	14.20	385
	Total ..	57.34	1,559
	Co. 449—Plant crop	45.08	1,226
	Co. 449—Ratoon crop	16.00	435
	Total ..	61.08	1,661
May planting ..	Co. 419	26.90	732
	Co. 449	47.60	1,295

The yield figures disclosed that it is not at all economical to maintain a long duration crop of 20 months in this tract. Though individual canes showed good development, loss in population due to lodging and rodent damage pulled down the tonnage per acre.

The May crop attained peak maturity in February-March when 10 months old and deteriorated rapidly thereafter. Unlike in the previous two years, the crop did not again record any improvement in sucrose and at harvest in December it was about 12 per cent sucrose only. This was mainly due to the damage to the crop by lodging and breaking coupled with severe drought conditions during the second growth period from June to November-December.

The experiment having completed three years of study will be discontinued.

Conclusions.—(a) The long duration May crop ceases active growth from March and resumes normal growth by about June-July. This period between March and June is characterized by short internodes. There is loss in yield due to lodging and breakage.

(b) The juice quality having reached peak by March-April, deteriorates rapidly till about July-August, when again it improves in quality registering fair quality juice in October-November.

(c) It is not economical to maintain a crop of 20 months though canes of fair quality are available for early crush in October-November when the crop is 16 to 17 months old.

(d) A plant crop and its ratoon taken within this period of 20 months are more profitable as they yield about double the 20 months crop.

B. OTHER CROPS.

8. **Paddy.**—Paddy was the main bulk crop grown in rotation with sugarcane. The seasonal conditions were very unfavourable and the area planted was only 8.24 acres in the main season (July to February) as against the normal area of 15.00 acres. An area of 0.45 acre was transplanted in the Navarai season (December to April) and 0.75 acre during the swarnavarai or Kar season (May to August). GEB. 24 was the early samba variety grown over 2.06 acres and yielded an average of 2,593 lb. per acre as against 2,857 lb. of the previous year. A new strain paddy MTU. 19 received from the Paddy Specialist for the early samba season was compared with paddy GEB. 24 in plots of 0.25 acre each. The grain yields per acre were 3,420 lb. and 3,000 lb. for MTU. 19 and GEB. 24 respectively. MTU. 19 was of the same duration as GEB. 24 and the yield difference was 14 per cent in favour of MTU. 19. It is proposed to try this strain over a larger area in the coming season. Paddy ASD. 5 was the strain grown over 5.56 acres. The crop was very much handicapped by late planting in November and there was a severe attack of white jassids. The pest was successfully controlled by Hexidol 810 dust, but insufficient irrigation due to paucity of rainfall pulled down the yields. An average acre yield of 1,580 lb. grain was harvested as against 2,073 lb. during the previous year. The blast resistant strains Co. 25 and Co. 26 were tried over 0.30 acre. Though the nursery was raised in July, transplanting could be taken up only in November when seedlings were 100 days old. In spite of this age in the nursery paddy Co. 25 came up well and yielded 2,070 lb. grain per acre and Co. 26 yielded 1,874 lb.

per acre. Paddy MTU. 15 planted in the second season (December to April) over 0.45 acre yielded 2,413 lb. per acre and TKM. 3 a short duration strain, from Tirurkuppam, grown over 0.75 acre yielded 2,712 lb. grain per acre. The duration of this latter strain was 109 days.

9. **Green manure crops.**—Sunn hemp was raised over 9.12 acres for green manure purposes. Of this 6.62 acres was puddled in as green manure for the succeeding crop of paddy and the acre yield of leaf was estimated at 2,900 lb. The seasonal conditions were very bad for the growth of this crop. From an area of 2.50 acres 252 lb. seed was collected for the next year's sowings.

Sesbania speciosa.—*Sesbania speciosa* was planted along all sugarcane and paddy field bunds for collection of seed. A quantity of 177 lb. of seed was collected for distribution to district staff.

Gliricidia maculata.—Over 800 shrubs, most of which were planted in 1947-48 were having luxuriant growth. To enable seed production leaf was not cut from these, this year. A quantity of 132 lb. of seed was collected for distribution. More plants and stumps were planted all along the fence to serve as posts to the barbed-wire fencing.

10. **Vegetables.**—Lady's fingers, cowpea (New era), cluster beans, tomatoes, brinjals and snake gourd (from Aduthurai Farm) were cultivated over 0.25 acre during the first-crop season from July to January. The very unfavourable seasonal conditions affected the growth and yield of these. The following quantities of seed were collected for distribution to the district staff:—

	LB.
New era cowpea	9 $\frac{3}{4}$
Lady's finger	8 $\frac{1}{2}$
Cluster beans	10 $\frac{3}{4}$
Snake gourd	3 $\frac{3}{4}$
Bitter gourd	$\frac{1}{2}$
	ozs.
Brinjals	10
Tomato	4 $\frac{1}{2}$

11. **Ragi.**—AKP. and Co. 2 transplanted over 3.08 acres failed for want of timely irrigations.

12. **Groundnut.**—The strain TMV. 3 was sown over 0.71 acre. The crop failed to set pods for lack of rains.

13. **Cotton P. 216.F.**—This was dibbled along the existing sugarcane ridges immediately after harvest of cane crop in December 1951. Picking commenced by April and was completed by the end of June. Three hundred and forty-four pound kapas was the average acre yield obtained.

14. **Fodder chulam.**—Chulam for fodder was raised over 0.50 acre and yielded 10,500 lb. (green) fodder per acre.

15. **Orchard.**—Failure of rains during the two successive years had its effect on the bearing of fruit trees. Poor yields were obtained as noted below:—

	LB.	oz.	Number of trees.
Oranges	24	4	3
Do.	13	12	1
Do.	28	4	1
	LB.	oz.	Number of trees.
Oranges	2	4	1
Lime fruits—(Palacole)	28	0	1
Maltalemons	14	4	1
Pomegranates	5	4	2
Sapota	131	4	2
Pomeloes	44	8	1
Mango—Bangalore	48	0	1
do. Banganapalle	8	0	1

Mulgoa, Humayuddin, Khadar and Neelam did not at all bear this season.

Singapore jack.—The five jack plants planted in 1947 did not bear any fruit. The plants have not put forth much growth in spite of regular pot watering.

C. MISCELLANEOUS.

16. *Training in horticultural practices*.—A trained mazdoor deputed from Kodur gave practical training to the permanent mazdoors on this station in the methods of grafting, layering, budding, pruning, etc.

The mazdoors on the farm layered 19 malta lemon layers of which 9 were planted on the farm.

Mango stones received from the district Staff were planted in a nursery for raising seedlings to serve as stocks in grafting during July and August of 1952.

17. The yields of bulk crops during the year are noted below:—

Name of crop.	Average yield of grain in lb.
Paddy—	
GEB. 24	2,593
MTU. 19	3,420
MTU. 15	2,413
ASD. 5	1,580
TKM. 3	2,712
Co. 25	2,070
Co. 26	1,874
Fodder cholam	10,500
Sunnhemp—(green leaf)	2,900
(seed)	88

18. The following quantities of seed were distributed:—

Name of seed.	Quantity distributed.
	LB.
Sugarcane—	
Co. 419	224
Co. 449	5,264
Co. 467	2,240
Co. 678	224
Co. 684	112
Total	8,064
Paddy—	
GEB. 24	3,080
ASD. 5	6,200
MTU. 19	556
MTU. 15	2,395
Co. 25	400
TKM. 3	1,150
Seedlings	48½ cents.
Sesbania speciosa.. .. .	114

SUGARCANE RESEARCH STATION, GUDIYATTAM

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Name of seed.	Quantity distributed.
	LB.
Gliricidia	132
Pungam pods	84
Prosopis Juliflora pods	838
Agathi	74
Newera cowpea	88
Dolichos lablab	24
	LB. OZ.
Lady's fingers	8—8
Cluster beans	10—½
Jaffna drum stick	3—12
Snake gourd	0—10
Brinjal	0—4½
Bitter gourd	0—7
Tomoto	0—4
	NOS.
Gliricidia, cuttings	375
„ seedlings	850
Guinea grass slips	25
Napier grass	25
Malts lemon layers	4

Steps taken to increase the Revenue of the station.—(1) The wells were deepened to augment the water-supply and in one of the wells a filter point was also fixed. With this improvement, the standing crop of sugarcane could be maintained in spite of failure of rains. The average yield of sugarcane was raised over that of the previous year.

(2) Propping with bamboos and wrapping were reduced to lessen the expenditure on the cost of cultivation and trash twist method of propping was adopted as it was found to be cheap and efficient.

(3) Resources of green manure were increased by planting *Gliricidia maculata* on all road margins, double bunds and other suitable places on the farm.

(4) Cotton was raised during the fallow period between sugarcane and samba paddy to increase the revenue.

(5) Mango seedlings were raised to produce grafts for sale in the coming season.

E. JAGANNADHA RAO,
Farm Manager in-charge.

SUGARCANE RESEARCH STATION,
ANAKAPALLE,
8th August 1952.

S. V. PARTHASARATHY,
Sugarcane Specialist.

APPENDIX I.

FINANCIAL STATEMENT OF THE WORKING OF THE SUGARCANE RESEARCH STATION, GUDIYATTAM, 1951-52.

Head of account.	Fasli 1360 (July 1950 to June 1951).	Fasli 1361 (July 1951 to June 1952).
	RS. A. P.	RS. A. P.
40. c. Agriculture—Experimental Farms—A. Agricultural Research Stations—		
Expenditure.		
C. 1. Pay and allowances of establishment—		
Pay	8,127 9 0	8,267 11 0
Dearness allowance	2,552 15 0	2,545 2 0
House rent allowances		262 14 0
Travelling allowances	479 2 0	420 8 0
Total	11,159 10 0	11,496 3 0

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STATION GUDIYATTAM

APPENDIX I—cont.

Head of account.					Fasli 1360 (July 1950 to June 1951).	Fasli 1361 (July 1951 to June 1952).
40. c. Agriculture—Experimental Farms—A. Agricultural Research Stations—cont.					RS. A. P.	RS. A. P.
Expenditure—cont.						
C. 2. Contingencies—Authorized—						
Other contingencies	..	..	..	..	34 15 9	103 3 3
Service stamps and telegram charges	..	..	..	..	190 0 0	180 0 0
Purchase of livestock and deadstock	..	..	..	..	292 8 6	2,139 1 6
C. 3. Working expenses—						
Repairs and upkeep	..	..	..	..	1,077 3 11	1,198 13 3
Maintenance of cattle	..	..	..	..	2,656 10 0	3,101 11 6
Mazdoor labour	..	..	..	..	6,676 11 0	6,420 9 0
Miscellaneous cultivation expenses	..	..	..	..	3,443 15 4	3,447 5 5
Manures and chemicals	..	..	..	..	2,298 10 6	2,546 14 5
Seeds and plants	..	..	..	..	219 0 0	576 11 0
Sundries	..	..	..	..	52 2 0	38 12 3
Dearness allowance to menials	..	..	..	..	3,633 7 0	3,501 14 0
Apparatus and materials	..	..	..	..	464 14 6	343 4 9
Petty construction and repairs	..	..	..	..	1,377 10 9	658 4 9
Total	..	..	..	..	22,417 13 3	24,256 9 1
Grand total	..	..	..	..	33,577 7 3	35,752 12 1

Revenue Receipts.

XXIX-A. Agricultural receipts	..	..	..	..	15,061 9 11	8,296 11 7
Value of farm produce transferred	..	..	..	..	3,464 9 8	2,759 2 6
Total	..	..	..	..	18,526 3 7	11,055 14 1

APPENDIX II.

COST OF CULTIVATION OF BULK CROPS ON THE SUGARCANE RESEARCH STATION,
GUDIYATTAM, FOR THE YEAR 1951-52.

Serial number and crop.	Area grown.	Preparatory cultiva- tion.		Manure and manuring.		Seeds and sowing.		After cultiva- tion.		Irrigation.		Harvesting.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	ACS.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
1 Paddy	9.63	459 14 9	432 14 9	308 13 5	260 0 9	693 14 0	243 5 6						
2 Vegetables	0.25	13 1 0	9 0 0	3 11 0	13 11 6	13 8 0	0 12 6						
3 Cotton	0.16	12 14 0	..	2 5 0	3 4 0	5 15 6	..						
Total cost of cultivation.													
Value of produce.													
Total value.													
For the whole area, Col. 13—Col. 10.													
Profit or loss per acre.													
1 Paddy	2,352 5 7	2,301 2 0	159 10 6	2,550 12 6	198 6 11	..	+ 20 9 8						
2 Vegetables	52 11 6	..	72 3 6	72 3 6	19 8 0	..	+ 74 0 0						
3 Cotton	24 6 6	..	27 8 0	27 8 0	3 1 6	..	+ 25 9 0						

ANNUAL REPORT OF THE AGRICULTURAL RESEARCH STATION,
SIRUGUPPA (BELLARY DISTRICT), FOR THE YEAR 1951-52 (FASLI 1361).

I. SEASON.

A total rainfall of 22.35 inches was received in 43 rainy days during the fasli year 1951-52 as against 31.35 inches received in 40 days during the previous fasli year and as against the average rainfall of 24.69 inches in 37 days for the last ten fasli years. This year's rainfall was less than the average rainfall for the last ten fasli years by 2.34 inches.

2. The statement of rainfall for the fasli year together with that of the previous year and average for last ten years is given in Table I.

TABLE I.—Statement of rainfall for the year 1951-52 (fasli 1361).

Month.	Week.	1951-52.		1950-51.		Average for ten years (1942-43 to 1951-52).	
		Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
South-west monsoon.							
June	7-13	..	..	0.01	..	0.99	1
	14-20	..	..	0.14	..	0.54	1
	21-27	0.54	2	1.64	1	0.85	1
June-July	28-4	0.02	..	0.48	1	0.60	1
	5-11	1.82	3	0.17	1	0.70	2
	12-18	1.00	1	0.46	2	0.61	2
	19-25	0.25	..	0.23	1	0.87	2
July-August	26-1	0.17	1	1.30	1	0.51	1
	2-8	0.90	3	0.03	..	0.73	1
	9-15	0.17	1	..	..	0.79	2
	16-22	0.04	..	0.50	2	0.49	1
	23-29	0.83	2	4.62	2	1.29	2
August-September	30-5	2.25	5	0.34	1	1.10	2
	6-12	0.99	2	1.40	3	0.99	2
	13-19	0.66	1	1.81	2	1.73	2
	20-26	..	..	0.55	3	1.65	2
Total	..	9.64	21	13.68	20	14.44	25
North-east monsoon.							
September-October	27-3	1.89	3	1.67	1	1.29	2
	4-10	0.72	2	4.96	3	1.34	1
	11-17	1.79	2	4.10	4	1.54	1
	18-24	0.14	1	..	..	0.96	1
November	25-31	0.01	..	..	..	0.24	..
	1-7	..	..	2.48	3	0.66	1
	8-14	..	..	..	..	0.33	..
	15-21	0.20	1	..	..	0.12	..
November-December	22-28	0.11	1	..	..	0.19	..
	29-5	..	..	..	..	..	..
	6-12	..	..	..	..	0.02	..
	13-19	..	..	..	..	0.03	..
December-January	20-26	..	..	..	..	..	..
	27-3	..	..	..	..	..	..
	4-10	..	..	..	..	..	..
	11-17	..	..	..	..	..	..
Total	18-24	..	..	..	..	..	..
	25-31	..	..	..	..	..	..
	..	4.86	10	13.21	11	6.72	6

		1951-52.		1950-51.		Average for ten years (1942-43 to 1951-52).	
Month.	Week.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dry and hot weather.							
February	.. 1—7	0.09	..	..	..	0.01	..
	8—14	..	..	..	..	..	..
	15—21	..	..	..	..	0.02	..
	22—29	..	..	..	..	0.08	..
March	.. 1—7	..	..	..	..	..	..
	8—14	..	..	..	..	0.04	..
	15—21	..	..	..	..	0.02	..
	22—28	..	..	0.23	1	0.02	..
March-April	.. 29—4	..	..	0.03	..	0.03	..
	5—11	..	..	..	..	0.04	..
	12—18	0.36	1	..	..	0.12	..
	19—25	0.33	1	0.38	1	0.12	..
April-May	.. 26—2	0.30	1	0.36	1	0.26	1
	3—9	0.36	1	0.03	..	0.21	1
	10—16	0.26	2	..	..	0.32	1
	17—23	1.28	1	0.25	1	0.69	1
	24—30	4.45	3	0.10	1	1.00	1
May-June	.. 31—6	0.42	2	3.08	4	0.55	1
Total ..		7.85	12	4.46	9	3.53	6
Grand total ..		22.35	43	31.35	40	24.69	37

3. The south-west monsoon started well in July bringing about 3 inches of rain which facilitated the sowings of jonna, groundnut, redgram and korra, but droughty conditions prevailed during the period of growth. Late rains received in August saved the crops. The south-west monsoon was therefore not good and favourable to get maximum production. The north-east monsoon was worst as it brought only 4.86 inches of rain and ill-distributed.

4. The absence of adequate rains in October-November has affected the yield of redgram. The season on the whole was not satisfactory.

5. The abstract of meteorological observations made is furnished in Table II.

TABLE II.—Abstract of the Meteorological Observations for 1951-52.

	1951.					
	July. (1)	August. (2)	Septem- ber. (3)	Octo- ber. (4)	Novem- ber. (5)	Decem- ber. (6)
Absolute maximum temperature in shade.	96.2	95.0	97.8	95.0	94.0	90.2
Mean maximum temperature in shade ..	90.2	91.0	91.5	92.3	90.9	86.5
Absolute minimum temperature in shade.	70.9	71.5	70.4	65.5	58.5	49.8
Mean minimum temperature in shade ..	73.9	73.0	72.9	71.7	65.5	55.6
Mean daily wind velocity	8.0	7.9	4.1	4.0	1.5	1.2
Mean daily evaporation in inches ..	0.196	0.202	0.150	0.171	0.212	0.226
Mean daily relative humidity	80.4	78.3	82.6	80.9	76.1	77.8
	per cent					
Total rainfall in inches ..	3.07	2.17	5.54	2.85	0.31	..

	1952.					
	Janu- ary. (7)	Febru- ary. (8)	March. (9)	April. (10)	May. (11)	June. (12)
Absolute maximum temperature in shade.	93.2	97.2	103.2	106.5	103.4	100.0
Mean maximum temperature in shade ..	89.1	94.3	100.1	104.1	100.5	96.3
Absolute minimum temperature in shade	53.0	56.9	58.6	70.0	71.2	74.4
Mean minimum temperature in shade ..	58.7	64.8	69.4	78.0	78.4	76.0
Mean daily wind velocity	1.8	1.3	3.2	5.4	9.3	9.2
Mean daily evaporation in inches ..	..	..	..	0.516	0.442	0.400
Mean daily relative humidity	75.1	58.5	46.5	56.1	67.8	72
					per cent	per cent
Total rainfall in inches ..	..	0.09	..	0.90	6.44	0.42

II. CHEMICAL INVESTIGATIONS.

6. During the year under report, 140 samples of soils, 30 samples of plant material and nine samples of water drawn from the various experiments conducted on black soils at the station, were analysed. The details of the experiments, samples drawn, analysis done, the results obtained and the conclusions drawn therefrom are given below.

7. (i) *Fundamental experiment on the effect of light irrigation on movement of salts in black soils.*—This experiment was started in the year 1939 in block III of the station to study the effect of different types of light irrigation, viz., (i) ryots' method (i.e., 2 inches of water as and when the crop needed); (ii) 2 inches once in 15 days; (iii) 3 inches once in 15 days; (iv) 3 inches once in 30 days and (v) no irrigation, on the movements of salts. The crops grown are cotton and jonna by rotation, cropping being restricted to the Hingari season. No manure was applied. Sampling of soils was done once a year in summer after the harvest of the crop, up to the Garusu layer. They are analysed for total solids and alkalinity.

(ii) For the year under report, 33 samples drawn during 1950-51 from the five plots were analysed for salts. The summary of results are given in Tables III and IV.

TABLE III.—The salt content in profiles receiving light irrigation for 12 years.
Total solids—Percentage on air dry basis.

Type of light irrigation. (1)	0-1'. (2)	1'-2'. (3)	2'-3'. (4)	3'-4'. (5)	4'-5'. (6)	5'-6'. (7)
Ryots' method	0.0680	0.0810	0.1110	0.2120	1.0630 (4'-4½')	0.6330 (4½'-5')
Two inches once in 15 days.	0.0830	0.0970	0.1200	0.1390	0.1740	0.0850
Three inches once in 15 days.	0.0910	0.1030	0.1230	0.1300	0.1650	0.1690
Three inches once in 30 days.	0.0720	0.0980	0.1230	0.1090	0.1180	0.1690
No irrigation	0.0910	0.1040	0.1600	0.2660	0.6980	1.5500

TABLE IV.—The salt content of top three feet layer of different light irrigated plots as compared with previous years.

	Total solids—Percentage on air dry basis.				
	Analysed in				
(1)	1947-48. (2)	1948-49. (3)	1949-50. (4)	1950-51. (5)	*Analysed in 1951-52. (6)
1 Ryots' method	0.0917	0.0945	0.0993	0.0927	0.0900
2 Two inches once in 15 days.	0.1083	0.1053	0.1057	0.1053	0.1000
3 Three inches once in 15 days.	0.1048	0.1047	0.1048	0.1027	0.1057
4 Three inches once in 30 days.	0.1210	0.0967	0.0952	0.0987	0.0977
5 No irrigation	0.1127	0.1289	0.1355	0.1293	0.1183
Pre-irrigation top three feet average					0.1115

* Samples analysed in the current year were actually drawn in the previous year, i.e., 1950-51 and sent been for analysis at the end of that year.

(iii) All the irrigation treatments are having less of salts in the top 3 feet layer of soil than the pre-irrigation level and are much below the toxic value of 0.2 per cent.

(iv) The finding is in conformity with that of the previous years. The experiment is continued to watch the movement of salts in the course of continued long-term irrigation as soil deterioration generally is a slow process.

8. *Experiment to study the effect of crop rotation on the movement of salts in light irrigated black soils.*—This study is intended to determine whether the rotation of garden land crops such as jonna, cotton, groundnut and korra, under light irrigation will have any bad effect, as was reported in Koilpatti black soils where the rotation of cotton and jonna brought about decreased yields in both the crops. The experiment is conducted in Block VIII with a four course rotation of cotton, jonna, wheat and groundnut plus redgram. There are six replications for each treatment. Soil samples are drawn once a year after the harvest of crops up to three depths. They are analysed for total solids and alkalinity. For the year 1950-51, 72 samples were drawn and were analysed for total solids during this year. The summary of results is given in Table V. The results indicate no upward movement of salts, the second and third foot showing more of salt than the first foot. The salt content of all the three foot layers in all the treatments is much below the toxic limit of 0.2 per cent.

TABLE V.—The salt content of soils under four course rotation of crops and receiving light irrigation.

Total solids—Percentage on air dry basis.				
Treatments.	First foot.	Second foot.	Third foot.	Average of 3 feet layer.
(1)	(2)	(3)	(4)	(5)
1 Cotton	0.0790	0.0890	0.1260	0.0980
2 Wheat	0.0760	0.0950	0.1150	0.0954
3 Jonna	0.0680	0.0880	0.1060	0.0873
4 Groundnut and redgram ..	0.0720	0.0930	0.1160	0.0937

9. (i) *Experiment to study the effect of heavy irrigation on the movement of salts.*—This experiment was started in 1939 in Block V of the station to investigate whether continued heavy irrigation of the black soil will result in the formation of perched water table and the consequent development of alkalinity.

(ii) The crop treatments are (i) single crop paddy, (2) sugarcane paddy rotation; and (3) double crop paddy. There are four replications for each treatment. Samples of soils are taken up to three depths after the harvest. They are analysed for total solids.

(iii) For the year 1950-51, 36 samples were drawn and were analysed during the year under report. The summary of results is given in Table VI. The results indicate no sign of rise of salts to the surface. There is a definite and good amount of washing down of salts.

TABLE VI.—Salt content of wet land soils after 12 years of heavy irrigation.

Total solids—Percentage on air dry basis.				
Treatments.	First foot.	Second foot.	Third foot.	Average of 3 feet.
(1)	(2)	(3)	(4)	(5)
Single crop paddy area—				
1. Pre-irrigation (1939)	0.1650	0.7900	0.9460	0.6337
2. Post-irrigation (1950-51) analysed in 1951-52	0.0920	0.1190	0.2330	0.1480
Sugarcane Paddy Rotation Area—				
1. Pre-irrigation (1939)	0.1060	0.5860	0.4620	0.3847
2. Post-irrigation (1950-51) Analysed in 1951-52	0.0790	0.1140	0.1315	0.1082
Double Crop area—				
1. Pre-irrigation	0.1650	0.7900	0.9460	0.6337
2. Post-irrigation (1950-51)	0.0935	0.1163	0.1220	0.1106

10. (i) *Analysis of irrigation, drainage and sub-soil waters from wet lands.*—To assess the nature and amount of salts removed by the irrigation water in surface and sub-soil drainage in wet lands, nine samples were collected during crop growth, in September, October and November. They were analysed for the salts present. The results are given in Table VII and the following are the conclusions.

(ii) The surface drainage contains 50—75 per cent more of total salts than the irrigation water mainly as calcium bicarbonate. The sub-soil drainage contains about 200—300 per cent more of salts than the irrigation water mainly as sodium bicarbonate.

(iii) While sodium carbonate and sulphate are generally absent in irrigation and surface drainage waters, the sub-soil drainage always contains sodium carbonate to the extent of 5 to 8 per cent of total salts and often sodium sulphate also to the same extent as carbonate.

TABLE VII.—The amount and nature of salts removed by irrigation in surface and sub-soil drainage.

Nature of salts.	(Parts per 100,000)								
	September 1951.			October 1951.			November 1951.		
	a. (2)	b. (3)	c. (4)	a. (5)	b. (6)	c. (7)	a. (8)	b. (9)	c. (10)
Calcium bicarbonate ..	7.29	11.34	8.1	9.7	16.2	20.3	8.9	15.4	23.6
Sodium bicarbonate ..	6.72	4.76	43.69	5.9	16.8	42.0	4.2	6.7	18.9
Sodium carbonate ..	..	..	3.18	..	..	4.24	..	1.1	4.3
Sodium chloride ..	4.77	5.23	8.31	4.8	3.6	7.1	2.1	2.4	2.4
Sodium sulphate ..	..	..	4.26	..	..	4.8	..	..	..
Total salts ..	18.78	23.32	67.54	20.4	36.6	78.4	15.2	25.6	49.1
Total solids ..	16.8	25.6	52.2	17.4	22.4	58.6	10.2	18.4	43.8

a—irrigation water; b—drainage; c—subsoil water.

11. *Analysis of soils from fields under light irrigation where crop growth was poor.*—The Government Agricultural Chemist during his visit to the station noticed some patches in fields where crop growth was badly affected. Soil samples were taken from the fields. Thirteen samples from four fields were analysed for total solids and alkalinity. The results are given in Table VIII. The results indicate that the soils taken up to three depths do not show high salt content, the salt content being far below the toxic limit of 0.2 per cent. However all the salts are as sodium salts, sodium bicarbonate forming the major part of it. Sodium carbonate is present only in low amounts and the PH is 8.5 to 9.0.

TABLE VIII.—Analysis of soils drawn from spots where crop growth was affected under light irrigation.

Nature of salts.	Percentage on air dry basis.						
	B1. III 0-1'.	Field 1'-2'.	5. Cotton 2'-3'.	B1. III 0-1'.	Field 1'-2'.	6. Cotton 2'-3'.	
	(2)	(3)	(4)	(5)	(6)	(7)	
Sodium bicarbonate ..	0.0906	0.1134	0.1344	0.0799	0.1218	0.1176	
Sodium carbonate ..	0.0053	0.0053	0.0106	0.0053	0.0053	0.0053	
Sodium chloride ..	0.0059	0.0177	0.0147	0.0059	0.0117	0.0117	
Sodium sulphate ..	..	..	0.0459	..	..	..	
Total salts ..	0.1078	0.1367	0.2056	0.0911	0.1388	0.1340	
Total solids ..	0.1055	0.1425	0.1909	0.0870	0.1090	0.1270	
P.H. ..	8.9	8.77	8.89	9.03	8.94	9.01	

Name of salts.	Bl. VIII 0-1'.	7a 1'-2'.	Malze 2'-3'.	Bl. VIII 0-1'-3'.	Field 1'-3'-2'.	Cotton 1'-3'-2'.	Pure garusu.
	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Sodium bicarbonate ..	0.1008	0.1176	0.1093	0.0585	0.0588	0.0756	0.0504
Sodium carbonate ..	..	0.0106	0.0106	..	..	..	0.0106
Sodium chloride ..	0.0117	0.0087	0.0117	0.0087	0.0087	0.0117	0.0059
Sodium sulphate ..	..	..	..	..	0.0219	..	..
Total salts ..	0.1125	0.1369	0.1316	0.0675	0.0894	0.0883	0.0669
Total solids ..	0.0955	0.1075	0.1015	0.0725	0.0850	0.0855	0.0650
P.H. ..	7.9	8.66	8.72	8.82	8.70	8.70	8.74

* Will be repeated.

12. (i) *Study of the effect of continued light irrigation on the exchangeable bases.*—One of the important factors contributing to soil fertility is the degree of alkalization which is the ratio of exchangeable Na+K to total exchangeable bases. If the degree of alkalization exceeds a particular limit (25 per cent for black soils) the yields are known to be affected badly. To determine whether the soils under continued light irrigation have deteriorated in this aspect, pre and post irrigation soils from block III which is under light irrigation for the past 12 years were analysed for total exchangeable bases and exchangeable sodium. The results are given in Table IX. The results indicate a decrease in the exchangeable sodium in all the three feet layers which means a consequent decrease in the degree of alkalization (exchangeable K being always below 1.0 m.e. per cent and hence negligible). The reduction is found to be appreciable in the surface soils.

TABLE IX.—The effect of light irrigation on the exchangeable bases in black soils.

	(m.e. per cent on air dry basis.)					
	* Pre-irrigation.			† Post-irrigation.		
	0-1 feet.	1-2 feet.	2-3 feet.	0-1 feet.	1-2 feet.	2-3 feet.
	(1)	(2)	(3)	(4)	(5)	(6)
Total exchangeable bases ..	57.4	60.4	61.6	56.0	56.7	59.9
Exch. Na. ..	8.97	10.06	12.11	6.85	10.02	11.38
Exch. Mg. ..	5.50	6.87	7.14	5.55	6.76	7.82

* Average of series '4' and '5' plots;

† Average of different light irrigated plots, viz.,

Ryots' method, 2" once in 15 days and 3" once in 15 days plot.

(ii) *Effect of continued heavy irrigation on exchangeable bases.*—The soils in block V wet lands have been receiving heavy irrigation for the past 12 years. The results of analysis of pre and post irrigation soils from this area are given in Table X and the results show that as in the case of light irrigation, there is a decrease in the exchangeable sodium both in the surface and sub-soil. This decrease is greater in this case than in the case of the light irrigation.

TABLE X.—The effect of heavy irrigation on the exchangeable bases in black soils (Block V wet lands).

	(m.e. per cent on moisture free basis.)			
	Pre-irrigation plot 17.		Post-irrigation plot 17.	
	0-30 inches.	30-45 inches.	0-30 inches.	30-45 inches.
	(1)	(2)	(3)	(4)
Total exchangeable bases ..	69.82	70.69	65.52	68.88
Ex. Na. ..	13.81	14.21	10.39	11.3

13. (i) *Manurial experiment on korra.*—An experiment to determine the effect of different doses of N and P₂O₅ was started during the year in Block VIII-12. The treatments were P₂O₅-N; 0—0, 0+20, 0+40, 0+60, 10+20, 10+40, 10+60, 20+20, 20+40 and 20+60. The soils drawn from the experimental plots after the harvest of crops were analysed for nitrogen and P₂O₅. The results along with

yield data are given in Table XI. It is seen from the data of yields, that increased yields of grain and straw are obtained with increasing doses of nitrogen. The addition of phosphates has not produced better yields. The results of analysis of yield data are given in Table XII.

TABLE XI.—Soil analysis and yield data from Korra manurial experiment in Block VIII-12.

Treatments.	Depth of soil.	Nitrogen per cent on air dry basis.	Avail P ₂ O ₅ per cent on air dry basis.	Yield in lb. per acre.	
				Grain.	Straw.
(1)	(2)	(3)	(4)	(5)	(6)
P ₂ O ₅ N					
0 0	0-9"	0.038	0.013	948	1,772
	9"-18"	0.029	0.212		
0 +20	0-9"	0.041	0.014	1,392	2,592
	9"-18"	0.029	0.011		
0 +40	0-9"	0.041	0.013	1,980	3,312
	9"-18"	0.029	0.010		
0 +60	0-9"	0.038	0.013	2,172	3,720
	9"-18"	0.031	0.011		
10 +20	0-9"	0.039	0.015	1,304	2,232
	9"-18"	0.031	0.011		
10 +40	0-9"	0.039	0.016	1,812	3,092
	9"-18"	0.022	0.010		
10 +60	0-9"	0.046	0.012	2,140	3,568
	9"-18"	0.028	0.010		
20 +20	0-9"	0.034	0.016	1,368	2,448
	9"-18"	0.029	0.010		
20 +40	0-9"	0.039	0.017	1,848	3,192
	9"-18"	0.031	0.010		
20 +60	0-9"	0.036	0.016	2,084	3,620
	9"-18"	0.031	0.011		
Original soil	0-9"	0.038	0.013	..	..
	9"-18"	0.029	0.010		

TABLE XII.—Results of analysis of yield data.

Field No.—VIII-12.	Treatments—cont.
Previous crop—Wheat.	(7) 10 P + 60 N.
Date of sowing—3rd July 1951.	(8) 20 P + 20 N.
Date of harvest—10th October 1951.	(9) 20 P + 40 N.
	(10) 20 P + 60 N.
Treatments—	Layout—Randomized and replicated 6 times.
(1) No nitrogen and no phosphoric acid as control.	Gross area of the plot—6' - 9" x 32' - 3".
(2) OP + 20 N.	Net area of the plot—3' - 10" x 28' - 6" (1 cent.)
(3) OP + 40 N.	Number of irrigations given—Three.
(4) OP + 60 N.	Total depth of irrigation—6.53".
(5) 10 P + 20 N.	Rainfall during the crop period—11.69".
(6) 10 P + 40 N.	

Particulars.	1	2	3	4	5	6	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Grain yield per acre in lb. ..	948	1,392	1,980	2,172	1,304	1,812	2,140
Straw yield per acre in lb. ..	1,772	2,592	3,312	3,720	2,232	3,092	3,568
Particulars.	8	9	10	General mean.	Standard error.	'Z' test satisfied or not.	Critical difference.
	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Grain yield per acre in lb. ..	1,368	1,848	2,084	1,705	112	Yes.	311
Straw yield per acre in lb. ..	2,448	3,192	3,620	2,975	151	Yes.	420
Conclusions—							
Grain—4, 7, 10, 3, 9, 6, 2, 8, 5, (1).							
Straw—4, 10, 7, 3, 9, 6, 2, 8, 5, (1).							

(ii) *On cotton.*—Experiment to study the effect of nitrogenous manures like ammonium sulphate and groundnut cake on cotton grown in alkaline soils (PH. fairly high 8.5-9.00) was started during the year in block X 10. The treatments were (i) no manure; (ii) 40 lb. N; (iii) 80 lb. N; (iv) 120 lb. N per acre as ammonium sulphate; (v) 40 lb. N; (vi) 80 lb. N and (vii) 120 lb. N as groundnut

cake per acre. Soil samples before starting experiment were drawn. Plant samples at seven stages during the life of the crop were also drawn. The analysis of plant samples so far done are given in Table XIII.

TABLE XIII.—Yield data and plant analysis from cotton manurial experiment.

Round of sampling, and age of plants.	Heads of analysis.	No ma- nure.	(Percentage on dry basis.) Ammonium sulphate.			Groundnut cake.		
			40 lb. per acre.	80 lb. per acre.	120 lb. per acre.	40 lb. per acre.	80 lb. per acre.	120 lb. per acre.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
I 15 days old ..	Nitrogen ..	2.71	3.30	3.49	3.45	3.51	3.19	3.40
	P ₂ O ₅ ..	0.67	0.51	0.65	0.72	0.61	0.59	0.72
II 32 days old ..	Nitrogen ..	2.67	2.86	2.91	3.00	2.83	2.84	3.09
	P ₂ O ₅ ..	0.80	0.68	0.79	0.77	0.77	0.82	0.85
III 72 days old ..	Nitrogen ..	2.66	2.86	2.78	2.67	2.73	2.96	2.89
	P ₂ O ₅ ..	0.80	0.73	0.69	0.59	0.68	0.67	0.62
IV 102 days old ..	Nitrogen ..	2.34	2.19	2.32	..	2.20	..	2.83
	P ₂ O ₅ ..	0.72	0.57	0.58	..	0.58	0.60	0.58

The results show that increased doses of nitrogen showed increase in nitrogen content of plant in the early stages of growth and not in the later stages. The analysis for P₂O₅ does not show any correlation in first and second rounds. Samples drawn later show a decrease in P₂O₅ with increasing doses of nitrogen.

The details of yield results are furnished below in Table XIV:—

TABLE XIV.—Cotton manurial trial.

1 Object of the experiment—To study the response of cotton grown in alkaline soils to nitrogenous manure.			7 Number of irrigations—Seven.				
2 Number of treatments—Seven.			8 Manure applied—As per treatments in plough furrows as basal dressing.				
3 System of layout—Randomised and replicated five times.			9 Previous crop—Maize.				
4 Area of each plot—Gross: one cent. Net: 0.59 cent.			10 Rainfall during crop growth—8.47"				
5 Date of planting—3rd September 1951.			11 Seasonal incidence of pests and diseases—The season was sub-normal. The incidence of thrips, jassids and aphids were noticed in all the plots and were controlled by suitable insecticides.				
6 Period of harvest—Middle of February to middle of March.							
Number and treatments.	Yield of kapas in lb./acre.	Percentage on control.	Yield of cotton stalks/acre in lb.	Mean length in in.	Ginning cent.	Lint index.	Weight of 100 seeds in g.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1 No manure (control) ..	336	100	1,363	24.9	34.2	40.2	77.4
2 40 N. Ammonium sulphate ..	493	147	1,877	24.8	34.0	39.2	76.4
3 80 N. Ammonium sulphate ..	535	159	2,045	24.5	33.8	37.8	73.6
4 120 N. Ammonium sulphate ..	598	178	2,326	24.6	32.4	38.2	79.2
5 40 N. Groundnut cake ..	494	147	1,654	24.8	33.0	40.0	81.6
6 80 N. Groundnut cake ..	572	170	2,264	24.9	32.8	38.2	78.6
7 120 N. Groundnut cake ..	573	170	2,246	24.8	30.2	39.2	86.2
Standard error ..	19.4	..	204	0.15	0.57	1.07	2.26
'F' test satisfied or not ..	Satis- fied.	..	Satis- fied.	N.S.	Satis- fied.	N.S.	Satis- fied.
Critical difference at 5 per cent.	57	..	600	..	1.7	..	6.6

Conclusions—(a) Yield—4, 7, 6, 3, 5, 2, 1

(b) Stalks—4, 6, 7, 8, 2, 5, 1

(c) Ginning per cent—1, 2, 3, 5, 6, 4, 7

(d) Seed weight—7, 5, 4, 6, 1, 2, 3

Application of nitrogenous manures have definitely improved the yields and with increased dosage of nitrogen better yields are obtained. Application of ammonium sulphate at 120 N. level has given the maximum yields of both kapas and stalks. Lint length was not significant among the treatments. With the application of manures, the ginning percent is depressed slightly, the higher the manure dosage, the lesser the lint out turn. The lint indices for the various treatments are statistically same. The weight of seed was affected largely by manuring and thus probably these plots showed a low lint output. Groundnut cake is seen to contribute more towards the increase in seed weight than the corresponding treatment in the ammonium sulphate series.

III. AGRONOMICAL INVESTIGATIONS.

14. The agronomical experiments were conducted to find out the suitability of different crops under irrigated conditions to this tract of black soils. All early and late crops were raised with good returns under both light and heavy irrigations without any untoward result being noticed in the texture of the soil. The main crops raised under garden blocks are jonna, groundnut, redgram mixture, korra, maize and redgram pure in the early season and wheat, Cambodia cotton, maize, vegetable, onions and sweet potato in the late season. The results of early and late cropping are furnished in Table XV.

TABLE XV.—Results of early and late cropping.

Serial number and name of the crop.	Area in acres.	Average yield in lb. per acre.	Maximum yield recorded per acre.	Month of sowing.	Month of harvest.
(1)	(2)	(3)	(4)	(5)	(6)
1 Jonna Co. 9 ..	6.76	1,504	1,731	June-July	October.
2 Korra N. 1 ..	0.42	1,233	1,233	July	October.
3 Raga ..	1.54	1,188	1,188	July	October-November.
4 Maize ..	0.56	1,196	1,196	July	September-October.
		cobs. 7,320	cobs. 7,320		
5 Fodder Jonna ..	3.31	10,024	13,198	June	August-September.
6 Bunch groundnut } Redgram mixture }	6.01	{ 1,643 278	{ 1,000 476	July	November-January.
7 Groundnut (Spreading).	1.08	589	589	July	December.
8 Redgram (pure) ..	0.98	385	385	July	January.
9 Paddy G.E.B. 24 ..	3.05	2,742	4,527	July-August	December.
10 Paddy A.K.P. 2 ..	1.16	3,663	3,943	July-August.	November.
11 Cotton H.A. 11 ..	5.32	642	778	..	February to April.
		Kapas. 1,186	Kapas. 1,890		
12 Glumed wheat ..	7.06	21.9	31.5	October end	February.
13 Sugarcane ..	1.04	tons. 200	tons. 200	February	February.
14 Onions ..	0.20	11,154	11,154	December.	May.
15 Bengalgram ..	5.93	300	400	October	January-February.
16 Naked wheat ..	0.64	734	734	..	..
17 Vegetables—					
1 Tomato ..	..	19,700	..	..	..
2 Brinjal ..	..	8,190	..	..	..
3 Chukkukura ..	..	200	..	..	..
	0.30	lb. seed.	..	..	..

The yield and economics are furnished in Appendix I.

15. *Dry land cropping.*—The area of the farm in Block I-B, comprising of 5.98 acres are cropped in the Hingari season with the dry crops that are grown in the farm under irrigated conditions for yield comparison. The yields recorded are furnished in the Table XVI.

TABLE XVI.—Results of dry land cropping.

Serial number and F. No.	Area in acres.	Name of the crop.	Yield per acre in lb.	Remarks.
(1)	(2)	(3)	(4)	(5)
1 I.B. 1, 4, 8 ..	1.50	Jonna M. 47-3	1,000	Straw. No grain could be collected because of the attack of birds in spite of efforts taken to scare away the birds.
2 I.B. 2, 3 ..	2.45	Bengalgram	62	
3 I.B. 5 ..	1.03	Korra-pathi mixture.	89	Kapas Korra failed.
4 I.B. 6 ..	1.00	Fodder Janna	2,200	

IV. EXPERIMENTAL CROPPING.

16. Eleven randomized replicated trials consisting of three varietal trials, four manurial trials and four rotation trials of the main crops grown in the farm were conducted during the year and their results are furnished below.

17. In addition to the replicated experiments 12 observation trials were conducted and their results recorded.

18. (i) *Redgram varietal trial*.—Six varieties, namely, Udgir, Jagudam, H. 39, No. 37, 72 and 2,900 were sown under comparative yield trials with a view to find out a suitable strain which gives better yield than local. Udgir is found statistically superior over the varieties 72, 2900 and H. 39. The results are recorded in Table XVII below:—

TABLE XVII.—Results of redgram varietal trial.

Field No.—II-6. Previous crop—Sweet potato. Manure—Ten cart-loads of farmyard manure per acre. Date of sowing—22nd June 1951. Date of harvest—16th to 18th January 1952. Variants—2,900, 72, 37, H. 39, Udgir, Jagudam.			Layout—Randomized and replicated six times. Gross area of the plot—22' × 18' = 352 square feet. Net area of the plot—13·6' × 8' = 1 cent. Number of irrigations—Only one. Total depth of irrigation—3·64". Rainfall during the crop period—14·46".			
Particulars.	Udgir.	Jagudam.	37.	72.	2900.	H. 39.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Acre yield in lb. grain	385	371	333	287	284	244
Particulars.	General mean.	Standard error.	'Z' test satisfied or not.	Critical difference.		
	(8)	(9)	(10)	(11)		
Acre yield in lb. grain	319	30·00	Yes.	88		
Conclusion—1, 2, 3, 4, 5, 6.						

(ii) *Ragi varietal trial*.—Five varieties K. 1, Co. 1, Co. 2, Co. 4 and Karunchuruttai were compared in replicated randomized trials to find out the highest yielder. K. 1 and Co. 4 were found to be equal to Karunchuruttai and superior to Co. 1 and Co. 2 in grain yield. Regarding straw Co. 1 and Co. 4 were found to be superior. (Table XVIII).

TABLE XVIII.—Results of ragi varietal trial.

Field No.—VIII 4 and 11. Previous crop—Cotton. Manures applied—154 lb. of ammonium phosphate. Date of planting—4th August 1951. Date of harvest—3rd November 1951. Variants—K. 1, Co. 4, Karunchuruttai, Co. 2 and Co. 1. Layout—Randomized and replicated six times.			Gross area of the plot—28' × 20' = 560 square feet. Net area of the each plot—18' 2" × 12' = 218 square feet or 1 cent. Number of irrigations—Five. Total depth of irrigation—10-89". Rainfall during the period—10-18".		
Particulars. (1)	K. 1. (2)	Co. 4. (3)	Karunchuruttai. (4)	Co. 2. (5)	Co. 1. (6)
Grain yield per acre in lb.	1,188	1,094	1,050	910	874
Straw yield per acre in lb.	3,500	3,754	2,800	2,066	3,934
Particulars.	General mean. (7)	Standard error. (8)	'Z' test satisfied or not. (9)	Critical difference. (10)	
Grain	1,023	48	Yes.	141	
Straw	3,207	240	Yes.	706	
Conclusions—					
Grain—1, 2, 3, 4, 5.					
Straw—5, 2, 1, 3, 4.					

(iii) *Korra varietal trials*.—Five varieties of korra, namely, Co. 1, Co. 2, H. 1, H.K. 282 and H.K. 289 were compared with N. 1 as standard. No statistical differences were observed between the different varieties tried and the standard N. 1 in grain yield. In straw yield Co. 2 was found to be significantly superior over all the other varieties. The results are furnished in Table XIX.

TABLE XIX.—Results of korra varietal trial.

Field No.—II-1. Previous crop—Jonna. Manure applied—Ten cart-loads of farmyard manure per acre. Date of sowing—22nd June 1951. Date of harvest—21st September 1951. Variants—N. 1, H. 1, Co. 1, Co. 2, H.K. 282 and H.K. 289.							Layout—Randomized and replicated six times. Gross area of the plot—21.75' × 10' = $\frac{1}{2}$ cents. Number of irrigations—Two. Total depth of irrigation—5.98". Rainfall during the crops growth—11.43"						
Particulars.		N. 1.		Co. 1.		H. 1.		H.K. 282.		H.K. 289.		Co. 2.	
(1)		(2)		(3)		(4)		(5)		(6)		(7)	
Grain yield per acre in lb.		1,086		1,132		1,023		859		692		866	
Percentage on standard		10		104.2		94.5		78.3		63.7		79.7	
Straw yield per acre in lb.		2,400		2,216		1,850		2,510		2,200		3,322	
Percent on standard		100		92.3		77.1		104.8		93.3		138.4	
Particulars.		General mean.		Standard error.		'Z' test satisfied or not.		Critical difference.					
		(8)		(9)		(10)		(11)					
Grain		942		132		No.		..					
Straw		2,419		228		Yes.		660					
Conclusion—													
Straw—6, 4, 1, 2, 5, 3.													

(iv) *Paddy manurial trial*.—The purpose of this experiment is to find out a suitable manurial treatment for the paddy crop grown on the irrigated black soils. This is the second year of the trial. Table XX.

TABLE XX.—Results of manurial trial on paddy.

Field number—V. 10.
Previous crop—Paddy.
Manure—Basal dressing of 5,000 lb. green leaf per acre.
Date of transplanting—1st February 1952.
Date of harvest—16th May 1952.
Treatments—(1) Control, (2) Mixture I (Ammonium sulphate 150 lb. per acre plus 1½ cwt. super phosphate) (3) Mixture II (Ammonium sulphate 75 lb. per acre plus 200 lb. groundnut cake plus 1½ cwt. super phosphate).

Layout—3 × 5 Randomized blocks.
Replications—Five.
Gross area of each plot—2 cents.
Net area—1 cent.
Total depth of irrigation—87.25 inches.
Rainfall during the period—1.7".
Variety—Co. 13 paddy.

Particulars.	Control.	Mixture I.	Mixture II.
(1)	(2)	(3)	(4)
Grain yield per acre in lb.	812	1,323	1,622
Percentage on control	100	162.5	199.7
Straw yield per acre in lb.	1,940	2,660	2,960
Percentage on control	100	137.1	152.6

Particulars.	Standard error.	'Z' test satisfied or not.	Critical difference.
	(5)	(6)	(7)
Grain	123	Yes.	416
Straw	95	Yes.	309

Conclusion—
Grain—3, 2, (1) Straw—3, 2, (1)

In both grain and straw yields, it was found that the manure treatments mixture I and mixture II were significantly superior over the control while there was no difference between these two mixtures.

The results during the year 1950-51 were not significant either in grain or straw yields.

(v) *Super-phosphate experiment on paddy*.—The object of this experiment was to find out the relative merits of dicalcium phosphate and the super-phosphate on paddy crop. (Table XXI).

TABLE XXI.—Results of manurial trial on paddy.

Field number—V D.C.A.	N plus dicalcium phosphate at 80 lb. P ₂ O ₅ (placed).
Previous crop—Paddy.	Layout—5 × 6 randomized blocks.
Date of transplanting—5th February 1952.	Replications—5.
Date of harvest—21st May 1952.	Gross area of each plot— $\frac{1}{2}$ cent.
Treatments—(1) Control (no manure), (2) groundnut cake at 40 N per acre, (3) groundnut cake at 40 N per acre plus super phosphate at 80 lb. P ₂ O ₅ (Broadcast), (4) groundnut cake at 40 N per acre plus dicalcium phosphate at 80 lb. P ₂ O ₅ (Broadcast), (5) groundnut cake at 40 lb. N plus super phosphate at 80 lb. P ₂ O ₅ (placed), (6) groundnut cake at 40 lb.	Net area— $\frac{1}{2}$ cent.
	Total depth of irrigation—112.45 inches.
	Rainfall during the period—1.70.
	Variety—Co.13 paddy.

Method of application of manure.—Under treatments five and six the fertilizer was applied at a depth of four inches by means of a drill. In treatment three and four fertilizer was applied broadcast ploughed and transplanted. Expeller groundnut cake was well powdered by pestle and mortar by human labour and mixed with other required phosphate and the homogeneous mixture was applied to the field as stated above.

Particulars.	1.	2.	3.	4.	5.	6.
Grain yield per acre in lb.	1,084	1,012	1,544	1,440	1,440	1,256
Percentage on control	100	95.10	145.1	135.3	135.3	118.0
Straw yield per acre in lb.	1,584	1,644	2,276	1,912	2,336	1,676
Percentage on control	100	103.8	143.6	123.5	147.4	105.8

	Standard error.	'Z' test satisfied or not.	Critical difference.
Grain	88	Yes.	260
Straw	98	Yes.	288

Conclusion—

Grain—3, 4, 5, 6 '1, 2 Straw—5, 3, 4, 6, 2, 1

Groundnut cake at 40 lb. N plus super-phosphate 80 lb. P₂O₅ (broadcast) was found to be superior over groundnut cake at 40 lb. N plus semi acidulated phosphate 80 lb. P₂O₅ (placed) and control, and groundnut cake at 40 N per acre. In straw yields, treatments super-phosphate plus groundnut cake (placement) and super-phosphate plus groundnut cake (broadcast) are found to be superior over other treatments.

(vi) *Green manure experiment*.—To find out the optimum dose of green manure of black soils the experiment was laid out on Hingari Jonna with six treatments, namely, (1) no manure, (2) growing dhaincha and ploughing it *in situ*, (3) applying 2,500 lb. dhaincha per acre, (4) 5,000 lb. dhaincha per acre, (5) 7,000 lb. dhaincha per acre and (6) 10,000 lb. dhaincha per acre. The trial was laid out in randomized and replicated form with five replications. As the results are highly vitiated by bird damage, conclusion could not be drawn.

(vii) *Three-year course rotation trial*—(Deep and shallow soils).—To find out a suitable three-year course rotation in both deep and shallow soils under irrigation, this trial was conducted with the following three treatments in randomized blocks with six replications. The treatments are—

- (1) Groundnut+redgram, cotton, korra.
- (2) Jonna, groundnut+redgram, cotton.
- (3) Cotton, groundnut+redgram, jonna.

In the first round in a period of three years, the results are in favour of the third rotation in the deep soils and treatment number one in the shallow soils.

This is the first year of the second round of the trial. The mean acre yields obtained from the different crops are furnished below in Table XXII.

TABLE XXII.—Results of three-year course rotation.

Number and name of the crop.	Date of sowing.	Date of harvest.	Deep soils.	
			Mean acre yield in lb.	
			Grain.	Straw.
(1)	(2)	(3)	(4)	(5)
1 Groundnut+redgram	1 July 1951	14 Nov. 1951	263	916
	Do.	16 Jan. 1952	409	(Haulms)
2 Jonna	Do.	25 Oct. 1951	1,363	3,596
3 Cotton	28 Aug. 1951	7 Feb. 1952	477	(kaps)
		1 Mar. 1952	..	..
		20 Mar. 1952	..	..
	Date of sowing.	Date of harvest.	Shallow soils.	
			Mean acre yield in lb.	
			Grain.	Straw.
(1)	(2)	(3)	(4)	(5)
1 Groundnut + redgram	29 June 1951	14 Nov. 1951	366	1,265
	Do.	16 Jan. 1952	229	..
2 Jonna	Do.	24 Oct. 1951	1,094	3,301
3 Cotton	29 Aug. 1951	7 Feb. 1952	242	(kaps)
		1 Mar. 1952	..	..
		20 Mar. 1952	..	..

Final conclusions will be drawn in the year 1953-54 after the three year course of the second round is completed.

(viii) *Four-year course rotation trials*—(Deep and shallow soils).—To find out a suitable four-year course rotation in both deep and shallow soils under irrigation, this experiment was conducted with the following four treatments in randomized blocks and replicated six times. The treatments are—

- (1) Groundnut, +redgram, cotton, green manure followed by wheat, jonna.
- (2) Jonna, green manure, followed by wheat, cotton, groundnut+redgram.
- (3) Green manure followed by wheat, groundnut+redgram, jonna, cotton.
- (4) Cotton, jonna, groundnut+redgram, green manure followed by wheat.

The trial was started in the year 1948-49 and the first round of the trial was completed by 1951-52. The mean yield data in the different years and the monetary return of each crop in the rotation and the total for each treatment were furnished in Table XXIII. In all the treatments the net area of each plot under each crop taken was one cent.

TABLE XXIII.—Final results of the four-year course rotation.

Serial number and treatment, particulars of rotation.	Year.	Deep soils.		Shallow soils.	
		Mean acre yield in lb.	Monetary return.	Mean acre yield in lb.	Monetary return.
	(1)	(2)	(3)	(4)	(5)
	(2)	(3)	(4)	(5)	(6)
			RS. A. P.		RS. A. P.
I—					
1 Groundnut+redgram	1948-49	903	254 0 0	805	226 7 0
		516	73 11 0	384	54 14 0
2 Cotton	1949-50	821	136 13 0	486	81 0 0
3 Wheat	1950-51	1,036	162 5 0	531	75 14 0
4 Jonna—Grain	1951-52	1,379	172 6 0	1,224	163 0 0
Straw	..	5,000	100 0 0	3,226	65 5 0
Total	..	..	899 3 0	..	656 8 0

Serial number and treatment, particulars of rotation.	Year.	Deep soils.		Shallow soils.	
		Mean acre yield in lb.	Monetary return.	Mean acre yield in lb.	Monetary return.
(1)	(2)	(3)	(4)	(5)	(6)
II—			RS. A. P.		RS. A. P.
1 Jonna—Grain	1948-49 ..	2,860	357 8 0	1,476	184 8 0
Straw	..	5,462	109 4 0	6,589	131 13 0
2 Wheat	1949-50 ..	683	97 10 0	490	70 0 0
3 Cotton	1950-51 ..	713	118 13 0	494	82 5 0
4 Groundnut+redgram ..	1951-52 ..	273	76 13 0	404	113 10 0
		526	75 2 0	273	39 0 0
Total ..			835 2 0		621 4 0
III—					
1 Wheat	1948-49 ..	1,140	162 14 0	718	102 9 0
2 Groundnut+redgram ..	1949-50 ..	1,205	338 15 0	983	276 8 0
		461	65 14 0	418	59 11 0
3 Jonna—Grain	1950-51 ..	1,225	153 2 0	742	92 12 0
Straw	..	8,267	165 5 0	6,983	139 10 0
4 Cotton	1951-52 ..	581	96 14 0	359	59 15 0
Total ..			983 0 0		731 1 0
IV—					
1 Cotton	1948-49 ..	1,776	296 0 0	833	138 13 0
2 Jonna—Grain	1949-50 ..	918	114 12 0	804	100 8 0
Straw	..	4,026	80 8 0	3,842	76 12 0
3 Groundnut+redgram ..	1950-51 ..	317	89 3 0	300	86 4 0
		1,167	166 11 0	520	75 4 0
4 Wheat	1951-52 ..	750	107 2 0	633	90 8 0
Total ..			854 4 0		568 2 0

Conclusion.—The rotation wheat, groundnut+redgram, jonna cotton is found to be the most economical rotation both in deep and shallow soils. The rotational trials are being continued to confirm the above results.

19. (i) *Non-replicated trials.*—(a) *Long duration paddy varietal trial.*—Five paddy varieties of long duration, namely, Co. 2, Co. 19, Co. 25, BCP. 1, ASD. 5 were transplanted in three series with an interval of 15 days on 17th September 1951, 1st October 1951, 15th October 1951 to find out the best suitable variety for being grown in the project area during the cold weather October to February. Their performances are furnished in the Table XXIV.

TABLE XXIV.—Results of long duration paddy varieties.

Serial number and field number X-11, 12.	Plot size.	Name of the variety.	Acre yield in lb.			
			Planted on 17th Septem-ber, 1951.	Harvested on	Planted on 1st October 1951.	Harvested on
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	One cent ..	Co. 2 ..	1,082	29 Jan. 1952 ..	1,505	3 Mar. 1952 ..
2	Do. ..	Co. 19..	580	3 Mar. 1952 ..	173	19 Mar. 1952..
3	Do. ..	Co. 25..	497	Do. ..	417	17 Mar. 1952..
4	Do. ..	BCP. 1.	398	17 Mar. 1952 ..	294	Do. ..
5	Do. ..	ASD. 5.	895	29 Jan. 1952 ..	687	3 Mar. 1952 ..
						1,555
						644*
						507
						494
						740

Conclusion.—(1) Co. 2 and ASD. 5 have given higher yields in all the series.

(2) Planting on 15th October 1951 is preferable since the varieties in the last series have given higher yields.

(b) *Short duration paddy varietal trial.*—Five paddy varieties of short duration, namely, charnok, Co. 20, MTU. 15, ADT. 18 and 8364 (Pullasanna vadlu culture) were tried in two series on 2nd and 17th October 1951. Their performance is furnished in the Table XXV.

TABLE XXV.—Results of short duration paddy varietal trial.

Serial number and field number X, 11, 12. Plot size.	Name of the variety.	Acre yield in lb.			
		Planted on 2nd Octo-ber 1951.	Date of harvest.	Planted on 17th Octo-ber 1951.	Date of harvest.
(1)	(2)	(3)	(4)	(5)	(6)
1 One cent	Charnok	143	3rd March 1952.	Failed	completely.
2 Do.	Co. 20	320	3rd March 1952.	67	7th April 1952.
3 Do.	MTU. 15	1,055	9th February 1952.	631	27th April 1952.
4 Do.	ADT. 18	1,674	9th February 1952.	150	7th April 1952.
5 Do.	8,364 (pullasanna vadlu culture).	1,089	9th February 1952.	177	Do.

Conclusion.—The varieties planted on 17th October 1951 have not made satisfactory growth because of the attack by the stem borer (*Schoenobius incertellus*). ADT. 18 is found to far better than other strains.

(c) *Short duration varieties of paddy for February-May season.*—Five paddy varieties of short duration, namely, Co. 13, Co. 20, ADT. 18, MTU. 15, 8364 (Pullasanna vadlu culture) were transplanted in two series on 2nd and 22nd February 1952 to find out the best suitable variety for being grown in the project area in the summer season between February-May season. The performances are furnished in the Table XXVI.

TABLE XXVI.

Serial number and field number V.D.C.A. Plot size.	Name of the variety.	Acre yield in lb.			
		Planted on 2nd Feb-ruary 1952.	Harvested on	Planted on 22nd Feb-ruary 1952.	Date of harvest.
(1)	(2)	(3)	(4)	(5)	(6)
1 One cent	Co. 13	375	20th May 1952.	1,364	20th May 1952.
2 Do.	Co. 20	900	Do.	1235	Do.
3 Do.	ADT. 18	1,075	Do.	Failed.	
4 Do.	MTU. 15	484	Do.	772	31st May 1952.
5 Do.	8364	325	Do.	463	31st May 1952.

Remarks.—(1) MTU. 15 in the first series was damaged by birds and hence low yield.

(2) ADT. 18 in second series failed due to the damage caused by birds as the plot was situated near the sugarcane crop.

Conclusion.—(1) ADT. 18 has given the maximum yield of 1,075 lb. in the first series.

(2) Co. 13 has given the maximum yield of 1,364 lb. in the second series.

(ii) *Sweet potato observation trial.*—To study the performances of the sweet potato varieties I.B. 5941, I.B. 22, I.B. 24, I.B. 33, Jersey big stem, local white

and local red, an observation trial was laid out with all the varieties. Their performances are furnished in Table XXVII.

TABLE XXVII.—Results of sweet potato varietal trial.

Serial number and varieties.	Plot size.	Planted on	Harvested on	Acre yield in lb.	
				Sweet potato tubers.	Vines.
(1)	(2)	(3)	(4)	(5)	(6)
1 Local white	9'9	9th July 1951	8th December 1951.	1,061	5,630
2 Local red	11'0	Do.	22nd December 1951.	1,045	5,091
3 Jersey big stem ..	12'4	Do.	29th December 1951. 31st December 1951.	1,016	861
4 I.B. 32	16'8	Do.	12th January 1951.	1,137	1,190
5 I.B. 24	19'8	Do.	14th and 15th January 1952.	1,652	1,747
6 I.B. 5941	2'6	Do.	15th January 1952.	692	2,385
7 I.B. 33	2'0	Do.	15th January 1952.	400	2,800

Remarks.—The crop badly affected by sweet potato weevil. As a result they did not fare well.

(iii) *Sesamum observation trial*.—Three varieties, namely, TMV. 1, TMV. 2 and TMV. 3 were found to give acre yields of 156 lb., 203 lb. and 175 lb. respectively. The Sesamum varieties have not come up well in black soils.

(iv) *Castor varietal observation trial*.—Three varieties of castor TMV. 1, TMV. 2, TMV. 3 gave acre yields of 180 lb., 227 lb., 100 lb. respectively.

(v) *Groundnut (bunch) observation trial*.—Five varieties A.H. 4218, A.H. 4515, A.H. 4111, TMV. 2 and local were sown under observation. Their performances are furnished in the Table XXVIII.

TABLE XXVIII.—Results of groundnut (bunch) observation trial.

Serial number and variety.	Size of plot.	Sown on	Harvested on	Acre yield in lb.	
				Pods.	Haulms.
(1)	(2)	(3)	(4)	(5)	(6)
1 A.H. 4218	15'0	11th July 1951.	13th November 1951.	375	794
2 A.H. 4515	15'0	Do.	Do.	347	710
3 A.H. 4111	15'0	Do.	Do.	340	730
4 TMV. 2	15'0	Do.	Do.	544	1,120
5 Local	17'5	Do.	Do.	400	825

(vi) *Groundnut (spreading) observation trial*.—Five varieties TMV. 3, A.H. 4354, local TMV. 1, A.H. 334 were tried under observation. Their performances are furnished in the Table XXIX.

TABLE XXIX.—Results of groundnut (spreading) observation trial.

Serial number and variety.	Size of plot.	Date of sowing.	Date of harvest.	Acre yield in lb.	
				Pods.	Haulms.
(1)	(2)	(3)	(4)	(5)	(6)
	CENTS.				
1 TMV. 1	28	11th July 1951.	16th November 1951.	589	950
2 A.H. 4354	16	Do.	Do.	550	1,269
3 Local	16	Do.	Do.	544	1,844
4 TMV. 1	16	Do.	Do.	513	1,162
5 A.H. 334	20	Do.	Do.	425	960

(vii) *Cambodia cotton observation trial*.—Seven cultures of Cambodia cotton, namely, M.A. 2, L. II—40-594, 9030, L. II—42-8079, H.A. 11, 2075-1, and Lakshmi were tried under observation. Their performances are furnished in Table XXX.

TABLE XXX.—Performance of the Cambodia cotton cultures.

Serial number and name of the variety.	Size of plot.	Date of sowing.	Period of picking.	Acre yield of kapas in lb.
	CENTS.			
1 M.A. 2	19'4	1st September 1951.	26th January to 10th April 1952.	803
2 L. II—40-594	6'1	Do.	Do.	759
3 9030	6'2	Do.	Do.	677
4 L. II. 42-8079	20'1	Do.	Do.	543
5 H.A. 11	46'0	Do.	Do.	479
6 2705-1	6'1	Do.	Do.	429
7 Lakshmi	6'2	Do.	Do.	416

(viii) *Sugarcane varietal trial*.—Five varieties of sugarcane Co. 419, Co. 449, Co. 467, Co. 527, Co. 475 were tried and their performances are furnished in Table XXXI.

TABLE XXXI.—Results of sugarcane varietal trial.

Serial number and varieties.	Acre yield in tons of cane.
1 Co. 419	21'9
2 Co. 449	29'5
3 Co. 467	31'5
4 Co. 475	32'0
5 Co. 527	14'0

(ix) *Residual effect of bacterial inoculum on the groundnut crop in succeeding year*.—During the year 1950-51, two plots of 12 cents each in area were sown one with groundnut seed treated with Bacterial inoculum and the other with untreated groundnut seed. To study the residual effect of the bacterium in the succeeding year groundnut seed without any treatment was sown in the two plots on 11th July 1951 and harvested on 13th November 1951. It was observed that the plot, which was sown with treated seed in the previous year, gave an acre yield of 517 lb. and the other plot gave an acre yield of 422 lb. during this year, (i.e.) 29'6 per cent increase in yield over control (untreated). Thus an increased yield of 95 lb. of pods per acre was obtained from the plot sown with treated seed over the plot sown with untreated seed in the previous year.

(x) *Soya bean trial*.—Soya bean Tata No. 5 was sown on 23rd August 1951 in an area of 220 square feet and was harvested on 1st November 1951. It recorded an acre yield of 100 lb. of pods.

Three varieties of Tata No. 5, Ozhuku-akidaiza and woods yellow were sown on 3rd December 1951 in the Hingari season in three plots with an area of 126 square feet each to study their performance. The first two varieties failed to set seed. The third variety woods yellow was harvested on 1st March 1952 and it gave an acre yield of 205 lb.

(xi) *Trial of perennial mung*.—A perennial variety of greengram received from the Philippines was sown and this has failed and not fared well.

(xii) *Naked wheat C. 253*.—Naked wheat C. 253 was sown on 19th October 1951 in an area of 64 cents to study its performance. The crop was manured with groundnut cake to give 40 lb. N as basal dressing. The crop received five irrigations. It was harvested on 8th February 1952. The crop gave an acre yield of 734 lb.

V. ENTOMOLOGICAL EXPERIMENTS.

20. *Studies on the control of cholam fly.*—The Cholam fly *A-therigona indica* was found to be a serious pest responsible for the complete failure of Hingari Jonna. Work on this pest was continued. An examination of grasses to find out an alternative host plant to the Cholam fly was not successful. The fly was not found to hibernate in the soil during the off season.

21. The control measures of this fly were experimented upon and four experiments were laid out and results furnished below :—

(i) *Flooding trial.*—(a) This trial was conducted to find out the effect of submerging the seedlings of Hingari Jonna when they are 10 days old with and without fish-oil rosin soap for 10, 20 and 30 minutes in controlling the shoot borer fly. Normal method of irrigation is treated as control. The infestation of the fly in all the treatments were noted and compared with that of the control, two varieties M-47-3 a fairly resistant type and Co. 9 highly susceptible type were used. The experiment was laid out in split plot design with the flooding treatments as major and varieties as minor variants and replicated four times.

(b) The seedlings when they were 10 days old were submerged completely under water with and without the addition of fish-oil rosin soap. The insecticidal fluid was prepared by dissolving one lb. of fish-oil rosin soap in ten gallons of water and this fluid at the rate of 200 gallons per acre was poured along the line of seedlings prior to flooding. The results obtained are furnished in Table XXXII.

TABLE XXXII.—Results of flooding trial.

1 Nature of the soil—Shallow soil.	8 Date of sowing—20th September 1951.
2 Irrigated or unirrigated—Irrigated.	9 Date of harvest—24th January 1952.
3 Number of irrigations—5.	10 Size of plot—
4 Rainfall during the crop growth—4.86 inches.	Gross—18' x 7': 126 square feet.
5 Variants—7 x 2: 14.	Net—15' x 3.75': 56.25 square feet.
6 System of layout—Split plot design.	11 Previous crop—Cotton.
7 Replications—4.	

Serial number and treatments.	Acre yield in lb.				Per cent of fly attacked seedlings.	
	M-47-3		Co. 9.		M-47-3.	Co. 9.
	Grain.	Straw.	Grain.	Straw.		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 Flooding with fish-oil rosin soap for 10 minutes.	381	3,774	559	2,092	36	89
2 Flooding with fish-oil rosin soap for 20 minutes.	552	4,877	505	2,268	40	91
3 Flooding with fish-oil rosin soap for 30 minutes.	391	4,995	509	2,457	41	89
4 Flooding without fish-oil rosin soap for 10 minutes.	488	4,819	480	2,203	44	94
5 Flooding without fish-oil rosin soap for 20 minutes.	412	4,239	378	2,265	45	91
6 Flooding without fish-oil rosin soap for 30 minutes.	494	4,704	445	2,393	42	89
7 Control	405	3,020	407	1,951	56	98
General mean	446	4,347	469	2,233	43	92
Standard error	84	568	67	223	3.6	3.1
Significance by 'F' test	N.S.	N.S.	N.S.	N.S.	Significant.	N.S.
Critical difference	..	..	..	..	11	..

Conclusion—1, 2, 3, 4, 5, 6, 7.

In the variety M-47-3 the incidence of the fly was significantly less in the other treatments than in the control. But the same result was not confirmed by yield data.

In the case of variety Co. 9 no differences are found either in the incidence of the fly or in the yields between the various treatments and control.

(ii) *Manurial trial.*—The aim of the experiment is to find out whether there is any relation between the incidence of the fly and the manure applied and to see how far it is possible to overcome the ravages of the fly by applying a good dose of manure that is to give 60 lb. N in different forms. By applying a good dose of manure, the presumption is the plant grows quickly and the cuticular region is hardened to resist the penetration of the fly maggots and thus avert the attack of the fly. For achieving this object two varieties M-47-3 a fairly tolerable

variety and Co. 9 a highly susceptible type were tried with four different manurial doses and compared with that of control (no manure). The treatments were—

- (1) Farmyard manure at 20 cart loads per acre.
- (2) Groundnut cake at 60 lb. nitrogen level.
- (3) Ammonium sulphate at 60 lb. N level.
- (4) Mixture of groundnut cake and ammonium sulphate to give 60 lb. N in the proportion of 1 : 1.
- (5) control (no manure).

Farmyard manure was applied one month in advance, powdered groundnut cake was drilled three weeks prior to sowing and ammonium sulphate was applied at the time of sowing. The incidence of the pest was studied at weekly intervals for four weeks from the time of sprouting. The results are furnished in Table XXXIII.—

TABLE XXXIII.—Results of manurial trial.

1 Nature of soil—Black shallow soil.	8 Replications—4.
2 Irrigated or unirrigated—Irrigated.	9 Date of sowing—20th September 1951.
3 Number of irrigations—5.	10 Date of harvest—24th January 1952.
4 Rainfall during the crop growth—4.86 inches.	11 Size of the plot—
5 Manures—As in treatments.	Gross—18' x 14': 252 square feet.
6 Variants—5 x 2: 10.	Net—15' x 10.5': 157.5 square feet.
7 System of layout—Split plot design.	12 Previous crop—Irrigated cotton.

Serial number and treatments.	Acre yield in lb.				Per cent of attacked seedlings.	
	M-47-3.		Co. 9.		M-47-3.	Co. 9.
	Grain.	Straw.	Grain.	Straw.		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 Farm yard manure at 20 C.L. per acre ..	556	3,735	481	2,427	46	87
2 Groundnut cake at 60 lb. N level. ..	578	3,817	483	2,292	45	93
3 Mixture of groundnut cake and Ammonium sulphate (1 : 1) at 60 lb. N level.	650	3,735	434	2,067	44	93
4 Ammonium sulphate at 60 lb. N level ..	711	4,100	524	2,292	45	94
5 Control (no manure)	523	3,485	445	2,012	56	98
General mean	604	3,792	473	2,218	47	93
Standard error	50	233	47	237	3.7	1.6
Significance by 'F' test	N.S.	N.S.	N.S.	N.S.	N.S.	Significant.
Critical difference at 5 per cent level ..	..	..	..	..	..	5

Conclusion—1, 2, 3, 4, 5.

It is seen from the table that there are no differences either in the incidence of the fly or in the yields between the different treatments in the variety of M-47-3. In the variety Co. 9, it is found the infestation of the fly is significantly less in the farm-yard manure treatment than in the other treatments. But the same was not confirmed by the yield data.

(iii) *Spraying and dusting trial.*—The aim of the trial is to find out the efficacy of the two insecticides BHC and DDT at different strength in controlling the shoot borer fly attack on irrigated Jonna in the Hingari season.

BHC and DDT as sprays at 0.05 per cent and 0.1 per cent and as dusts at 5 per cent concentrations were applied on two varieties in fairly big-sized observation plots. Each insecticide was applied on five different plots with the minor treatments—

- (1) control (no treatment); (2) one time—immediately after sproutings
- (3) two times—immediately and 10 days after sprouting; (4) three times immediately, 10 and 20 days after sprouting and (5) four times immediately, 10, 20 and 30 days after sprouting.

The crop was sown on 20th September 1951 and the treatments were given on 26th September 1951, 6th October 1951, 17th October 1951 and 26th October 1951. The counts of the fly attacked plants were taken at weekly intervals in the different plots up to the end of four weeks. It was found that BHC 0.1 per cent

spray was found to be superior in controlling the pest than other treatments. Among the minor treatments, the results were in favour of applying the insecticide BHC 0.1 per cent three times and four times in averting the pest. The results are furnished below in Tables XXXIV and XXXV :-

TABLE XXXIV—Results of insecticidal trial—Variety M-47-3.

Number and treatments.	Per cent of fly attacked seedlings in the different weeks.					Acre yield.	
	1st week.	2nd week.	3rd week.	4th week.	Total.	Grain.	Straw.
	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1 Control (no treatment) ..	3	9	31	9	52	760	5,458
2 BHC dust 5 per cent ..	1	9	25	8	43	1,052	6,812
3 BHC spray 0.05 per cent ..	4	12	21	6	43	783	6,358
4 BHC spray 0.1 per cent ..	3	10	20	5	38	1,035	6,893
5 DDT dust 5 per cent ..	4	16	25	9	53	537	5,375
6 DDT spray 0.05 per cent ..	3	16	19	7	45	627	6,261
7 DDT spray 0.01 per cent ..	2	13	27	7	49	559	7,000

It is seen from the above table that BHC 0.1 per cent spray is superior in controlling the pest.

The results obtained on the variety Co. 9. are furnished in the Table XXXV below :-

TABLE XXXV.

Serial number and treatment.	Per cent of fly attacked seedlings in the different weeks.					Acre yield.	
	1st week.	2nd week.	3rd week.	4th week.	Total.	Grain.	Straw.
	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1 Control (no treatment) ..	11	21	44	20	96	919	2,204
2 BHC dust 5 per cent ..	8	18	36	81	93	936	2,592
3 BHC spray 0.05 per cent ..	12	21	41	15	89	1,046	3,177
4 BHC spray 0.1 per cent ..	10	26	45	7	88	930	3,047
5 DDT dust 5 per cent ..	14	25	40	13	92	795	2,372
6 DDT spray 0.05 per cent ..	13	24	35	17	89	901	1,945
7 DDT spray 0.1 per cent ..	16	25	27	21	89	863	2,333

It is seen from the table that the percentage infestation has been as high as 96 per cent in the control and ranged from 88 to 93 in other treatments and the yields are as high as 913 lb. per acre on average. The infestation of the fly in the first and second weeks after sprouting was about 35 per cent and all the seedlings that were attacked in the early stages were completely destroyed. It was observed the seedlings that were attacked in the later stages, tiller and the tillers in their turn produced earheads though small and added to the total yields. From this it is presumed the attacks by the fly during the end of the third and fourth week of the crop do not seem to adversely affect the yields.

(iv) *Adopting thickseed rate and subsequent thinning as against normal seed rate.*—(a) The aim of the trial was to find out the economics of sowing a thick seed rate and subsequently thinning the affected plants as against normal seed rate without further thinning. Here the aim of adopting high seed rate was to provide a better stand of the crop even after the crop was infested by the fly. For studying the economics, an observation trial was laid out with two varieties. (M-47-3 and Co. 9).

(b) The main treatments were (1) thick sowing, i.e., adopting a seed rate of 24 lb. per acre and thinning subsequently after the fourth week and (2) normal seed rate of 12 lb. per acre. The incidence of the fly in both the treatments and varieties was noted at weekly intervals upto four weeks and the thick sown plots were thinned after the fourth week by removing the fly attacked seedlings and some excess plants.

(c) The excess produce in grain and straw by adopting a high seed rate was valued and the cost of excess seed used and labour charges for thinning out the respective plots were deducted and the economics worked out. The grain and

straw valued at the rates fixed on the farm, i.e., 7 lb. per rupee and 50 lb. per rupee respectively. The results obtained are furnished below in Table XXXVI.

TABLE XXXVI.—Results of cultural trial.

Serial number and treatment.	percentage of fly attacked seedlings.	Grain acre yield.	Straw acre yield.	Net profit over thin sown plot.	
(1)	(2)	(3)	(4)	(5)	
				Rs.	P.
Variety—M. 47-3.					
1 Adopting normal seed rate ..	40	771	3,734	..	..
2 Adopting a high seed rate and thinning	44	888	4,010	15	8 0
Variety—Co. 9.					
1 Adopting normal seed rate ..	92	605	2,074	..	..
2 Adopting a high seed rate and thinning.	94	640	2,282	2	5 0

It is seen from the above table that in both the varieties the thick sown plots gave higher yields and adopting a high seed rate and subsequently thinning are found to be economical.

22. *Control of pests on cotton*—(i) *Control of cotton jassids (Empoasca devastans).*—The aim of the trial is to find out the effective and economic control measure for cotton jassids. For this purpose, the experiment was laid out on randomized and replicated form with four repetitions. Four treatments, viz., sprays DDT 0.05 per cent, DDT 0.1 per cent dust at DDT 5 per cent and control (no insecticide) were tried on H.A. 11 cotton. To find out the efficacy of the treatments, jassid nymphs were counted just before the application of insecticide on 50 leaves of 25 plants in each plot. The plants were selected in the centre of the plot avoiding personal bias. Nymphal counts on the same leaves, 24 hours, 48 hours and 72 hours after the application of the treatments were taken and the percentage of mortality in each case was worked out. The yield data was also recorded and correlated with the nymphal mortality for arriving at the economical concentration of DDT in controlling the pest. The results are furnished in Table XXXVII.

TABLE XXXVII.—Control of cotton jassids trial, 1951-52.

1 Nature of soil—Heavy black soil.	7 System of layout—Randomised.
2 Irrigated or unirrigated—Irrigated.	8 Variants—Four.
3 Number of irrigations—Six.	9 Replications—Four.
4 Rainfall during the crop growth—9.20 inches.	10 Sown on—28th August 1951.
5 Manure applied—Four thousand lb. of green manure incorporated one month prior to sowing and 100 lb. of ammonium phosphate on 7th August 1951.	11 Harvested on—9th and 23rd February and (28th March 1952).
6 Object—To find out an effective control measure for jassid.	12 Size of plot—Gross area—210 square feet. Net area—135 square feet.
	13 Previous crop—Green manure sunnhemp crop.

Serial number and treatments.	Per cent of mortality in 24 hours.	Per cent of mortality in 48 hours.	Per cent of mortality in 72 hours.	Acre yield kapa in pound.
(1)	(2)	(3)	(4)	(5)
1 DDT 0.05 per cent spray ..	94.8	98.0	98.9	530
2 DDT 0.1 per cent spray ..	97.0	98.9	99.3	532
3 DDT 5 per cent dust ..	97.1	98.3	99.2	455
4 Control ..	4.6	13.0	20.4	436
General mean ..	73.4	74.6	79.5	491
Standard error ..	1.8	2.4	3.8	22
Significant by 'F' test ..	Significant.	Significant.	Significant.	Significant.
Critical difference at 5 per cent level ..	5.7	7.7	12.2	71
Conclusion—3, 2, 1, 4	2, 3, 1, 4	2, 3, 1, 4	1, 2, 3, 4.	

It is seen from the above table that all the treatments with DDT are significantly superior over control in controlling jassids. Regarding yields, the treatments DDT 0.05 per cent spray and DDT 0.1 spray were found to be better than the other treatments. In correlation with the yields, the results are in favour of DDT 0.05 per cent spray.

(ii) *Control of cotton boll worms.*—(a) The aim of the trial was to find out the ways and means of controlling the cotton boll worms by applying insecticides. For this purpose, a trial was laid out on replicated form with 12 treatments. The treatments were given commencing from the flowering stage till the bolls open at intervals of 21 days.

(b) To find out the efficacy of the insecticides the total bolls shedding in the different treatments were recorded at fortnightly intervals. After the harvest, the entire produce was examined and the boll worm infested kapas were separated and the percentage of bad kapas to the total produce was worked out. This is the first year of the trial. The results of the experiment are given in Table XXXVIII.

TABLE XXXVIII.—Control of cotton boll worms, 1951-52.

1 Nature of soil—Heavy black soil.	7 Variants—Twelve.
2 Irrigated or unirrigated—Irrigated.	8 System of layout—Randomised.
3 Number of irrigations—Six.	9 Replications—Four.
4 Rainfall during crop growth—9.20 inches.	10 Sown on—28th August 1951.
5 Manures applied—Four thousand lb. green manure incorporated one month prior to sowing and 100 lb. Ammonium phosphate was applied on 7th August 1951.	11 Picked on—9th February, 28th February and 28th March 1952.
6 Object—To find out the control measures of cotton boll worms.	12 Size of plot—Gross area—25' × 21' = 525 square feet. Net area—20' × 18' = 360 square feet.
	13 Previous crop—Green manure crop sunnhemp.

Serial number and treatment.	Total number of bolls and flowers shed by the attack of boll worms.	Percent of boll worm attacked kapas.	Acre yield of seed cotton in pounds.
(1)	(2)	(3)	(4)
1 DDT 5 per cent dust	98	4.1	484
2 BHC 5 per cent	92	5.5	448
3 DDT 0.1 per cent spray	111	4.4	484
4 BHC 0.05 per cent spray	82	6.5	448
5 DDT 10 per cent dust	103	3.5	629
6 BHC 10 per cent dust	102	5.8	460
7 DDT 5 per cent plus sulphur (1:1) dust	95	5.1	557
8 DDT 10 per cent plus sulphur (1:1) dust	86	5.0	508
9 3: 10: 20 mixture of BHC 5 per cent, DDT 5 per cent and sulphur	93	3.7	496
10 3: 10: 20 mixture of BHC 10 per cent, DDT 10 per cent and sulphur	85	3.9	557
11 Agrocide cotton dust	78	4.0	460
12 Control (no insecticide)	131	7.3	448
General mean	96	4.9	498
Standard error	8.2	0.7	48
Significant by 'F' test	Signifi- cant.	Signifi- cant.	Not signifi- cant.
Critical difference at 5 per cent level	24	2.0	..

Conclusion.—Total boll shedding—12, 3, 5, 6, 1, 7, 9, 2, 8, 10, 4, 11.
Percentage of attacked kapas—12, 4, 6, 2, 7, 8, 3, 1, 11, 10, 9, 5.

From the table it is seen that the total boll shedding is low in the plot applied with Agrocide cotton dust and maximum in the control and DDT 0.1 per cent spray treatment. The percentage of boll worm attacked kapas is significantly lower in the treatments DDT 10 per cent dust and 3: 10: 20 mixture of BHC 5 per cent, DDT 5 per cent and sulphur treatment than in the control and BHC 0.05 per cent spray. There are no differences in the yield data between the various treatments.

(iii) *Control of cotton aphids.*—(a) The aim of the trial is to find out the effective control measures for aphids on cotton. For this purpose DDT and BHC dusts at 5 per cent and spray at 0.05 per cent and 0.1 per cent concentrations were tried and compared with that of tobacco spray. The treatments were tried on H.A. 11 and replicated four times.

(b) To assess the value of the insecticides the population of aphids on 25 leaves in each plot before, 24 hours and 48 hours after the application of treatments was recorded. The percentages of mortality of the aphids were calculated. The yields from different plots were gathered and analysed. This is the first year of the trial. The results of the experiments are furnished below in Table XXXIX.

TABLE XXXIX.—Control of cotton aphids, 1951-52.

1 Nature of soil—Heavy black soil.	8 System of layout—Randomized.
2 Irrigated or unirrigated—Irrigated.	9 Replications—Four.
3 Number of irrigations—Six.	10 Sown on—28th August 1951.
4 Rainfall during the crop growth—9.20 inches.	11 Picked on—9th and 28th February and 28th March 1952.
5 Manures applied—4,000 lb. green manure incorporated one month prior to sowing and 100 lb. ammonium phosphate prior to 3 weeks of sowing.	12 Size of plot—Gross area—10' × 21'—210 square feet. Net area—7.5' × 18'—135 square feet.
6 Object—To find out the effective control measures of cotton aphids.	13 Previous crop—Green manure crop sunnhemp.
7 Variants—Seven.	

Serial number and treatments.	Per cent of mortality of aphids in 24 hours.	Per cent of mortality of aphids in 48 hours.	Acre yield kapas in pounds.
(1)	(2)	(3)	(4)
1 DDT 5 per cent dust	19.8	26.3	461
2 DDT 0.05 per cent spray	22.7	22.8	406
3 DDT 0.1 per cent spray	5.5	19.5	393
4 BHC 5 per cent dust	11.9	22.0	455
5 BHC 0.05 per cent spray	56.1	67.6	390
6 BHC 0.1 per cent spray	54.2	73.9	432
7 Control (Tobacco spray)	39.5	48.1	490
General mean	30.0	40.0	432
Standard error	6.8	8.8	38
Significant by 'F' Test	Signifi- cant.	Signifi- cant.	Not Signifi- cant.
Critical difference at 5 per cent level	20.2	26.2	..

Conclusion—5, 6, 7, 2, 1, 4, 3 6, 5, 7, 1, 2, 4, 3.

It is obvious from the above table that BHC sprays at 0.05 per cent and 0.1 per cent concentrations are significantly superior in controlling the pest even in 24 hours as in the case of tobacco spray over others. As there are no differences between the various treatments in the yields, the economical advantages of controlling the aphids by any particular insecticide could not be worked.

23. *Control of pests on onion.*—*Control of thrips*—*Thrips tabaci*.—Work on this pest at Coimbatore had indicated the remarkable efficacy of the BHC spray at 0.05 per cent and 0.1 per cent in controlling the pest. To confirm the efficacy of BHC sprays at 0.05 per cent and 0.1 per cent concentrations in controlling the thrips, the experiment was laid out in fairly big-sized observational plots for the first time on the station. A fair trial was given to DDT 0.1 per cent spray and BHC 5 per cent dust and compared with that of control (no insecticide). In the trial 25 lb. of dust and 100 gallons of spray fluid as dosage was adopted per acre. Only a single treatment was given for controlling the pest. The efficacy of the treatment was assessed on the basis of yields. The crop was planted on 18th December 1951. The insecticidal treatments were given on 29th January 1952. The results are furnished below in Table XL.

TABLE XL.—Control of onion thrips, 1951-52.

Serial number and treatment.	Yield per plot.	Area of the plot.	Yield per acre.	Percentage of control.
(1)	(2)	(3)	(4)	(5)
		CENTS.	LB.	
1 BHC 0.1 per cent spray	486	4	12,150	135.
2 BHC 0.05 per cent spray	442	4	11,050	123
3 BHC 5 per cent dust	445	4	11,125	124
4 DDT 0.1 per cent spray	426	4	10,650	118
5 Control (no insecticide)	60	2/3	9,000	100

An increase yield of 35 per cent was got by controlling the pest with BHC 0.1 per cent spray over the control. The result confirms the efficacy of BHC 0.1 per cent in controlling the pest.

VI. HINGARI JONNA SCHEME.

24. 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.

25. *Comparative trials.*—Eight promising cultures of the previous season were tried under comparative trials for the second time to assess their consistency in yield. The cultures were grouped in two sets based on their duration and tested against M. 47-3 and H-1, in short and long duration series respectively. The first set comprised of three late types (viz., N.D. 15, P.B. 3-R. and S.M.-1). In the second series five short duration cultures (viz., M. 35-1, M. 31-2, M. 9 S.I. 2, P.B. 2-R. and P.B. 10-R.) were included. The data gathered in this trial are furnished in Tables XLI and XLII.

TABLE XLI.—Comparative trial of irrigated Hingari jonna varieties—Set I.

Serial number and culture.	Acre yield in lb.		Per cent on control.		Shoot-borer fly counts, per cent of healthy seedlings.	Duration in days.
	Grain.	Straw.	Grain.	Straw.		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 P.B. 3 R.	704	3,854	140	95	61	121
2 N.D. 15	640	3,805	113	94	69	121
3 H. 1. (control)	569	4,044	100	100	61	121
4 S.M. 1	621	3,637	92	90	57	121
General mean	631	3,835	..	..	..	..
Standard error	68	175	..	..	2.6	..
Whether 'F' test	Not	Not	..	..	Not	..
satisfied	satisfied.	satisfied.	..	..	satisfied.	..
Critical difference at 5 per cent level	..	..	..	..	..	..

TABLE XLII.—Comparative trial of irrigated Hingari jonna varieties—Set II.

Serial number and culture.	Acre yield in lb.		Per cent on control.		Shoot-borer fly counts, per cent of healthy seedlings.	Duration in days.
	Grain.	Straw.	Grain.	Straw.		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 M. 35-1	1,576	2,957	130	93	61	116
2 M. 31-2	1,568	2,299	129	104	65	116
3 P.B. 2-R.	1,449	3,816	119	120	61	116
4 P.B. 10-R.	1,383	3,138	114	99	54	116
5 M. 9 S. I-2	1,247	3,349	103	107	67	116
6 M. 47-3 (control)	1,216	3,178	100	100	62	116
General mean	1,407	3,290	..	..	..	..
Standard error	130	248	..	..	2.5	..
Whether by 'F' test satisfied	Not	Not	..	..	Satisfied.	..
satisfied	satisfied.	satisfied.	..	..	..	..
Critical difference at 5 per cent level	..	..	..	..	7	..
Conclusions—						
Cholam fly counts—5, 2, (6), 1, 3, 4						

It is seen from the figures in Tables XLI and XLII that the results did not satisfy the statistical test for both the attributes, viz., grain and straw. In the second series, the percentage of healthy seedlings free from fly incidence was significantly lower in P.B. 10-R. than in the control M. 47-3.

26. *Bulk trials.*—A total of seventy-two promising cultures from bulk trials and non-replicated trials of the previous season were raised in six sets and in two series. In the first series, twenty-five short duration cultures were tried in two sets against 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. The results gathered in this experiment are furnished in Tables XLIII, XLIV, XLV, XLVI, XLVII and XLVIII.

TABLE XLIII.—Bulk trial of irrigated Hingari jonna varieties (Set IV).

Serial number and culture.	Acre yield in lb.		Per cent on control.		Shoot-borer fly counts, per cent of healthy seedlings.	Duration in days.
	Grain.	Straw. (dry.)	Grain.	Straw.		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 S.M. 109	1,743	5,277	152	85	57	112
2 S.M. 112	1,564	4,366	136	71	47	113
3 S.M. 110	1,434	5,010	125	81	57	120
4 S.M. 111	1,416	5,941	123	95	49	116
5 S.M. 119	1,307	5,851	114	95	49	110
6 S.M. 100	1,297	4,861	113	79	43	114
7 S.M. 113	1,208	3,387	105	55	53	113
8 S.M. 114	1,188	4,178	103	68	62	111
9 S.M. 120	1,178	5,614	102	90	51	111
10 M. 47-3	..	..	..	..	..	..
(control)	1,149	6,158	100	100	60	115
11 S.M. 121	1,119	4,267	97	69	60	112
12 S.M. 117	1,099	4,931	95	79	49	109
13 S.M. 104	1,069	5,337	93	85	60	112
14 S.M. 115	1,055	4,347	92	69	43	113
15 S.M. 118	1,000	4,188	87	68	51	111
16 S.M. 99	851	3,574	74	58	57	113
17 B.J.	703	4,267	61	69	45	114
General Mean	1,205	4,797	..	..	..	..
Standard error	138	463	..	..	4.88	..
Whether by 'F' test satisfied	Satisfied.	Satisfied.	..	..	Satisfied.	..
Critical difference 5 per cent level	380	1,287	..	..	..	..
Conclusion—						
Grain—1, 2, 3, 4, 5, 6, 7, 8, 9, (10), 11, 12, 13, 14, 15, 16, 17.						
Straw—(10), 4, 5, 9, 13, 1, 3, 12, 6, 2, 14, 11, 17, 15, 8, 16, 7.						

TABLE XLIV.—Bulk trial of irrigated Hingari jonna varieties (Set VI).

Year—1951-52.	Object of the trial—Varietal trial.
Nature of soil—Black.	Number of variants—Ten.
Irrigated or unirrigated—Irrigated.	System of layout—Randomized block design.
Number of irrigations—Four.	Number of replications—Four.
Rainfall during crop growth—5.07 inches.	Date of planting—18th September 1951.
Manures applied—Kind—Groundnut cake.	Period of harvest—January to February.
Rate—60 N. per acre.	Previous crop—Cambodia cotton.
Placement—Drilled before sowing.	Size of plot—
	Gross area—15' x 7' = 105 square feet.
	Net area—11' x 4' = 44 square feet.

Serial number and culture.	Acre yield in lb.		Per cent on control.		Shoot-borer fly counts. Per cent of healthy seedlings.	Duration in days.
	Grain.	Straw.	Grain.	Straw.		
1 S. M. 102	1,928	5,327	154	91	58	115
2 S. M. 106	1,505	4,371	123	84	62	116
3 S. M. 105	1,356	5,307	115	91	64	115
4 S. M. 108	1,257	5,782	107	100	65	116
5 J. 103	1,188	5,653	101	98	67	111
6 N. J. 314	1,188	4,950	101	86	72	116
7 M. 27-3 (control)	1,178	5,762	100	100	73	115
8 S. M. 101	990	5,990	82	103	59	113
9 J. 1962	792	5,356	67	93	64	111
10 S. M. 33	732	7,574	62	131	75	117
General Mean	1,208	5,657	..	..	..	..
Standard error	113	553	..	..	4.13	..
Whether 'F' test	satisfied.	Not Satisfied.	..	..	Not Satisfied.	..
Critical difference at 5 per cent level.	347	..	..	..	..	..
Conclusion—	Grain—1, 2, 3, 4, 5, 6, (7), 8, 9, 10.					

TABLE XLV.—Bulk trial of irrigated Hingari jonna varieties—Set I.

Year—1951-52.
Nature of soil—Black.
Irrigated or unirrigated—Irrigated.
Number of irrigations—Four.
Rain during the crop growth—5.07 inches.
Manures applied—
Kind—Groundnut cake.
Rate—60 N. per acre.
Placement—Drilled before sowing.
Object of trial—Varietal trial.

Number of variants—Ten.
System of layout—Randomised block design.
Number of replications—Four.
Date of planting—18th September 1951.
Period of harvest—January to February.
Previous crop—Cambodia cotton.
Size of plot—
Gross area—15' x 7' = 105 square feet.
Net area—11' x 4' = 44 square feet.

Serial number and culture.	Acre yield in lb.		Per cent on control.		Shoot-borer fly counts. Per cent of healthy seedlings.	Duration in days.
	Grain.	Straw.	Grain.	Straw.		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 S. M. 67	1,099	6,218	116	112	71	133
2 S. M. 144	1,069	5,455	113	93	72	122
3 S. M. 60	1,050	7,040	111	127	67	137
4 S. M. 141	1,050	4,693	111	84	65	120
5 A. S. 8110	1,000	6,950	105	124	68	122
6 H. 1. (control)	950	5,554	100	100	71	124
7 S. M. 69	871	6,406	92	115	65	126
8 S. M. 75	792	6,218	83	112	66	128
9 N. J.	713	4,733	75	85	85	119
10 S. M. 79	713	7,842	75	141	63	138
General Mean	931	6,111	..	..	..	..
Standard error	87	550	..	..	5.04	..
Whether 'F' test satisfied.	Satisfied.	Satisfied.	..	..	Satisfied.	..
Critical difference at 5 per cent level.	253	1,624	..	..	15	..
Conclusions—	Grain—1, 2, 3, 4, 5, (6), 7, 8, 9, 10.					
	Straw—10, 3, 5, 7, 1, 8, 6, 2, 9, 4.					
	Cholam fly counts—2, 1, (6) 5, 10, 3, 8, 4, 7, 9.					

TABLE XLVI.—Bulk trial of Irrigated Hingari Jonna varieties—Set I.

Year—1951-52.
Nature of soil—Black.
Irrigated or unirrigated—Irrigated.
Number of irrigations—Four.
Rainfall during crop growth—5.07 inches.
Manures applied—
Kind—Groundnut cake.
Rate—60 N. per acre.
Placement—Drilled before sowing.
Object of the experiment—Varietal trial.

Number of variants—Sixteen.
System of layout—Randomised block design.
Number of replications—Four.
Date of planting—18th September 1951.
Period of harvest—January to February.
Previous crop—Cambodia Cotton.
Size of plot—
Gross area—15' x 7' = 105 square feet.
Net area—11' x 4' = 44 square feet.

Serial number and culture.	Acre yield in lb.		Per cent on control.		Shoot-borer fly counts. Per cent of healthy seedlings.	Duration in days.
	Grain.	Straw.	Grain.	Straw.		
1 J. 756-1-3	1,050	5,970	204	86	63	129
2 J. 724-3-3-3	941	5,347	183	76	63	130
3 J. 756-1-1	693	6,337	135	90	66	130
4 J. 750-2-1	673	6,832	131	97	68	130
5 J. 720-4-3-2	634	5,277	123	76	60	132
6 J. 720-2-7-4	594	6,525	115	93	66	129
7 J. 720-2-7-6	564	6,633	110	96	69	130
8 H-1 Control	515	6,960	100	100	67	124
9 J. 720-4-8-1	505	7,183	98	103	68	130
10 J. 720-2-6-2	455	6,020	88	86	61	123
11 J. 720-2-7-2	406	5,792	79	83	63	130
12 J. 720-2-7-5	396	6,277	77	90	66	130
13 J. 720-4-4-2	386	5,515	75	79	61	130
14 J. 720-2-7-1	356	7,782	69	112	61	130
15 J. 720-2-7-3	347	7,406	67	106	64	129
16 J. 720-4-8-3	317	6,673	62	96	63	129
General mean	552	6,412	..	..	..	..
Standard error	72	526	..	..	2.61	..
Whether 'F' test satisfied ..	Satisfied.	Satisfied.	..	..	Not satisfied.	..
Critical difference at 5 per cent level.	208	1,455	..	..	..	..

Conclusions—

Grain—1, 2, 3, 4, 5, 6, 7, (8), 9, 10, 11, 12, 13, 14, 15, 16.

Straw—14, 15, 9, (8), 4, 7, 16, 6, 3, 12, 10, 1, 11, 13, 2, 5.

TABLE XLVII.—Bulk trial of irrigated Hingari jonna varieties—Set III.

Year—1951-52.
Nature of soil—Black.
Irrigated or unirrigated—Irrigated.
Number of irrigations—Four.
Rainfall during crop growth—5.07 inches.
Manures applied—
Kind—Groundnut cake.
Rate—60 N. per acre.
Placement—Drilled before sowing.
Object of the trial—Varietal trial.

Variants—Twelve.
System of layout—Randomized block design.
Replications—Four.
Date of planting—18th September 1951.
Period of harvest—January to February.
Previous crop—Cambodia cotton.
Size of plot—
Gross area—15' x 7' = 105 square feet.
Net area—11' x 4' = 44 square feet.

Serial number and culture.	Acre yield in lb.		Per cent on control.		Shoot-borer fly counts. Per cent of healthy seedlings.	Duration in days.
	Grain.	Straw. (dry.)	Grain.	Straw.		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 P.B. 7 R.	1,347	5,168	148	98	62	119
2 P.B. 8 R.	1,158	4,327	127	81	66	119
3 A.S. 8373	941	2,248	103	42	55	111
4 H. 1 (Control)	917	5,307	100	100	73	124
5 S.M. 170	762	6,079	84	115	68	124
6 S.M. 169	752	6,198	83	116	67	127
7 S.M. 171	752	6,455	83	123	62	128
8 S.M. 153	713	5,881	78	111	67	134
9 S.M. 172	653	5,515	72	104	67	125
10 S.M. 168	624	5,812	68	109	73	132
11 S.M. 166	594	6,238	65	117	74	121
12 S.M. 152	574	6,891	63	130	73	127
General mean	815	5,510	..	..	..	..
Standard error	120	587	..	..	..	..
Whether 'F' test satisfied.	Satisfied.	Satisfied.	..	..	..	Not satisfied.
Critical difference at 5 per cent level.	337	1,703	..	..	..	..

Conclusions—

Grain—1, 2, 3, (4) 5, 6, 7, 8, 9, 10, 11, 12.

Straw—12, 7, 11 6, 5, 8, 10, 9, (4), 1, 2, 3.

TABLE XLVIII.—Bulk trial of irrigated Hingari jonna varieties—Set V.

Year—1951-52.
Nature of soil—Black.
Irrigated or unirrigated—Irrigated.
Number of irrigations—Four.
Rainfall during crop growth—5.07 inches.
Manures applied—
Kind—Groundnut cake.
Rate—60 N. per acre.
Placement—Drilled before sowing.
Object of the trial—Varietal trial.

Variants—Thirteen.
System of layout—Randomized block design.
Replications—Four.
Date of planting—18th September 1951.
Period of harvest—January to February.
Previous crop—Cambodia cotton.
Size of plot—
Gross area—15' x 7' = 105 square feet.
Net area—11' x 4' = 44 square feet.

Serial number and culture.	Acre yield in lb.		Per cent on control.		Shoot-borer fly counts.	Duration in days.
	Grain.	Straw.	Grain.	Straw.	Per cent of healthy seedlings.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 S.M. 65	1,871	5,446	155	71	66	127
2 A.S. 8002	1,248	6,554	102	87	55	114
3 H. 1 (control)	1,208	7,644	100	100	63	124
4 S.M. 142	1,069	5,941	88	78	78	119
5 S.M. 143	693	7,545	57	99	73	122
6 S.M. 70	683	9,802	56	129	74	142
7 S.M. 77	604	8,287	50	109	63	139
8 S.M. 64	584	8,911	48	117	63	138
9 A.S. 8001	505	5,188	42	68	66	116
10 S.M. 68	475	7,376	39	97	65	136
11 S.M. 72	475	7,812	39	103	71	127
12 S.M. 63	406	9,782	34	129	68	134
13 S.M. 78	376	8,673	31	114	73	135
General mean	784	7,612	..	..	..	..
Standard error	171	718	..	..	4.30	..
Whether 'F' test satisfied.	Satisfied.	Satisfied.	..	..	Not satisfied.	..
Critical difference at 5 per cent level.	476	1,980	..	..	..	..
Conclusions—						
Grain—1, 2, (3), 4, 5, 6, 7, 8, 9, 10, 11, 12, 13.						
Straw—6, 12, 8, 13, 7, 11, (3), 5, 10, 2, 4, 1, 9.						

In the short duration series, out of the twenty-five cultures tested, only three cultures (viz., S.M. 102, S.M. 109 and S.M. 112) have been found to be significantly superior grain yielders, while as many as nineteen cultures are classed as equals to the standard M. 47-3. In straw yields, none of the cultures out-yielded the control, but only seven of them proved as equals.

Among the forty-seven late-cultures tested against H. 1 in the second series, only four cultures (viz., J. 756-1-3, J. 724-3-3, P.B. 7 R. and S.M. 65) have registered significantly superior grain yields, while as many as thirty-two cultures equalled the control. Regarding straw yields, three cultures, viz., S.M. 69, S.M. 70 and S.M. 79 proved their superiority, while thirty-nine cultures could be classified as equals to the standard.

27. Progeny row studies.—Forty-one promising selections carried forward from the generations of crosses were sown under replicated rows to test their performance. The strain M. 47-3 was included as the standard for comparison. The results gathered in this trial are furnished in Table XLIX.

TABLE XLIX.—Progeny row studies of Hingari jonna cultures.

Year—1951-52.
Nature of soil—Black.
Irrigated or unirrigated—Irrigated.
Number of irrigations—Four.
Rainfall during crop growth—5.07 inches.
Manures applied—Groundnut cake at 60 N per acre.
Placement—Drilled prior to sowing.

Object of the experiment—Yield comparison of selections.
Number of variants—Forty-two.
System of layout—Replicated and randomised.
Number of replications—Three.
Date of planting—18th September 1951.
Date of harvest—28th February 1952.
Previous crop—Cambodia cotton.
Net area—15' x 1'-1" = 16½ square feet.

Serial number and culture.

	Acre yield in lb.		Per cent on control.	
	Grain.	Straw.	Grain.	Straw.
(1)	(2)	(3)	(4)	(5)
1 C. 85-A-2	1,375	5,575	177	117
2 C. 70-1	1,225	4,900	158	103
3 C. 42-5	1,225	4,150	158	87
4 C. 85-A-7	1,000	3,150	129	67
5 C. 42-2	975	6,150	126	129
6 C. 85-B-3	925	2,750	119	58
7 C. 85-A-12	900	4,000	116	84
8 C. 61-6	875	5,750	113	121
9 C. 62-4	825	7,150	106	151
10 C. 85-A-6	800	5,500	103	116
11 M. 47-3-Control	775	4,750	100	100
12 C. 85-A-4	750	4,400	97	93
13 C. 85-A-5	700	5,000	90	105
14 C. 85-B-8	700	5,000	90	105
15 C. 70-3	700	7,400	90	156
16 C. 85-A-1	675	4,650	87	98
17 C. 70-2	675	4,150	87	87
18 C. 42-4	625	4,250	80	89
19 C. 42-1	600	4,900	77	103
20 C. 61-7	550	7,075	71	149
21 C. 85-A-11	550	5,325	71	112
22 C. 85-A-3	550	4,075	71	86
23 C. 62-3	525	8,325	68	175
24 C. 62-1	500	7,500	65	158
25 C. 70-4	500	6,150	65	129
26 C. 62-5	500	6,325	65	133
27 C. 61-1	500	7,150	65	151
28 C. 62-8	475	6,575	61	138
29 C. 85-B-11	475	5,750	61	121
30 C. 85-A-10	475	6,750	61	142
31 C. 42-6	450	4,750	58	100
32 C. 62-2	450	7,650	58	163
33 C. 85-A-8	425	4,150	55	87
34 C. 42-3	425	3,500	55	74
35 C. 85-A-9	400	5,075	52	107
36 C. 85-B-4	400	3,325	52	70
37 C. 61-4	400	3,825	52	80
38 C. 85-B-1	375	7,500	48	158
39 C. 61-2	375	4,000	48	84
40 C. 61-5	350	8,325	45	175
41 C. 85-B-2	350	4,150	45	87
42 C. 61-3	325	6,650	42	140
General mean	635	5,416	..	..
Standard error	188	875	..	..
Whether 'F' test satisfied	Satisfied.	Satisfied.	..	..
Critical difference at 5 per cent level.	500	2,450	..	..
Conclusion.—				
Grain—(i) C. 85-A-2 superior to M. 47-3 control.				
(ii) All the rest are equal to control.				
Straw—(i) Six cultures—C. 61-5, C. 62-1, C. 62-2, C. 62-3, C. 70-3 and C. 85-B-1 are superior to control.				
(ii) All the rest are equal to control.				

It is seen from the yield data that only one selection, viz., C. 85-A-2 has registered significantly higher grain yield than the control and all the rest were found to be equals. Six cultures (viz., C. 61-5, C. 62-1, C. 62-2, C. 62-3, C. 70-3 and C. 85-B-1) proved statistically superior to M. 47-3 in respect of straw yield, while all the rest were classified as equals.

28. *Hybrid studies.*—All the selected hybrid progenies of the last season were raised in non-replicated plots to study their genetic behaviour and resistance status in their subsequent generations. The following Table L gives the details of the crosses sown:—

TABLE L.—Study of jonna Hybrid progenies during 1951-52.

Serial number and filial generation in 1951-52.	Number of single plants raised.			Number of single plants selected.		
	Number of combinations involved.			Number of combinations involved.		
(1)	(2)			(3)		
1 F. 1	63/38			19/11		
2 F. 2	112/17			40/7		
3 F. 3	94/21			23/8		
4 F. 4	80/5			18/3		
5 F. 6	33/4			72/12		
Total ..	382/85			172/41		

In addition to the above, 184 new crosses comprising of 36 combinations were effected of which 143 crossed earheads involving 33 combinations were secured during the year.

The selected cultures from F. 4 and F. 6 generations will be further studied under compact family blocks during the coming season.

29. *Trial of new types.*—A total of 83 types comprising of 56 types from Bellary district, 21 from Kurnool district and 6 from Anantapur district were raised in non-replicated plots with H. 1 as control to study their suitability for the project conditions. Of these, only 37 cultures have registered higher grain yields than the standard. The data pertaining to these promising cultures are listed in Table LI.

TABLE LI.—List of promising jonna cultures selected from non-replicated trials.

1 Year—1951-52.	7 Object of the experiment—To study the suitability and yield.
2 Nature of soil—Black.	8 Number of variants—Eighty-three tested.
3 Irrigated or unirrigated—Irrigated.	9 System of layout—Non-replicated.
4 Number of irrigations—Four.	10 Number of replications—Nil.
5 Rainfall during crop growth—5.07".	11 Date of planting—19th September 1951.
6 Manures applied—	12 Date of harvest—27th February 1952.
Kind—Groundnut cake.	13 Previous crop—Cambodia cotton.
Rate—60 N per acre.	14 Size of plot—Net area—15' x 34' : 52.5 sq. ft.
Placement—Drilled prior to sowing.	

Serial number and culture.	Acre yield in lb.		Per cent on control.		Origin.
	Grain.	Straw.	Grain.	Straw.	
(1)	(2)	(3)	(4)	(5)	(6)
1 S.M. 207	1,511	4,736	378	115	Bellary.
2 S.M. 215	1,356	1,992	339	49	Do.
3 S.M. 210	1,175	2,050	295	51	Do.
4 S.M. 201	1,020	2,810	255	68	Do.
5 S.M. 212	1,020	2,099	255	51	Do.
6 S.M. 247	826	3,116	207	76	Kurnool.
7 S.M. 209	813	2,678	203	16	Bellary.
8 S.M. 197	762	4,198	191	602	Do.
9 S.M. 204	762	1,240	191	29	Do.

Serial number and culture.	Acre yield in lb.		Per cent on control.		Origin.
	Grain.	Straw.	Grain.	Straw.	
(1)	(2)	(3)	(4)	(5)	(6)
10 S.M. 205	749	2,140	187	51	Bellary.
11 S.M. 214	697	2,165	174	54	Do.
12 S.M. 221	684	2,115	171	51	Do.
13 N.J. 16	649	1,726	162	41	Kurnool.
14 S.M. 202	645	2,033	161	49	Bellary.
15 S.M. 211	645	2,215	161	54	Do.
16 S.M. 217	645	2,537	161	61	Do.
17 S.M. 216	633	2,348	158	56	Do.
18 S.M. 203	620	1,744	155	41	Do.
19 S.M. 235	620	2,645	155	63	Kurnool.
20 S.M. 236	620	2,256	155	56	Do.
21 S.M. 200	593	1,579	148	39	Bellary.
22 S.M. 244	593	3,455	148	85	Kurnool.
23 S.M. 213	581	1,711	145	41	Bellary.
24 S.M. 187	530	4,537	133	110	Do.
25 S.M. 220	530	2,438	133	259	Do.
26 S.M. 186	503	4,198	126	102	Do.
27 S.M. 184	490	4,471	123	110	Do.
28 S.M. 219	490	1,628	123	39	Do.
29 S.M. 206	478	2,281	120	56	Do.
30 S.M. 246	478	3,083	120	76	Kurnool.
31 S.M. 198	465	1,653	116	41	Bellary.
32 S.M. 199	465	2,050	116	51	Do.
33 S.M. 248	465	2,504	116	61	Kurnool.
34 N.J. 6	434	1,619	109	39	Do.
35 S.M. 233	426	2,198	107	54	Do.
36 S.M. 226	413	4,769	103	117	Anantapur.
37 S.M. 249	413	2,975	103	73	Kurnool.
38 H-1-Control	400	4,056	100	100	Bellary.
General mean	663	2,633	..	..	..

The yield of the control used (i.e.) H. 1 being low, the per cent of increases recorded by the superior cultures have gone up to three folds in some cases. These cultures will be retried in replicated plots in the coming season. The promising cultures comprised of 26 types from Bellary district, ten from Kurnool district and one from the district of Anantapur.

30. *Cholam shoot-borer fly resistance studies.*—Forty sorghum types comprising of provincial, extra-provincial and foreign origin received from the Millet Specialist, Coimbatore, were raised in non-replicated rows along with M. 47-3 and H. 1 as standards to study their resistance to 'Atherigona indica' under irrigated conditions. To start with, germination was quite satisfactory in all the cultures. The cultures were examined in detail for the cholam shoot-borer fly 'Atherigona indica' and the fly counts were recorded weekly up to the end of fourth week, when the activities of the fly ceases. The varieties were grouped into four grades based on

the per cent of healthy seedlings recorded in the respective types. The data gathered are furnished in Table LII.

TABLE LII.—Cholam shoot-borer fly-counts.

Serial number.	Per cent of healthy seedlings.							
	Grade I.		Grade II.		Grade III.		Grade IV.	
	(Highly resistant 80 per cent to 100 per cent.)		(Resistant 60 to 80 per cent.)		(Susceptible 40 to 60 per cent.)		(Highly susceptible below 40 per cent.)	
	Culture.	Origin.	Culture.	Origin.	Culture.	Origin.	Culture.	Origin.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	Co. 7	Coimbatore	Co. 2	Coimbatore	Co. 13	Coimbatore	A.S. 3437	Central Province.
2	Co. 8	Do.	Co. 3	Do.	Co. 15	Do.	A.S. 4109	Do.
3	Co. 12	Do.	Co. 6	Do.	Co. 16	Do.	A.S. 4168	N. Rhodesia.
4	H. 1	Hagari (Bellary).	Co. 9	Do.	A.S. 224	Adoni	A.S. 4190	Do.
5	..	..	Co. 14	Do.	A.S. 4003	Tanganyika	A.S. 4255	Bihar.
6	..	..	M. 47-3	Bombay	A.S. 4103	Central province.	A.S. 4537	Kane Nigeria.
7	..	..	A.S. 244	Kudligi (Bellary).	A.S. 4116	Do.	A.S. 4552	Nigeria.
8	..	..	A.S. 3998	Kew	A.S. 4135	N. Rhodesia	A.S. 5835	N. Rhodesia.
9	..	..	A.S. 4130	N. Rhodesia.	A.S. 4135	Do.	..	..
10	..	..	A.S. 5779	Burma	A.S. 4291	North Arcot	..	..
11	..	..	..	..	A.S. 4538	Kane N. geria	..	..
12	..	..	..	..	A.S. 4610	Tanganyika	..	..
13	..	..	..	..	A.S. 4627	Do.	..	..
14	..	..	..	..	A.S. 4635	Do.	..	..
15	..	..	..	..	A.S. 4695	Ganzam	..	..
16	..	..	..	..	A.S. 5466	Tanganyika	..	..
17	..	..	..	..	A.S. 5785	Paramakudi	..	..
18	..	..	..	..	A.S. 6187	Kenya	..	..
19	..	..	..	..	A.S. 76.8	Belgian Congo	..	..
20	..	..	..	..	A.S. 8155	Madura	..	..

It is seen from the table that only three type, viz., Co. 7, Co. 8 and Co. 12 are put under grade I including their high resistance status to the cholam fly, as many as nine types qualify themselves for grade II connoting their tolerance capacity towards the fly and the rest were classified under grades III and IV, which succumbed to the ravages of the fly pest to varying degrees. The crop growth in this experiment was rather poor in most of the cultures. The cultures that are found to be highly resistant and tolerant to *Atherigona* flies will be retried under replicated plots for studying their yielding capacity in the coming season.

31. *Large-scale trials on the farm.*—Three promising types, viz., N.D. 15, M. 9, S. 1-2 and H. 1 that have put in a good record in the breeding area for the past four seasons were sown in plots of 15 cents each. Co. 9 was also raised in the same field for comparing the intensity of fly incidence in the types. The crop came up well and there were no pests and diseases excepting the fly pest in the early stages. The plots being adjacent to the sugarcane area, damage by birds was very severe and consequently the grain yields were so poor that only straw yields were recorded. These will be retried in the coming season in a suitable area.

32. *Rainfed trials.*—The two standard strains, viz., M. 47-3 and H-1 were raised as bulks in the rainfed blocks to have a comparative yield data along with the irrigated crop. This year, rainfed crops in general failed completely and Hingari Jonna was the worst sufferer. The yields recorded on the farm in the bulk plots under rainfed and irrigated conditions are given in Table LIII.

TABLE LIII.

Serial number and varieties.	Area of the plot.	Acre yields in lb.		Area of the plot.	Irrigated area.	
		Rainfed area.			Grain.	Straw.
		Grain.	Straw.			
1 M. 47-3	0.59	108	488	0.04	1,181	5,033
2 H-1	0.64	57	1,190	0.04	831	5,902

It is seen from the above figures that a short duration type has given better grain yields than the late one H-1. This year's results confirm the previous findings, that in years of low rainfall, like the one under review, growing of short duration types will be more profitable than the long-duration varieties. The season being very adverse, the irrigated yields were also far below normal. Nevertheless, the wide disparity seen in the yields between the rainfed and irrigated crops in a year of poor rainfall clearly marks out the great benefit conferred by the irrigation projects on the peasant populace. Thus, it can be concluded that the ill effects of famine can be largely mitigated with the advent of irrigation in the regions less favoured by the monsoons.

33. *Miscellaneous.*—Eight types from Tenkasi were tried in the Hingari season of 1950-51 and their performance was poor, they being highly susceptible to the cholam shoot-borer fly *Atherigona indica*. These types were retired in non-replicated plots during the late season of 1951-52 in the breeding area. They were also given a trial in the Mungari season of 1952 to see whether they can fare well in the early season, when the fly incidence is low. These cultures were raised in non-replicated plots of about four cents each with Co. 9 as the standard. The performance of the Tenkasi type both in the early and late seasons is furnished in Table LIV.

TABLE LIV.—Performance of Tenkasi types on the Agricultural Research Station, Sirugappa, 1951-52.

Serial number.	Culture.	Mungari (June to September).						Hingari (September to February).					
		Acre yield in lb.		Per cent on control.		Cholam fly counts.	Acre yield in lb.		Per cent on H-1.		Per cent on Co. 9.		Cholam fly counts.
		Grain.	Straw.	Grain.	Straw.		Grain.	Straw.	Grain.	Straw.			
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1	A.S. 8356 ..	2,444	5,556	138	103	100	477	2,276	78	74	170	111	50
2	A.S. 8360 ..	1,655	4,069	94	97	96	869	2,473	143	81	310	115	56
3	A.S. 8362 ..	1,586	5,142	90	100	96	574	1,542	94	43	205	75	48
4	A.S. 8363 ..	1,611	6,472	91	126	96	335	1,884	55	61	120	92	20
5	A.S. 8364 ..	1,833	8,166	104	159	98	598	2,276	98	74	212	110	30
6	A.S. 8369 ..	2,277	6,111	129	118	98	596	756	96	26	212	37	46
7	A.S. 8373 ..	2,333	6,138	132	119	100	591	1,785	97	56	211	87	40
8	A.S. 8378 ..	2,500	7,278	141	142	98	461	1,109	75	35	165	54	44
9	Co. 9 (control)	1,767	5,142	100	100	96	280	2,050	..	..	100	100	51
10	H. 1 (control)	..	..	..	..	..	609	3,149	100	100	..	..	51

The following inference can be drawn from the results:—(a) In the Mungari season, five types (viz., A.S. 8364, A.S. 8369, A.S. 8373, A.S. 8376 and A.S. 8378) have out-yielded the control. Co. 9 in grain as well as straw, the increases ranged from 29 to 41 and from 8 to 59 per cent respectively. (b) In the late season trials, two standards, viz., Co. 9 and H-1 have been provided. Co. 9 being highly susceptible to the fly, while the standard H-1, being fairly tolerant to the fly pest. Taking Co. 9 as the control, all the eight types were found to be superior to the control in grain, while only three of them (viz., A.S. 8360, A.S. 8364 and A.S. 8376) proved to be superior straw yielders. (c) Only one type, viz., A.S. 8360 has registered higher grain yield than H-1, while none could complete it in straw yield. Thus, it can be said that the Tenkasi types are more suited for early cropping than for the late season.

VII. KORRA TRIALS.

34. *Object.*—The improvement of korra crop has been newly added to the breeding work at this station this year. The main object is to explore the possibilities of improving the present values of the strain N. 1 in more than one direction, such as yield, duration, etc.

35. Preliminary trials on a small-scale were conducted during 1949-50 and 1950-51. The selections found promising were tested under replicated trials during 1951-52.

36. *Bulk trials.*—Twenty cultures, which were tried last year were again tested, during this season with N-1 as the standard. These cultures were suitably grouped into two sets based on their previous performance. Set I comprised of thirteen cultures, which have out-yielded the control, while the cultures included in Set II had yield levels of lower order but they were above the general mean. The results gathered in this experiment are furnished in Tables LV and LVI.

TABLE LV.—Bulk trials of Korra cultures (Set I).

1 Year—1951-52.	8 Number of variants—Fourteen.
2 Nature of soil—Black.	9 System of layout—Randomized block design.
3 Irrigated or unirrigated—Irrigated.	10 Number of replications—Four.
4 Number of irrigations—Two.	11 Date of planting—26th June 1951.
5 Rainfall during crop growth—9.10".	12 Period of harvest—September to October.
6 Manures applied—	13 Previous crop—Cambodia cotton.
Kind—Groundnut cake.	14 Size of plot—
Rate—40 N per acre.	Gross area—15' x 8' = 120 sq. ft.
Placement—Drilled prior to sowing.	Net area—11' x 4.5' = 49.5 sq. ft.
7 Object of the experiment—Varietal trial.	

Serial number and culture.	Acre yield in lb.		Per cent on control.		Duration in days.
	Grain.	Straw.	Grain.	Straw.	
(1)	(2)	(3)	(4)	(5)	(6)
1 K. 123	2,123	3,061	132	99	89
2 N. 1. Control	1,614	3,096	100	100	90
3 K. 140	1,597	3,149	99	102	90
4 K. 141	1,474	1,746	91	56	82
5 K. 6'	1,447	1,711	90	55	83
6 K. 150	1,421	2,140	88	69	80
7 K. 92-10	1,333	2,342	83	76	83
8 K. 92	1,254	1,763	78	57	82
9 K. 54	1,237	1,877	77	61	79
10 K. 92-2	1,132	2,596	70	84	84
11 K. 132-5	1,097	1,982	68	64	84
12 K. 114	1,088	2,447	67	79	82
13 K. 66	1,088	2,360	67	76	88
14 K. 40	1,000	1,561	62	50	81
General mean	1,350	2,274	..	..	..
Standard error	156	189	..	..	..
Whether 'F' test satisfied.	Satisfied.	Satisfied.	..	..	..
Critical difference at 5 per cent level.	434	523	..	..	..

Conclusion—

Grain—1, (2), 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14.

Straw—3, (2), 1, 10, 12, 13, 7, 6, 11, 9, 8, 4, 5, 14.

TABLE LVI.—Bulk trials of Korra cultures (Set II).

1 Year—1951-52.	8 Number of variants—Eleven.
2 Nature of soil—Black.	9 System of layout—Randomized block design.
3 Irrigated or unirrigated—Irrigated.	10 Number of replications—Four.
4 Number of irrigations—Two.	11 Date of planting—26th June 1951.
5 Rainfall during crop growth—9.10".	12 Period of harvest—September to October.
6 Manures applied—	13 Previous crop—Cambodia cotton.
Kind—Groundnut cake.	14 Size of plot—
Rate—40 N. per acre.	Gross area—15' x 8' = 120 sq. ft.
Placement—Drilled prior to sowing.	Net area—11' x 4.5' = 49.5 sq. ft.
7 Object of the experiment—Varietal trial.	

Serial number and culture.	Acre yield in lb.		Per cent on control.		Duration in days.
	Grain.	Straw.	Grain.	Straw.	
(1)	(2)	(3)	(4)	(5)	(6)
1 K. 113	1,427	2,661	132	102	93
2 K. 122	1,334	2,254	123	86	91
3 K. 131	1,220	2,000	112	77	84
4 N. 1. control	1,085	2,610	100	100	90
5 K. 94	1,025	1,627	94	62	79
6 K. 96	942	1,356	87	52	80
7 K. 61	805	1,915	74	73	82
8 K. 76	797	1,492	73	57	80
9 K. 94-1	783	2,051	72	79	79
10 K. 57	695	2,000	64	77	82
11 K. 95	469	1,203	43	46	81
General mean	962	1,924	..	..	..
Standard error	147	227	..	..	..
Whether 'F' test satisfied,	Satisfied.	Satisfied.	..	..	..
Critical difference at 5 per cent level.	425	654	..	..	..
Conclusion—					
Grain—1, 2, 3, (4), 5, 6, 7, 8, 9, 10, 11.					
Straw—1, (4), 2, 9, 3, 10, 7, 5, 8, 6, 11.					

In set I, among the thirteen cultures under test, only one culture, viz., K. 123 has registered significantly superior grain yield over the control and seven of them were found as equals. In the case of straw, these cultures, viz. (K. 140, K. 123 and K. 92-2) were found as equal. It was also observed that barring K. 123 and K. 140 all the rest were earlier in duration by about a week than the control.

In set II, excepting the culture K. 95, the rest were equal grain yielders, while only five of them proved equal to the standard in straw, yield and thus none of them were superior to N. 1 in this trial.

37. *Row yield trials.*—A total of 85 promising cultures selected from non-replicated observation plots of last year were grouped in three sets based on their previous year's yield levels and raised in replicated rows with N. 1. as the standard to test their yield performance. The data gathered in these trials are furnished in Tables LVII, LVIII, and LIX.

TABLE LVII.—Row yield trials of korra cultures (Set I).

1 Year—1951.	7 Object of the experiment—To compare their yields.
2 Nature of soil—Black.	8 Number of variants—Forty-three.
3 Irrigated or unirrigated—Irrigated.	9 System of layout—Randomized block design.
4 Number of irrigations—Two.	10 Number of replications—Three.
5 Rainfall during crop growth—9.10".	11 Date of planting—27th June 1951.
6 Manures applied—	12 Period of harvest—September to October.
Kind—Groundnut cake.	13 Previous crop—Cambodia cotton.
Rate—40 N. per acre.	14 Size of plot—
Placement—Drilled prior to sowing.	Net—15' x 1.13' = 16.95 sq. ft.

Serial number and culture.	Acre yield in lb.		Per cent on control.		Duration in days.
	Grain.	Straw.	Grain.	Straw.	
(1)	(2)	(3)	(4)	(5)	(6)
1 K. 211	1,513	3,154	126	105	90
2 K. 256	1,513	3,102	126	103	90
3 K. 199	1,333	3,026	111	101	90
4 K. 225	1,333	2,821	111	94	90
5 K. 244	1,333	2,974	111	99	88
6 K. 159	1,256	3,026	104	101	91
7 K. 208	1,256	2,333	104	78	88
8 K. 170	1,231	2,462	102	82	91
9 K. 252	1,231	2,333	102	78	88
10 N. 1. Control	1,205	3,000	100	100	89
11 K. 194	1,154	2,589	96	86	91
12 K. 188	1,128	2,589	94	86	91
13 K. 180	1,128	2,333	94	78	90
14 K. 92-5-1	1,103	3,026	92	101	95
15 K. 222	1,103	3,000	92	100	88
16 K. 176	1,077	2,641	89	88	88
17 K. 223	1,077	2,641	89	88	91
18 K. 221	1,077	2,667	89	89	89
19 K. 258	1,077	2,744	89	91	90
20 K. 92-7-1	1,051	2,564	87	85	91
21 K. 171	1,051	1,949	87	65	90
22 K. 177	1,051	2,487	87	83	90
23 K. 228	1,051	2,664	87	85	89
24 K. 257	1,026	2,795	85	93	90
25 K. 200	1,000	2,795	83	93	91
26 K. 216	1,000	2,462	83	82	89
27 K. 140-2	974	2,641	81	88	90
28 K. 260	949	2,564	79	85	89
29 K. 157	949	2,615	79	87	90
30 K. 122-5	923	2,436	77	81	91
31 K. 142-2	897	2,905	74	74	90
32 K. 164	897	2,872	74	96	94
33 K. 212	897	2,667	74	89	90
34 K. 266	897	2,831	74	94	90
35 K. 151-2	872	1,514	72	50	90
36 K. 154-1	872	3,077	72	103	91
37 K. 209	793	1,461	66	49	87
38 K. 140-1	769	2,436	64	81	90
39 K. 201	667	3,333	55	111	90
40 K. 131-2	641	2,831	53	94	90
41 K. 206	513	4,077	43	136	90
42 K. 193	461	2,487	38	83	91
43 K. 158	436	2,102	36	70	91
General mean	1,018	2,556	..	..	..
Standard error	133	321	..	..	..
Whether 'F' test satisfied,	Satisfied.	Satisfied.	..	..	..
Critical difference at 5 per cent level,	385	897	..	..	..

Conclusion—
 Grain—(a) Numbers 1 to 36 are equal to N. 1. (b) Rest are inferior to control.
 Straw—(a) Number 41 is superior to N. 1. (b) Numbers 21, 25 and 37 are inferior to N. 1. and (c) the rest are equal to the standard.

TABLE LVIII.—Row yield trials of korra cultures (Set II).

Serial number and culture.	Acre yield in lb.		Percent on control.		Duration in days.
	Grain.	Straw.	Grain.	Straw.	
(1)	(2)	(3)	(4)	(5)	(6)
1 K. 156	1,871	3,194	101	109	88
2 N. 1. control	1,846	2,923	100	100	90
3 K. 173	1,743	2,707	94	91	88
4 K. 183	1,641	3,051	89	104	86
5 K. 120-2	1,641	3,025	89	103	92
6 K. 187	1,615	3,092	87	106	89
7 K. 219	1,538	3,282	83	112	91
8 K. 151-1	1,437	2,092	81	72	84
9 K. 122-4	1,487	3,648	81	125	87
10 K. 150-3	1,461	2,341	79	80	83
11 K. 192	1,435	2,820	78	96	89
12 K. 131-3	1,410	3,102	76	106	87
13 K. 172	1,410	2,400	76	82	89
14 K. 189	1,410	2,443	76	83	87
15 K. 160	1,384	2,820	75	96	88
16 K. 196	1,359	2,435	74	83	88
17 K. 203	1,205	2,692	65	92	88
18 K. 202	1,205	2,835	65	97	88
19 K. 186	1,153	3,059	62	104	88
20 K. 196	1,153	3,066	62	105	92
21 K. 217	1,100	2,494	60	85	85
22 K. 150-2	1,051	2,246	57	76	86
23 K. 181	1,025	2,905	56	99	87
24 K. 229	1,000	2,007	54	69	88
25 K. 205	948	2,794	51	95	92
26 K. 142-1	948	2,697	51	89	87
27 K. 139-1	897	2,084	48	71	89
28 K. 220	743	2,415	40	83	83
29 K. 182	693	2,502	37	86	88
General mean	1,306	2,724	..	..	..
Standard error	208	1,663	..	..	..
Whether 'F' test satisfied,	Satisfied.	Not satisfied.	..	..	..
Critical difference at 5 per cent level,	582	..	..	..	..
Conclusion—	Grain.—1, (2), 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29.				

N.B.—Bars in relation to control only are shown for the sake of clarity.

TABLE LIX.

1 Year—1951.	8 Number of variants—Sixteen.
2 Nature of soil—Black.	9 System of layout—Randomised block design
3 Irrigated or unirrigated—Irrigated.	10 Number of replications—Three.
4 Number of irrigations—Two.	11 Date of planting—27th June 1951.
5 Rainfall during crop growth—9.10"	12 Period of harvest—September to October
6 Manures applied—	13 Previous crop—Cambodia cotton.
Kind—Groundnut cake.	14 Size of plot—
Rate—40 N. per acre.	Net area—15' X 1.13': 16.95 sq. ft.
Placement—Drilled prior to sowing.	
7 Object of the experiment—Yield comparison of selections.	

Serial number and culture.	Acre yield in lb.		Percent on control.		Duration in days.
	Grain.	Straw.	Grain.	Straw.	
(1)	(2)	(3)	(4)	(5)	(6)
1 K. 191	1,308	2,718	121	107	90
2 K. 169	1,179	2,333	109	92	90
3 K. 175	1,128	2,051	105	81	90
4 K. 162	1,077	2,179	100	86	90
5 N. 1 control	1,077	2,538	100	100	90
6 K. 165	949	2,564	88	101	88
7 K. 178	949	2,359	88	93	89
8 K. 163	872	1,846	81	73	88
9 K. 184	872	2,205	81	87	90
10 K. 166	846	2,385	79	94	88
11 K. 167	769	2,128	71	84	89
12 K. 174	718	2,538	67	100	89
13 K. 185	718	2,205	67	87	90
14 K. 161	692	1,590	64	63	88
15 K. 168	692	2,769	64	109	90
16 K. 190	590	2,051	55	81	88
General mean.	902	2,279	..	..	..
Standard error	69	251	..	..	..
Whether 'F' test satisfied.	Satisfied	Not satisfied	..	..	..
Critical difference at 5 per cent level.	205	..	..	..	..

Conclusion—

Grain.—1, 2, 3, 4, (5), 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16.

N.B.—Bars in relation to control only are shown for the sake of clarity.

It is seen from the figures given in Table LVII that barring the last seven cultures, the rest equal to the standard N. 1 in grain yield. Only K. 206 has registered a significantly superior straw yield over the control. While 38 of the cultures under test were found to be equal straw yielders.

In set II, the yield differences between the cultures were found to be statistically significant only for grain. It is seen that as many as fifteen of them have been classed as statistical equals to the control in grain yields.

In the third set also, the yield differences between the cultures proved significant only in the case of grain. The culture K. 191 has proved to be significantly a superior grain yielder than N. 1. While the succeeding seven cultures come under the category of statistical equals to the standard.

38. *Non-replicated trials.*—One hundred and sixty-seven cultures were raised in non-replicated rows of observation and selection with N. 1 as the standard. This trial comprised of reselection made last year from the bulk crops on the farm and selections carried forward from the previous season. The data gathered in this experiment revealed that 45 cultures as promising ones and their performance are given in Table LX.

TABLE LX.

1 Year—1951.
2 Nature of soil—Black.
3 Irrigated or unirrigated—Irrigated.
4 Number of irrigations—Two.
5 Rainfall during crop growth—9.10".
6 Manures applied—
Kind—Groundnut cake.
Rate—40 N. per acre.
Placement—Drilled prior to sowing.

7 Object of the experiment—To test the yields.
8 Number of variants—Forty six.
9 System of layout—Non-replicated.
10 Number of replications—Nil.
11 Date of planting—27th June 1951.
12 Period of harvest—September to October.
13 Previous crop—Cambodia cotton.
14 Size of plot—
Net area 15' X 1.13' 16.95 sq. ft.

Serial number and culture.	Acre yield in lb.		Percent on control.		Duration in days.
	Grain.	Straw.	Grain.	Straw.	
1 K. 176-2	2,759	2,323	203	56	89
2 K. 228-1	2,564	4,246	188	102	90
3 K. 212-1	2,364	3,126	174	75	88
4 K. 283	2,123	4,169	156	100	89
5 K. 187-1	1,964	4,246	144	102	89
6 K. 264-1	1,882	4,649	139	112	88
7 K. 310	1,882	4,649	139	112	90
8 K. 294	1,841	4,887	136	118	90
9 K. 285	1,841	4,167	136	100	90
10 K. 311	1,841	6,010	136	145	90
11 K. 221-1	1,841	4,008	136	97	90
12 K. 174-1	1,841	2,482	136	59	89
13 K. 198-1	1,759	2,482	129	59	89
14 K. 189-1	1,759	3,526	129	85	89
15 K. 163-1	1,723	3,446	127	83	89
16 K. 215-1	1,723	2,682	127	65	88
17 K. 308	1,682	5,046	124	122	90
18 K. 257-1	1,644	4,085	121	98	90
19 K. 292	1,644	3,608	121	87	90
20 K. 204-1	1,644	4,167	121	100	90
21 K. 274	1,603	4,405	118	106	90
22 K. 224-1	1,562	6,572	115	158	90
23 K. 225-1	1,562	6,731	115	162	90
24 K. 122-3-1	1,562	3,846	115	93	88
25 K. 208-1	1,521	2,800	112	67	88
26 K. 122-2-1	1,521	3,687	112	84	88
27 K. 175-1	1,521	4,246	112	102	89
28 K. 272	1,521	4,008	112	97	90
29 K. 131-3-1	1,521	3,846	112	93	89
30 K. 312	1,521	4,567	112	110	90
31 K. 197-1	1,482	3,764	109	90	90
32 K. 316	1,482	4,085	109	98	90
33 K. 307	1,482	4,406	109	106	90
34 K. 162-2	1,482	4,085	109	98	90
35 K. 298	1,444	3,285	106	79	88
36 K. 223-1	1,444	3,926	106	95	90
37 K. 161-1	1,444	5,849	106	140	89
38 K. 227-1	1,444	3,764	106	90	90
39 K. 207-1	1,444	2,085	106	50	89
40 K. 281	1,444	3,205	106	77	90
41 K. 314	1,444	4,085	106	98	90
42 K. 131-3-2	1,444	3,285	106	79	90
43 K. 205-1	1,403	4,405	103	106	89
44 K. 217-1	1,403	5,210	103	126	88
45 K. 276	1,403	4,609	103	111	90
46 N. 1 Control	1,362	4,151	100	100	90
General mean	1,665	4,063	..	..	..

The yields registered by the promising cultures show that one culture K. 176-2 had yielded double that of N. 1, while three more cultures K. 228-1, K. 212-1, K. 283 had yielded more than one and half times of grain than that of N 1.

39. *Miscellaneous*—(i) *Livestock*.—The strength of the herd on the farm was 32 at the beginning of the year. Three calves were born, two died, seven auctioned and one Sindhi stud bull was received on transfer from Hosur during the year making a total of 27.

During the year three animals were in lactation for periods of 246, 216 and 152 days and gave a total yield of milk 4,938.5 lb.

Green grass 172,193 lb. was cut from the field bunds and fed to cattle.

(ii) *Bull service*.—One Murrah buffalo stud bull was maintained on the farm. It served 143 animals.

(iii) *Pisciculture*.—Nine *Labeo finbricatus* varying in size from 7 inches to 15 inches × 3 inches to 5 inches and four *Barbous* of size 2 inches × 7 inches were caught and sold during the year. Eighteen *Osphromenus gourami* varying in size from 9 to 12 inches × 3 to 5½ inches were caught and released in the pond for multiplication. The growth of fish was satisfactory.

(iv) *Pests and Diseases*.—Weevil attack on sweet potato was severe. Thrips on cotton and chillies and jassids on cotton, paddy were met with and controlled.

(v) *Vanamohotsava*.—About 9,000 seedlings and cuttings of different kinds of green leaf yielding plants were planted in the farm.

(vi) *Supervising committee*.—The Committee held three meetings during the year under report and reviewed the results achieved on the farm.

(vii) *Farmer's Day*.—It was celebrated in September 1951. An exhibition was held in that connection and the farmers 200 in number who attended were taken round the farm and shown the standing crops.

(viii) *Seed distribution*.—The following quantities of seeds were distributed by transfer to other officers :—

	LB.		LB.
Paddy	8,315	Cotton seed H.A. 11 ..	2,400
Co. 9 Jonna	10,560	Cotton seed M.A. 2	100
Glumed wheat	1,394	Tomato seed	10
Groundnut pods	800	Ragi seed E.C. 593	540
Bengal gram	1,200	Korra seed N. 1	1,275
Maize	84	<i>Sesbania speciosa</i>	25

40. *Bagawadi Farm*.—The main crops jonna, korra, cotton and groundnut, redgram were grown under irrigated conditions following the methods adopted at Agricultural Research Station, Siruguppa. The ryots of the farm were slowly taking to grow the green manure crops and realized the benefit of such practice. The yields of all the crops recorded have greatly encouraged the ryots in irrigating the crops.

AGRICULTURAL RESEARCH STATION,
SIRUGUPPA,

Dated 15th September 1952.

S. RAJARATNAM,
Agronomist.

APPENDIX I.

SHOWING THE YIELD AND ECONOMICS OF THE BULK CROPS.

Serial number and field number.	Crop.	Area.	Acre yield in pounds.		Total value of produce.	
			Grains.	Straw.		
(1)	(2)	(3)	(4)	(5)	(6)	
		ACS.	LB.	LB.	RS.	A. P.
1 VI-1, 2 and 4	Jonna Co. 9	1.43	1,731	3,800	292	6 0
2 IX-2, 3 and 4	Do.	1.08	1,235	3,704	228	7 0
3 IA-2	Korra	0.42	1,233	2,000	194	2 0
4 IV-8	Maize	0.56	1,106 (Cobs).	7,320 (Fodder).	172	6 0
5 VI-6, 7 and 8	Groundnut	1.48	724	..	300	1 0
	Redgram		476	..		
6 IX-1, 5 and 6	Groundnut	0.58	672	..	238	15 0
	Redgram		98	..		
7 VII-3 and 4	Cambodia cotton	1.59	770 (Kapas).	..	386	14 0
8 VII-2	Glumed wheat	1.60	1,699	..	242	11 0
9 IX-21 to 24	Cambodia cotton	1.09	544 (Kapas).	..	38	0 0
10 IV-1	Glumed wheat	0.50	1,890	..	270	0 0
11 IV-8	Bengal gram	0.56	400	800 (Bhusa).	63	2 0
12 IV-3 and 6	Paddy GEB. 24	1.00	3,252	..	471	18 0
13 V.D.C.A.	Paddy AKP. 2	0.62	3,384	6,450	509	0 0
14 V.S.B.A.W.	Do.	0.54	3,943	7,590	594	1 0
15 IV-9	Paddy GEB. 24	0.15	4,527	6,667	654	18 0
16 V.S.B.A.E.	Sugarcane Co. 419	0.56	18.5 tons cane.	..	740	0 0

Serial number and field number.	Crop.	Cost of cultivation.		Net profit per acre.		Remarks.
		(7)		(8)			(9)
		RS.	A. P.	RS.	A. P.	
1 VI-1, 2 and 4	Jonna Co. 9	141	6 0	151	0 0	Deep soil.
2 IX-2, 3 and 4	Do.	190	11 0	108	12 0	Shallow soil.
3 IA-2	Korra	135	7 0	58	11 0	Deep soil.
4 IV-8	Maize	127	0 0	45	6 0	Do.
5 VI-6, 7 and 8	Groundnut	100	8 0	199	9 0	Do.
	Redgram					
6 IX-1, 5 and 6	Groundnut	98	3 0	140	12 0	Shallow soil.
	Redgram					
7 VII-3 and 4	Cambodia cotton	102	7 0	234	7 0	Deep soil.
8 VII-2	Glumed wheat	120	7 0	122	4 0	Do.
9 IX-21 to 24	Cambodia cotton	76	9 0	161	7 0	Shallow soil.
10 IV-1	Glumed wheat	194	4 0	75	12 0	Deep soil.
11 IV-8	Bangalgram	42	3 0	20	15 0	Second crop.
12 IV-3 and 6	Paddy GEB. 24	219	10 0	252	3 0	Single crop paddy area.
13 V.D.C.A.	Paddy AKP. 2	253	0 0	256	0 0	Double crop paddy area.
14 V.S.R.A.W.	Do.	217	4 0	376	13 0	Sugarcane paddy rotation area.
15 IV-9	Paddy GEB. 24	303	14 0	350	14 0	
16 V.S.R.A.E.	Sugarcane Co. 419	535	0 0	205	0 0	

APPENDIX II.

STATEMENT OF RECEIPTS AND EXPENDITURE FOR THE YEAR 1951-52 UNDER
"40-C. AGRICULTURE, EXPERIMENTAL FARMS".

Receipts.				RS.	A.	P.
XXIX. Agriculture—Agricultural Receipts	..	..	..	8,642	16	6
By free transfer of seeds	..	..	..	3,427	0	0
III. Other Remittances—P.W.D.—House-rent and Water-tax	..	..	..	34	3	6
XIII. Other Taxes—Sales tax	..	..	..	70	1	0
Recovery of overpayments	..	..	..	8	12	0
XLV. Stationery and Printing	..	..	..			
Total, Receipts	..	..	..	12,183	0	0

Expenditure.

		RS.	A.	P.
1. Pay of Officers and Establishment—				
Pay of Officers and Establishment		20,134	13	0
Dearness Allowance of Officers and Establishment		6,672	0	0
Travelling Allowance and Other Compensatory Allowance		5,603	14	0
Total, Expenditure		32,410	11	0
2. Office Contingencies		31,677	1	6
Total		31,677	1	6
Total, Expenditure		64,087	12	6

STATEMENT OF RECEIPTS AND EXPENDITURE ON ACCOUNT OF BAGAWADI FARM UNDER
" 68: CONSTRUCTION OF IRRIGATION, NAVIGATION, EMBANKMENT AND
DRAINAGE WORKS—TUNGABHADRA PROJECT ".

Receipts—Nil.

Expenditure.

		RS.	A.	P.
Pay of Establishment		1,661	11	0
Dearness Allowance		451	2	0
Travelling Allowance		67	5	0
Compensatory Allowance		413	2	0
Contingencies		844	10	0
Total		3,437	14	0

APPENDIX III.

STATEMENT OF RECEIPTS AND EXPENDITURE OF THE BULK CROPS GROWN
IN AGRICULTURAL RESEARCH STATION, SIRUGUPPA, DURING 1951-52.

Serial number and field number.	Crop.	Area in acres.	Receipts.		Expenditure.		Balance.	
			RS.	A.	RS.	A.	Profit.	Loss.
1 III-9; IV-3, 6, 9; V.D.C.A., S.C.A., S.B.A.W. 3.	Paddy ..	4.21	1,684	9 0	913	10 0	770	15 0
2 V.S.R.A.E. ..	Sugarcane ..	0.56	414	6 0	299	11 0	114	11 0
3 IA-3; II-7; VI-1, 2, 4, 3, 5; X-2, 3, 4, 17 to 20.	Jonna ..	6.76	1,838	10 0	860	7 0	978	3 0
4 IA-2	Korra ..	0.42	85	4 0	61	1 0	24	3 0
5 IV-8	Maize for cobs.	0.56	96	9 0	71	2 0	25	7 0
6 II-3; III-2a, 7, 8; IX-9 to 12.	Fodder cho- lam.	3.71	533	13 0	290	5 0	243	8 0
7 II-2, 5a, 8, 11; IV-1; VII-2; VIII-10; IX-13 to 15.	Glumed wheat.	6.62	1,199	10 0	1,041	9 0	158	1 0
8 II-9, 12; VI-12 to 14; VII-3, 4; IX-7, 8, 16, 21 to 24.	Cotton ..	5.82	1,583	7 0	537	1 0	996	6 0
9 IA; VI-6, 7, 8; VII-2a, 4a; IX-1, 5, 6; X-1 to 5.	Groundnut redgram.	5.31	1,325	1 0	563	9 0	761	8 0
10 IA-2; II-1, 7; IV-8; VIII-12.	Bengal gram.	3.31	167	3 0	137	3 0	30	0 0
11 II-5b	Vegetables..	0.30	650	3 0	95	6 0	554	13 0
Total		36.93	9,528	11 0	4,871	0 0	4,657	11 0

RS. A. P.

RS. A. P.

Add to expenditure		4,871	0	0
Water-rate at Rs. 7-8-0 per acre was taken in the cost of cultivation and hence not added here.				
Supervision charges for 36.93 acres—				
One manager at Rs. 100 plus dearness allowance Rs. 24..	124	0	0	
Fieldman at Rs. 45 plus dearness allowance 22	67	0	0	
Head coolie at Rs. 14 plus dearness allowance 18	32	0	0	
	223	0	0	2,676 0 0
Total, Receipts	9,528	11	0	
Total, Expenditure	7,547	0	0	
Net profit	1,981	11	0	

SHORT NOTE ON THE STEPS TAKEN TO INCREASE THE REVENUE OF THE FARM.

Measures to step up revenue of the farm were taken by bringing all the uncultivated fallow portions in nook and corner under plough. 0.25 acre of marshy low lying land in block III was converted into wet land and a good crop of paddy was raised. 0.75 acre of land in the threshing yard was brought under plough and reclaimed for raising fodder crops. Waste lands round quarters were planted with *Glyricidia maculata* for green manure. About 0.75 acre of land in B. 1. was reclaimed and cropped with groundnut and redgram. An area of 0.62 acre adjoining to B. VII-1 was reclaimed and cropped with fodder maize. With the available pumped water there is very little scope to raise more than a crop in year. However, an acre of 3.31 acres was cropped with bengalgram as second crop with one irrigation. *Gyricidia* have been planted all along the paths and empty spaces. Green manure crops have been raised in bulk fields. These measures will reduce manure bill.

Utilizing the waste lands, raising of two crops in a year with bengalgram, raising of money crops, and economic cultivation are some of the steps taken to increase the revenue of the farm.

APPENDIX IV.

A SHORT NOTE ON THE ORIGIN AND OBJECT OF THE AGRICULTURAL RESEARCH
STATION, SIRUGUPPA (BELLARY DISTRICT).

After the consideration of the findings of the soil survey of Tungabhadra Project, the Irrigation Development Board recommended the opening of a station to investigate on—

(a) the physico-chemical reaction of light irrigation on the black soils with Tungabhadra water, and

(b) to carry on agronomical experiments to determine suitable crops for irrigation, their seasons and rotation, soil management and duty of water, etc.

Accordingly a compact block of 91 acres was acquired at Siruguppa, 1½ miles east of Siruguppa town on the Adoni-Siruguppa road at the 24th mile stone from Adoni and handed over on 21st June 1937. The field operations were started from the middle of August 1937. Subsequently one acre of land was acquired and added thus making the total area of the farm to 92 acres of which 74 acres were cultivated, the remaining being occupied by buildings, roads and channels, etc.

Soils.—The soil of the station is deep black extending to a depth of 6 feet to 8 feet with a typical profile containing gypsum in the lower horizon along with a high salt concentration. In common with the deep blacksoils of the tract they have a high capacity for retaining moisture with low percolation and consequent poor sub-soil drainage. But the surface drainage is facilitated by the presence of two drains running along the western and eastern boundaries of the farm.

Rainfall.—The tract is marked for its unevenly distributed rainfall mostly received in the later half of the south-west monsoon during the months of August and September closely followed by the uncertain rains of the north-east monsoon which lasts from October to middle of November. The precipitation is often heavy and torrential leading to considerable run-off and erosion of the surface soil. Very often complete drought prevails during the critical period of crops' growth resulting in failure of crops and consequent famine. In order to solve this problem of famine, the Tungabhadra Project was inaugurated to supply water to some of the famine-stricken areas.

The main purpose of the station was therefore to study the problems arising out of irrigation of the blacksoils which is unknown in the tract. The local agricultural practices were adopted as far as possible in irrigation system of agriculture. Other economic crops best fitted under project conditions were also introduced and their performances studied.

Later the Government have sanctioned two new schemes, namely :—

(1) *Cambodia scheme.*—For the breeding varieties of Cambodia cotton medium and long stapled best suited for the black soils sanctioned in G.O. Ms. No. 2839, Development, dated 30th October 1943.

(2) *Hingari jonna scheme.*—For the selection and multiplication of suitable strains for the late season under irrigation sanctioned in G.O. No. 3702, Development, dated 15th November 1943.

An additional area of 12 acres was acquired for the above two schemes adjoining the farm and the soil has been found to be very similar.

ANNUAL REPORT OF THE RICE RESEARCH STATION, TIRURKUPPAM, FOR THE YEAR 1951-52 (FASLI 1361).

Season.—The rainfall during the year was very defective the total precipitation being only 65 per cent of the normal. The total rainfall recorded was 34.55 inches in 48 rainy days, as against 38.01 inches in 50 rainy days of the previous year, and the preceding eight-year average of 53.27 inches in 55.6 rainy days. The south-west monsoon that set in in July recorded 12.36 inches in 23 rainy days as against 15.75 inches in 26 rainy days of the previous year and the eight-year average of 17.68 inches in 24.3 rainy days. The monsoon became vigorous only in the second half of August and first week of September with the result that rainfed and semi-dry sowings could be taken up only in September first week instead of August which is the period when the sowings usually commence. The north-east monsoon that started in early October was weak throughout. The total rainfall recorded during north-east monsoon was only 8.62 inches in 16 rainy days as against 16.14 inches in 14 days last year and the eight year average of 28.35 inches in 22 days. From December to May complete dry weather prevailed except for a fall of 60 cents and 29 cents in February and March respectively. The entire samba and navarai crops had to depend entirely on lift irrigation. The low rainfall coupled with the cumulative effect of the preceding four years of the drought made this season one of the worst. There was not enough water in wells. The general yield of the crop especially in late sown and late planted fields was low. The hot weather period in 1952 recorded 13.57 inches in 9 rainy days as against 6.12 inches in 10 days of the previous year and the preceding eight-year average of 7.24 inches in 9.3 days. Of the 13.57 inches 11.40 inches fell in two rainy days in May which could not be made full use of. On the whole the season was very unfavourable for paddy cultivation. The rainfall statement is given in Table I.

TABLE I.—Statement of rainfall.

Month.	Week.	1951-52.		1950-51.		Average for the previous 8 years.	
		Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>South-west monsoon.</i>							
1951.							
July	1-7	0.85	2	1.56	2	1.52	2.0
	8-14	0.40	1	0.72	1	0.90	1.8
	15-21	0.65	2	0.77	2	0.94	2.0
	22-28	0.54	1	..	..	1.23	1.6
July-August ..	29-4	0.83	3	1.09	3	0.98	1.6
	5-11	..	..	1.00	4	2.00	2.6
	12-18	0.53	2	..	..	0.86	1.4
	19-25	2.94	4	1.12	3	0.94	1.4
August-September ..	26-1	2.92	4	3.36	2	1.97	2.5
	2-8	1.01	2	3.04	5	1.76	2.4
	9-15	0.48	1	0.23	2	2.75	2.1
	16-22	..	..	0.32	1	0.94	1.6
	23-29	1.21	1	2.54	1	0.89	1.3
Total ..		12.36	23	15.75	26	17.68	24.3
<i>North-east monsoon.</i>							
September-October ..	30-6	0.27	1	0.09	..	2.00	1.4
	7-13	1.11	2	5.29	4	4.09	1.9
	14-20	0.85	1	4.90	3	2.80	2.0
	21-27	0.27	1	..	..	1.68	2.1
October-November ..	28-3	0.56	2	0.86	1	1.17	1.3
	4-10	2.10	4	0.51	1	2.90	1.9
	11-17	..	..	4.91	5	4.64	2.8
	18-24	2.72	3	..	..	2.22	2.5
November-December.	25-1	1.24	2	..	..	1.45	1.1
	2-8	..	..	..	..	3.45	1.4
	9-15	..	..	0.08	..	0.79	0.9
	16-22	..	..	..	..	0.53	1.0
	23-29	..	..	..	..	0.02	0.1
December-January 1952.	30-5	..	..	..	..	0.25	0.6

Month.	Week.	1951-52.		1950-51.		Average for the previous 7 years.	
		Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1952.		North-east monsoon—cont.					
January	6-12	..	..	..	..	0.16	0.3
	13-19	..	..	..	..	0.17	0.3
	20-26	..	..	..	..	0.12	0.1
January-February ..	27-2	..	..	..	..	0.43	0.3
Total ..		8.62	16	16.14	14	28.35	22.0
		Hot weather.					
1952.							
February ..	3-9	..	..	..	..	..	..
	10-16	..	..	..	..	..	..
	17-23	0.60	2	..	..	0.60	0.4
February-March ..	24-2	..	..	..	..	..	..
	3-9	..	..	..	..	0.89	0.8
	10-16	..	..	..	..	0.15	0.4
	17-23	0.29	1	..	..	..	..
	24-30	..	..	..	..	0.09	0.3
March-April ..	31-6	..	..	1.42	2	0.71	0.6
	7-13	..	..	1.75	2	0.24	0.4
	14-20	..	..	0.76	1	0.47	0.5
	21-27	..	..	0.42	1	0.05	0.1
April-May ..	28-4	..	..	0.10	1	0.91	0.1
	5-11	..	..	..	..	0.02	0.1
	12-18	..	..	..	..	0.17	0.4
	19-25	11.40	2	..	..	0.64	0.4
May-June ..	26-1	..	..	..	..	0.62	0.9
	2-8	0.12	1	1.12	1	0.87	1.3
	9-15	..	..	0.55	2	0.67	1.0
	16-22	0.17	1	..	..	0.74	1.1
	23-30	0.99	2	..	..	0.30	0.5
Total ..		13.57	9	6.12	10	7.24	9.3
Grand total ..		34.55	48	33.01	50	53.27	55.6

2. *Cultivation routine.*—Preparatory cultivation given to each of the three crops of the year was the same. The plots were prepared by ploughing twice with the iron plough and a number of times with the country plough followed by working the puddler and finished by passing the levelling board. Whenever green manure was applied, green manure trampler was used with advantage. *Sornavari* seed beds were not manured. *Samba* and *Navarai* seed beds were manured with groundnut cake at 500 lb. per acre before sowing. The seed rate used was 3 lb. per cent for samba nurseries and 3½ lb. per cent for navarai and sornavari nurseries. In general the manurial treatment for all the planted plots consisted of the application of groundnut cake at 400 lb. per acre at planting time and ammonium sulphate at 100 lb. per acre one month thereafter. Transplant plots that received green manure at 4,000 lb. to 5,000 lb. per acre were manured with groundnut cake at only 200 lb. per acre. In the economic area 100 lb. of bonemeal or super also were applied just before the last ploughing and levelling. Cultivation of dry and semi-dry area consisted of two courses of ploughing with the iron plough followed by a number of ploughings with the country plough till a good tilth was obtained. *Karmaram* was worked to collect the weeds and *Kattimaram* was passed to break the clods and level the fields. The whole of rainfed and semi-dry areas was manured with farm-yard manure at 10 cart loads per acre. The fields that did not receive farm-yard manure were manured with groundnut cake at 200 lb. per acre. Bulk sowings were done with the *Gorru* and seeds were covered with *Guntaka*. The guntaka was again worked on the third day after sowing to break the crust and thereby facilitate germination. The seed rate used in dry and semi-dry area was 60 lb. per acre. In all the bulk sowings in semi-dry area

sunnhemp was inter sown with paddy 2 feet apart for green manuring semi-dry paddy. The details of sowing, transplanting and harvesting are given below :—

	Sornavari.	Samba.	Navarai.
Seeds beds ..	25th April to 10th May 1951.	15th July to 26th September 1951.	5th January to 5th February 1952.
Transplanting ..	23rd May to 8th June 1951.	21st August to 28th November 1951.	4th February to 3rd March 1952.
Harvesting ..	18th August to 15th September 1951.	1st December 1951 to 28th February 1952.	29th April to 19th June 1952.
Total area planted in acres.	5.62	16.15	2.75
Acres yields of bulks in lb.	2,636	2,099	1,401

3. *Paddy improvement work—Pure-line selection—A. Sornavari season.*—Twenty-four *sornavari* cultures were under regular yield trials in three series against TKM 3. (*sornavari*) as standard. Fisher's 'Z' test was satisfied for two series only. Eleven cultures that gave significantly higher yields than the standard were carried forward for further trials. The details of the experiment and summary of conclusions are presented in Table II.

TABLE II.—Yield trials of sornavari cultures-wet (*sornavari* season).

Field number—11c.
Previous crop—Samba paddy.
Manure—Groundnut cake at 400 lb ammonium
at sulphate 100 lb. per acre.
Layout—3 series of 9 × 4 randomized blocks.

Size of sub-plot—20' × 4'.
Spacing—4' × 4' two seedlings per hole.
Sown—10th May 1951.
Planted 7th June 1951.
Harvested—2nd September 1951.

Summary of results (I Series).

Particulars.	8,921	8,897	8,859	8,925	8,929	8,924
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Acres yield of grain in lb. ..	3,480	3,767	3,540	3,710	3,769	3,801
Percentage on control ..	99.9	108.1	101.6	106.5	108.1	109.1
Flowering duration in days ..	76	76	77	77	82	82
—	8,915	8,888	TKM. 3 Standard.	General mean.	'Z' test satisfied or not (P = 0.05).	Standard error.
	(8)	(9)	(10)	(11)	(12)	(13)
Acres yield of grain in lb. ..	3,686	3,969	3,481	3,689	No.	175.0
Percentage on control ..	105.9	113.9	100.0	105.4	..	5.0
Flowering duration in days ..	78	78	86			

Conclusions—Treatment differences not statistically significant.

Summary of results (II Series).

Particulars.	8,869	8,776	2,049	1,888	8,812	8,826
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Acres yield of grain in lb. ..	3,679	3,658	3,473	3,593	3,816	3,530
Percentage on control ..	109.2	108.6	103.1	115.6	110.4	104.8
Flowering duration in days ..	82	83	86	83	80	80
—	8,834	8,876	TKM. 3 Standard.	General mean.	'Z' test satisfied or not (P = 0.05).	Standard error.
	(8)	(9)	(10)	(11)	(12)	(13)
Acres yield of straw in lb. ..	3,853	4,107	3,365	3,708	Yes.	110.0
Percentage on control ..	114.5	122.0	100.0	110.1	..	3.6
Flowering duration in days ..	83	86	86	..	..	..

Conclusions—8,876 1,888 8,834 8,812 8,869 8,776 8,826 2,049 TKM. 3 Standard.

Summary of results (III Series).

Particulars.	1763.	1768.	1769.	1961.	1886.	2094.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Acre yield of grain in lb. ..	3,422	3,771	3,596	3,658	3,785	3,361
Percentage on control ..	99.8	110.0	105.0	106.8	110.4	98.1
Flowering duration in days.	88	90	89	89	88	89

Particulars.	1691.	1665.	TKM. 3 Std.	General mean.	'Z' test satisfied or not (P = 0.05).	Standard error.	Critical difference (P = 0.05).
(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Acre yield of grain in lb.	3,933	3,577	3,426	3,615	Yes.	104.0	303.0
Percentage on general control.	114.8	104.4	100.0	105.4	..	3.0	8.8
Flowering duration in days.	89	86	85	..	..	..	..

Conclusion—1,691, 1,886, 1,768, 1,961, 1,769, 1,665, TKM 3. Std., 1,763, 2,094.

B. Samba season—(i) Rainfed varieties.—Twelve cultures of *Sembalai* were under regular yield trials against TKM. 2 standard. Seventy-six cultures of *Mottakar* were under preliminary yield trials against *Mottakar* standard. Three district samples of *Bairuvaldu* were grown for selection work. Owing to the failure of the north-east monsoon, the experiments failed to give any results and only seed materials were collected for further trials.

(ii) Semi-dry varieties.—Ten *Vadansamba* cultures and five *Kaligansamba* cultures were under regular yield trials against ADT. 22 standard. Twenty-four cultures of *Vadansamba* from Sulurpet were under preliminary yield trials against ADT. 22. Two cultures, 434 and 610 of *Kappasamba* were under yield trials against the standard. All the cultures failed due to severe drought conditions and even their seed materials had to be multiplied under wet conditions for further trials.

(iii) Wet rice—(a) Seevansamba.—This is an important variety of paddy of South Arcot district. Fourteen cultures of *Seevansamba* were under regular yield trials against ASD. 6, 3528 Coimbatore and *Seevansamba* standard in two series. The cultures failed due to inadequate water supply. However seed materials have been collected and the trials will be repeated. Seed materials were collected from the district samples also for fresh selection work.

(b) Kappakar.—Kappakar is also an important variety of South Arcot district grown under both in semi-dry and wet conditions. Sixteen cultures were under regular yield trials. Trials failed due to inadequate water-supply but seed materials were collected in all the cultures for conducting the trials in the coming season.

(c) Chinnasamba.—One hundred and twenty-two promising cultures were under preliminary yield trials against Co. 5. Owing to the adverse season, the growth was poor and variation among the cultures was not perceptible. All the cultures were carried over for trials in the coming season.

(d) Kittansamba.—This is a long duration variety resembling Co. 19 (Chingleput Sirumani) popular in North Arcot district. Twelve cultures of Kittansamba were under yield trials against Co. 19 standard in two series. Though the crop established fairly well reliable results could not be obtained due to irregular water-supply. 'Z' test was not satisfied in both the series. Seed materials have been collected in all the cultures for continuing the trials. The performance of all the cultures is given in Table III below:—

TABLE III.—Yield trials of kittansamba cultures (Samba season).

Field No.—16-gk.	Spacing—3' × 6" (two seedlings per hole).
Previous crop—Fallow.	Sown—1st September 1951.
Manure—groundnut cake at 400 lb. + ammonium sulphate at 100 lb. per acre.	Planted—12th October 1951.
Lay out—Two series 7 × 6 randomized blocks.	Harvested—18th February 1952.
Size of sub-plot—40' × 4'.	

Summary of results (I Series).

Particulars.	7967.	8037.	8061.	8086.	8109.	8113.	Co. 19 Std.	General mean.	'Z' test satisfied or not (P = 0.05).	Standard error.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Acre yield of grain in lb.	3,432	3,559	3,415	3,473	3,768	3,325	3,742	3,531	No.	124.0
Percentage on control.	96.7	100.2	96.1	97.8	106.1	93.7	100.0	99.4	..	3.5
Flowering duration in days.	129	125	130	129	131	124	129	..	..	..

Conclusions—
Treatment differences not statistically significant.

Summary of results (II Series).

Particulars.	8080.	8209.	8247.	8284.	8331.	8301.	Co. 19 Std.	General mean.	'Z' test satisfied or not (P = 0.05).	Standard error.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Acre yield of grain in lb.	2,484	2,120	2,496	2,507	2,444	2,479	2,471	2,429	No.	139.0
Percentage on control.	100.6	85.9	101.1	101.5	99.0	100.4	100.0	98.4	..	5.6
Flowering duration in days.	132	133	134	131	130	125	133	..	..	..

Conclusion—Treatment differences not statistically significant.

(e) Sirumani.—Twenty-eight cultures of Sirumani in four series were under yield trials against Co. 19 standard. Though the crop progressed well, reliable data could not be obtained due to inadequate water-supply. 'Z' test was not satisfied in any of the series. However seed materials have been collected in all the cultures for continuing the trials. The performance of the various cultures is presented in the following Table IV:—

TABLE IV.—Yield trials of Sirumani cultures (Samba season).

Plot No.—16-ca.
Previous crop—Fallow.
Manure—Groundnut cake at 400 lb. + ammonium sulphate at 100 lb. per acre.
Layout—4 series of 8 × 6 randomized blocks.
Size of sub-plot—16' × 4'.
Spacing—8' × 6" (two seedlings per hole).
Sown—1st September 1951.
Planted—15th October 1951.
Harvested—16th February 1952.

Summary of results (I Series).						
Particulars.	8951.	8955.	8960.	8963.	8964.	
(1)	(2)	(3)	(4)	(5)	(6)	
Acre yield of grain in lb.	2,406	2,328	2,251	2,085	2,331	
Percentage on control	111.9	108.2	104.7	96.1	108.5	
Flowering duration in days	136	130	124	128	126	
—	8965.	8966.	Co. 19 Std.	General mean.	'Z' test satisfied or not. (P=0.05).	Standard error.
	(7)	(8)	(9)	(10)	(11)	(12)
Acre yield of grain in lb.	2,283	2,375	2,149	2,274	..	148
Percentage on control	106.3	110.6	100.0	105.8	No.	6.9
Flowering duration in days	122	126	134	..	..	..
Conclusions— Treatment differences not statistically significant.						

Summary of results (II Series).

Summary of results (1922-1923)						
Particulars.	8969.	8972.	8991.	8998.	9002.	
(1)	(2)	(3)	(4)	(5)	(6)	
Acre yield of grain in lb.	1,843	2,406	2,043	1,882	2,040	
Percentage on control	95.1	124.2	105.3	97.1	105.2	
Flowering duration in days	133	133	128	134	133	
—	9006.	9019.	Co. 19 Std.	General mean.	'Z' test satisfied or not (P = 0.05).	Standard error.
	(7)	(8)	(9)	(10)	(11)	(12)
Acre yield of grain in lb.	2,273	2,116	1,937	2,073	..	189
Percentage on control	114.9	111.8	100.0	106.9	No.	9.7
Flowering duration in days	135	135	133	..	..	..
Conclusion — Treatment differences not statistically significant.						

moisture available was utilized by the organic matter for decomposition affecting the growth of paddy. Details of the experiment are given in the following Table VI:—

TABLE VI.—*Sunnhemp manurial experiment—Semi-dry—Samba season.*

Particulars.	Treatments.		General mean.	'Z' test satisfied or not (P=0.05).	Standard error.	Critical difference (P=0.05).
	A.	B.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Area yield of grain in lb. ..	1,327	816	1,072	..	81	253
Percentage on control (A) ..	100.0	61.4	80.7	Yes.	6.1	19.1
Acre yield of straw in lb. ..	3,713	2,407	3,061	..	15	47
Percentage on control (A) ..	100.0	64.8	82.4	Yes.	0.4	1.3
Flowering duration in days ..	113	110	..	..	..	..

Field No. 5-b.
Previous crop—Fallow.
Layout—2 × 12 ABBA manner.
Size of sub-plot—30' × 12' (outer rows rejected).
Spacing—6" × 6" drill sowing.
Variety—ADT. 22.

Treatments:
A. Paddy sown alone—
B. Paddy with sunnhemp sown in lines 2' apart, pulling out and trampling in the sunnhemp plants between the lines of paddy six to eight weeks after sowing at the time of irrigation.
Sown—12th September 1951.
Sunnhemp pulled out and trampled on 31st October 1951.
Harvested—4th February 1952.

Conclusion—Grain and straw—A, B.

(b) *Wet conditions—Nightsoil compost experiments.*—To find out the relative merits of nightsoil compost and farmyard manure when applied on equal nitrogen basis the experiment was conducted during sornavari and samba seasons both in double and single-crop wet lands. The nitrogen content of the nightsoil compost and farmyard manure applied to sornavari season trial plots were 0.42 per cent N. and 0.48 per cent N. respectively. Details of the experiment conducted in sornavari season and summary of conclusions are presented in Table VII-A. Fisher's 'Z' test was satisfied for grain and straw yields. Nightsoil compost and farmyard manure were on a par among themselves and both were superior to No manure for grain and straw yields in sornavari season.

In Samba season the nightsoil compost and farmyard manure analysed to 0.41 per cent N and 0.68 per cent N respectively. Details of the experiment and summary of conclusions are presented in Table VII-B. In single-crop wet land, Fisher's 'Z' test was satisfied for grain and straw yields. Nightsoil compost was the best followed by farmyard manure for grain and straw yields. No manure was the poorest. In the previous year in single-crop wet land farmyard manure was the best and nightsoil compost and no manure were on a par with regard to grain yield. For straw yield farmyard manure and nightsoil compost were on a par and significantly above no manure. The growth of the crop in the experiment in double crop wet land was very uneven due to extreme drought conditions and the trials are therefore rendered inconclusive and are therefore not furnished.

TABLE VII-A.—*Nightsoil compost experiment—Double-crop wet land—Sornavari season.*

Field number—15-ac. Previous crop—Night soil compost experiment—Samba season. Layout—3 × 6 randomized blocks. Size of sub-plot—87' × 13' (outer rows rejected). Spacing—4' × 4'—bulk planting—two seedlings per hole. Variety—Co. 13.	Treatments— 1 No manure. 2 Nightsoil compost to supply 60 lb. N per acre. 3 Farm-yard manure to supply 60 lb. N per acre. Sown—25th April 1951. Planted—23rd May 1951. Harvested—20th August 1951.
--	--

Particulars.	Treatments.			General mean.	'Z' test satisfied or not (P=0.05).	Standard error.	Critical difference (P=0.05).
	1.	2.	3.				
Acre yield of grain in lb. ..	1,831	1,958	1,939	1,844	..	63	197
Percentage on control (1) ..	100.0	120.1	118.9	118.0	Yes.	3.8	12.1
Acre yield of straw in lb. ..	2,789	3,460	3,314	3,181	..	64	200
Percentage on control (1) ..	100.0	124.9	119.7	114.9	Yes.	2.3	7.2
Flowering duration in days ..	85	85	85	..	..	..	..

Conclusion—Grain and straw—2, 3, 1

TABLE VII-B.—*Nightsoil compost experiment—Single-crop wet land—Samba season.*

Field No. 12a. Previous crop—Fallow. Layout—3 × 6 randomized blocks. Size of sub-plot—134' × 7' (outer rows rejected). Spacing—6" × 6"—bulk planting—two seedlings per hole.	Variety—Co. 19. Sown on—7th September 1951. Planted on—24th October 1951. Harvested on—12th February 1952.
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Particulars.	Treatments.			General mean.	'Z' test, satisfied or not (P=0.05).	Standard error.	Critical difference (P=0.05).
	1.	2.	3.				
Acre yield of grain in lb. ..	916	1,372	1,081	1,123	..	14	45
Percentage on control (1) ..	100.0	149.8	118.1	122.7	Yes.	1.6	5.0
Acre yield of straw in lb. ..	1,624	2,828	2,000	2,150	..	93	310
Percentage on control (1) ..	100.0	174.2	123.2	132.4	Yes.	6.1	19.1
Flowering duration in days ..	128	128	128	..	..	..	..

Conclusions—Grain and straw—2, 3, 1

(c) *Phosphate manurial experiment.*—To find the effect of the application of phosphatic manure direct to paddy crop and through the green manure crop preceding paddy crop an experiment with the following treatments was conducted during the samba season.

Treatments—

- No phosphate and no green manure.
- Green manure alone (sunnhemp).
- 30 lb. P 205 as super to green manure.
- Green manure + 30 lb. P 205 as super applied at the time of planting.
- 45 lb. P 205 as super to green manure.
- Green manure + 45 lb. P 205 as super applied at the time of planting.
- 60 lb. P 205 as super to green manure.
- Green manure + 60 lb. P 205 as super applied at the time of planting.

Details of the experiment and summary of conclusions are given in Table VIII. The yield data of sunnhemp was analysed; 'Z' test was not satisfied. Sunnhemp was applied to the respective plots and paddy was transplanted. 'Z' test was satisfied for both grain and straw yields. In regard to grain yield the application of super to supply 30 lb. P₂O₅ per acre to the green manure crop gave 450 lb. more per acre or 35.8 per cent more than the yield obtained by the application of super to supply 30 lb. P₂O₅ direct to paddy crop. 30 lb. P₂O₅ applied to green manure crop gave as much yield as 45 lb. or 60 lb. P₂O₅ applied direct to paddy crop or to green manure crop. 30 lb. P₂O₅ seems to be the optimum dose. In regard to straw yield all the manure treatments were on a par and superior to no manure. The phosphate application gave a very good response in this droughty year.

TABLE VIII.—*Phosphate manurial experiment—Samba season (Sunnhemp).*

Field No.—15-bdth. Previous crop—Fallow. Manure—As per schedule. Layout—3 × 4 randomized blocks. Size of sub-plot—70' × 10'. Sown—28th August 1951. Harvested—11th October 1951.	Treatments— A No phosphate and no green manure. B Green manure alone. C 30 lb. P ₂ O ₅ as super to green manure. D Green manure + 30 lb. P ₂ O ₅ as super applied at the time of planting. E 45 lb. P ₂ O ₅ as super to green manure. F Green manure + 45 lb. P ₂ O ₅ as super applied at the time of planting. G 60 lb. P ₂ O ₅ as super to green manure. H Green manure + 60 lb. P ₂ O ₅ as super applied at the time of planting.
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Summary of results for green leaf only.

Particulars.	Treatments.				
	B.	C.	D.	E.	F.
(1)	(2)	(3)	(4)	(5)	(6)
Acre yield of green leaf in lb.	12,790	13,560	12,650	12,610	12,490
Percentage on general mean	100.4	100.7	99.3	99.0	98.1
Particulars.	Treatments—cont.		General mean.	'Z' test satisfied or not (P = 0.05).	Standard error.
	G.	H.			
(1)	(7)	(8)	(9)	(10)	(11)
Acre yield of green leaf in lb.	12,350	12,730	12,750	No.	864
Percentage on general mean	96.8	99.9	100	..	6.8

Conclusion—Treatment differences not statistically significant.

Phosphate manurial experiment—Samba season.

Field number—15-bdfh.
Previous crop—Sunnhemp.
Layout—8 × 4 randomized blocks.
Size of sub-plot—76' × 16' (outer rows rejected).
Spacing—6' × 6'—Bulk planting—2 seedlings per hole.

Variety—Co.2.
Sown—23rd September 1951.
Planted—25th October 1951.
Harvested—31st January 1952.

Summary of results.						
Particulars.	A.	B.	C.	D.	E.	F.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Acre yield of grain in pounds	834	1,307	1,706	1,256	1,557	1,426
Percentage on control (A) ..	100.0	156.8	204.8	150.8	186.9	171.2
Acre yield of straw in pounds	1,496	2,436	2,800	2,350	2,750	2,436
Percentage on control (A) ..	100.0	162.9	187.2	156.5	184.0	162.9
Flowering duration in days	96	96	96	96	96	96

Particulars.	G.	H.	General mean.	Z test satisfied or not (P=0.05).	Standard error.	Critical difference (P=0.05).
	(8)	(9)	(10)	(11)	(12)	(13)
Acre yield of grain in pounds	1,557	1,522	1,395	..	102	301
Percentage on control (A) ..	186.9	182.7	107.5	Yes.	12.3	36.1
Acre yield of straw in pounds	2,780	2,558	2,514	..	164	482
Percentage on control (A) ..	185.9	170.9	168.1	Yes.	11.0	32.2
Flowering duration in days	96	96	..	..	..	..

Conclusions—

Grain—C, E, G, H, F, B, D, A.

Straw—D, C, G, E, H, B, F, A.

(d) Di-calcium phosphate experiment.—To find out the relative merits of di-calcium phosphate and super phosphate and their placement effect, an experiment with the following treatments was started during the samba season:—

Treatments—

A. Control.

B. Groundnut cake at 40 lb. N per acre.

C. Groundnut cake at 40 lb. N per acre + super at 80 lb. P₂O₅ per acre (broadcast).

D. Groundnut cake at 40 lb. N per acre + di-calcium phosphate at 80 lb. P₂O₅ per acre (broadcast).

E. Groundnut cake at 40 lb. N per acre + super at 80 lb. P₂O₅ per acre (placed).

F. Groundnut cake at 40 lb. N per acre + di-calcium phosphate at 80 lb. P₂O₅ per acre (placed).

For placement of fertilizers the manure was applied in furrows behind the country plough and covered. For treatments E and F manures were applied on 6th October 1951. For treatments B to D the manures were applied at the time of planting and groundnut cake for E and F also at the time of planting. Co. 2 nursery was sown on 23rd September 1951. Planting was done on 11th and 12th November 1951. The crop did not establish at all due to extreme drought conditions.

7. Mixed cropping—Madras Uganda No. 1 as a mixed crop with rainfed paddy.—Seventy cents in 2 C were prepared well and cattle manure was applied at 10 cart loads per acre. TKM. 1 (pisini) was sown by means of a country drill at

60 lb. per acre on 4th September 1951. The plot was divided into three equal portions of 70' × 80'. In two sub-plots, Madras Uganda 1 was sown in lines 8 feet apart spacing within the line being one foot. Cotton was dibbled on the same day immediately after sowing paddy. The third sub-plot which was in between these cotton plots was not sown to cotton. Initial stand of both paddy and cotton was good. Filling up of gaps and thinning were done in time. Owing to the failure of the monsoon, paddy crop failed but cotton was able to withstand the drought. Cotton came to flower during the first week of November. First picking was taken on 25th December 1951. Pickings continued till the end of April 1952. The yield of cotton worked to 510 lb. and 409 lb. per acre in the two plots—the average acre yield working to 460 lb. In the previous year when the lines were 16 feet apart, the yield was only 109 lb. per acre. This seemed to be a practice worthwhile adopting in all the dry paddy areas of the tract.

8. Other crops—(i) Perennial cotton types.—Bulks of Quebradinho, Moco and Caramura II were grown in 17 cents, 6.2 cents and 3.5 cents, respectively. Acre yields of 246 lb., 177 lb. and 204 lb. of kapas respectively were obtained.

(ii) Cereals.—Ragi Co. 2 was raised in January to May season in 42 cents. The acre yield worked out to 574 lb.

(iii) Pulses.—Cowpea New era was sown in December in 11.4 cents. Ten pounds of seed was collected. Horsegram sown in November gave an acre yield of 350 lb. Perennial green gram from Philippines grown in ½ cent gave an acre yield of 1,087½ lb.

(iv) Oil seeds.—Gingelly TMV. 3 was raised in 1.23 acres and an acre yield of 248 lb. was obtained. TMV. 2 groundnut sown in March gave an acre yield of 263 lb.

(v) Fodder crops.—Guinea grass, water grass, thin Napier grass, F1 of cumbu × elephant grass, Australian drought resistant grass, fodder cholam were sown in small plots. Fodder cholam gave 22,040 lb. of green fodder per acre. Guinea grass, water grass, thin Napier grass, F1 of cumbu × elephant grass and Australian drought resistant grass gave 67,500 lb., 20,906 lb., 27,111 lb., 40,333 lb., and 6,917 lb., respectively.

(vi) Green manure crops.—Green manure crops of sunnhemp, daincha and crotalaria striata were grown. Acre yields of 13,560 lb., 20,000 lb. and 5,000 lb. of green matter were obtained from sunnhemp, daincha and crotalaria, respectively. Seedlings of sesbania were planted along paddy field bunds and 276 lb. of seeds were collected. Two thousand eight hundred and seventeen Gliricidia seedlings and 1,132 cuttings were planted along the boundary fence and field bunds. 56½ lb. seeds were collected from older plants.

(vii) Vegetables.—Lady's finger, tomatoes, cluster beans, snake gourd, bitter gourd, ribbed gourd and cucumber were grown for collection of seeds. 208 lb. of vegetable seeds were collected.

(viii) Tapioca.—Malavellai and local varieties of tapioca were planted in 28.8 cents and 29.1 cents and the acre yields of 6,586 lb. and 10,099 lb. of tubers from Malavellai and local tapioca respectively were obtained.

(ix) Fibre crops.—Madras Uganda cotton No. 1 raised as a pure crop and as a mixed crop with ragi and groundnut after the harvest of samba paddy gave 631 lb. and 149 lb. of kapas respectively. P 216F cotton was sown in March 1952 in 1.18 acres. The picking of kapas is in progress.

(x) Fruit plants.—Among the three Singapore jack plants, plant No. 2 is bearing for the second year. Seville limes, Rajahmundry lemons, Nepali lemons, custard apples are bearing for the third year. Acid lime and citrons are bearing for the second year. The bananas and papayas suffered on account of severe drought conditions.

The seed material distributed is given in Table IX.

TABLE IX.—Seed distribution.

	LB.	oz.
Paddy seeds	39,311	15
Ragi Co. 3	230	8
Gingelly TMV. 3	219	8
Cowpea (New era)	11	4
Bendai seed	31	6
Amaranthus seed	0	6
Bittergourd	2	7½
Tomato seeds	2	4
Snake ground seed	10	3½
Cluster beans	84	½
Agathi	45	1
Daincha	1	0
Sesbania speciosa	235	0
Cucumber seed	0	8
Papaya seed	0	1
Horsegram seed	6	0
Prosopis pods	39	0
Cotton kapas	39	11½
	Cents.	
Paddy seedlings	59·3	
	Nos.	
Papaya seedlings	75	
Lemon Nepali layers	49	
Citron layers	7	
Rajahmundry lemon layers	6	
Seville lime layers	22	
Acid lime layers	9	
Sesbania seedlings	4,900	
Guinea grass slips	300	
Tapioca cuttinga	4,410	
Malaipoovarasu cuttings	60	

RICE RESEARCH STATION,
TIRURKUPPAM,
10th August 1952.

M. K. VENKATASUBRAMANIAN,
Superintendent.

LAWLEY ROAD P.O., COIMBATORE,
14th August 1952.

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

GLOSSARY A.

Names of plants.

Local name.	Language.	English name.	Botanical name.
Nel	Tamil.	Rice	<i>Oryza sativa.</i>
Cumbu	Do.	Spiked millet	<i>Pennisetum typhoides.</i>
Ragi	Do.	.....	<i>Eleusine coracana.</i>
Verkadalai	Do.	Groundnut	<i>Arachis hypogea.</i>
Yel	Do.	Gingelly	<i>Sesamum indicum.</i>
Pungam	Do.	.....	<i>Pongamia glabra.</i>
Sanappu	Do.	Sunnhemp	<i>Crotalaria juncea.</i>
Takkaipoondur	Do.	Daincha	<i>Sesbania aculeata.</i>
Seemai agathi	Do.	.....	<i>Sesbania speciosa.</i>
Yeruthazhai	Do.	.....	<i>Gliricidia maculata.</i>
Yerukkan	Do.	Calotropis	<i>Calotropis gigantea.</i>
Avuri	Do.	Indigo	<i>Indigofera sumatrana.</i>
Kollu	Do.	Horsegram	<i>Dolichos biflorus.</i>
Thuvarai	Do.	Redgram	<i>Cajanus cajan.</i>
Naripayaru	Do.	Phillipesara	<i>Phaseolus trilobus.</i>
Makkacholam	Do.	Maize	<i>Zea mays.</i>
Cholam	Do.	.....	<i>Sorghum vulgare.</i>
Kudiraimasal	Do.	Lucerne	<i>Medicago sativa.</i>
Agathi	Do.	.....	<i>Sesbania grandiflora.</i>
Guinea pullu	Do.	Guinea grass	<i>Panicum maximum.</i>
Napier pullu	Do.	Thin Napier grass	<i>Pennisetum polystachyon.</i>
.....	.....	Buffalo or water grass.	<i>Brachiaria mutica.</i>
Anaipullu	Tamil.	Elephant grass	<i>Pennisetum purpureum.</i>
.....	.....	Australian drought resistant grass.	<i>Panicum antidotale.</i>
Thengu	Tamil.	Coconut	<i>Cocos nucifera.</i>
Sarkaraivalli	Do.	Sweet potato	<i>Ipomea batatas.</i>
Paruthi	Do.	Cotton	<i>Gossypium sp.</i>
Papali	Do.	Papaya	<i>Carica papaya.</i>
Vazhai	Do.	Plantain	<i>Musa sps.</i>
Vendai	Do.	Lady's finger	<i>Hibiscus esculantus.</i>
Keerai	Do.	Amaranthus	<i>Amaranthus sp.</i>
Thattapayaru	Do.	Cowpea	<i>Vigna catieng.</i>
Milagai	Do.	Chillies	<i>Capsicum sp.</i>
Kathiri	Do.	Brinjal	<i>Solanum melongena.</i>
Seemai thakkali	Do.	Tomato	<i>Lycopersicon esculantum.</i>
Kothavarai	Do.	Cluster beans	<i>Cyamopsis tetragonoloba.</i>
Vellari	Do.	Cucumber	<i>Cucumis sativus.</i>
Maravalli	Do.	Tapioca	<i>Manihot utilisima.</i>
Pavakkai	Do.	Bittergourd	<i>Momordica charantia.</i>
Pudal	Do.	Snakegourd	<i>Trichosanthes anguina.</i>
Sambu	Do.	Colocasia	<i>Colocasia antiquorum.</i>

GLOSSARY B.

Local names and expressions.

Local name.	Language.	English equivalent.
Gorru	Telugu	Seed drill.
Guntaka	Do.	Cultivator.
Karmaram	Tamil.	Iron tined inter-cultivator.
Kattimaram	Do.	Wooden cultivator for breaking clods and levelling.
Sornavari	Do.	Hot-weather season.
Navarai	Do.	Cold-weather season.
Kar	Do.	Short duration paddy seasons and varieties.
Kuruvai		

FINANCIAL STATEMENT EXHIBITING THE EXPENDITURE AND RECEIPTS OF THE AREAS IN WHICH BULK CROPS HAVE BEEN GROWN DURING 1951-52.

Expenditure per acre.															
(1)	(2)	(3)		(4)		(5)		(6)		(7)		(8)		(9)	
		RS.	A. P.	RS.	A. P.	RS.	A. P.	RS.	A. P.	RS.	A. P.	RS.	A. P.	RS.	A. P.
Sornavari ..	3.10	20	12 0	79	11 0	30	10 0	8	11 0	131	12 0	16	5 0	296	13 0
Samba ..	0.41	34	1 0	67	9 0	32	8 0	13	13 0	131	5 0	17	0 0	296	2 0
Navarai ..	1.40	31	1 0	79	11 0	23	8 0	12	14 0	131	12 0	11	12 0	290	10 0
Other crops.															
Gingelly ..	1.23	16	10 0			9	10 0	0	10 0			9	6 0	36	4 0
Ragi ..	0.46	10	6 0	8	10 0	10	14 0	5	1 0	23	0 0	8	10 0	68	9 0
Groundnut ..	1.12	9	14 0	20	10 0	30	2 0	2	15 0	10	0 0	26	7 6	100	0 6
Receipt per acre.															
	Grain yield in lb.	Value.		Straw yield in lb.	Value.		Total.		Profit or loss. + or -						
	(10)	(11)		(12)	(13)		(14)		(15)						
		RS.	A. P.		RS.	A. P.	RS. A. P.								
Sornavari ..	2,680	363	11 0	2,603	36	0 0	369 11 0		+ 102 14 0						
		Deduct for supervisory staff and miscellaneous cultivation expenses ..						12 13 0							
		Net profit ..						90 1 0							
Samba) ..	2,101	297	11 0	3,950	39	7 0	337 2 0		+ 41 0 0						
		Deduct for supervisory staff and miscellaneous cultivation expenses ..						12 13 0							
		Net profit ..						28 3 0							
Navarai ..	1,024	141	5 0	3,636	36	6 0	177 11 0		- 112 15 0						
		Deduct for supervisory staff and miscellaneous cultivation expenses ..						12 13 0							
								- 125 12 0							
Other crops.															
Gingelly ..	305	166	12 0	..	..	..	166 12 0		+ 130 8 0						
		Deduct for supervisory staff and miscellaneous cultivation expenses ..						12 13 0							
		Net profit ..						+ 117 11 9							
Ragi ..	264	49	8 0	1,440	14	6 5	63 14 5		- 2 10 7						
		Deduct for supervisory staff and miscellaneous cultivation expenses ..						12 13 0							
								- 15 7 7							
Groundnut ..	294	82	8 0	1,470	14	11 2	97 3 2		- 2 13 4						
		Deduct for supervisory staff and miscellaneous cultivation expenses ..						12 13 0							
								- 15 10 4							

One-third of the emoluments of the Farm Assistant during supervisory work and one-third wages of the mistry, store boy and irrigator under miscellaneous cultivation expenses have been apportioned towards the cultivation expenses of bulk crops. The total area cropped was 56.24 acres and the cost of supervisory work for bulk worked to Rs. 8-13-0 per acre and miscellaneous cultivation expenses comes to Rs. 4 per acre. Rs. 12-13-0 have to be added to the cost of cultivation of each of the crops.

The cost of irrigation is high since the crops had to be maintained entirely by lift irrigation.

APPENDIX I.

FINANCIAL STATEMENT OF THE RICE RESEARCH STATION, TIRURKUPPAM,
FOR THE YEAR 1951-52 (FASLI 1361).

A. Expenditure.

40. C. Agriculture—Experimental Farms—A. Agricultural Research Stations—
Authorized—

	RS.	A.	P.
1. Pay of officer ..	3,122	0	0
Pay of establishment ..	7,306	9	0
Travelling allowance ..	1,139	0	0
Dearness allowance ..	3,321	0	0
2. Contingencies—			
Dearness allowance to menials ..	4,111	3	0
Service postage ..	300	0	0
Other contingencies ..	115	12	9
Petty construction and repairs ..	1,214	11	6
Dead and livestock ..	3,724	12	3
Apparatus and materials ..	116	9	6
Working expenses ..	21,002	5	9

B. Receipts.

XXIX. Agriculture—									
Agricultural Stations ..	1,918	6	6						
Miscellaneous ..	312	0	6						
Rent on rest-house ..	28	12	0						
	2,259	3	0						
Value of seeds transferred to districts ..	4,876	6	3						
	7,135	9	3						

APPENDIX II.

STEPS TO INCREASE THE REVENUE AND REDUCE THE EXPENDITURE.

Since the dearth for irrigation water was the chief limiting factor in bringing the maximum area under cultivation and reducing the fallow period, steps were taken to deepen wells and locate underground water-supply. Two filter points were installed inside the main well and one in block No. 1. Silt clearance was done periodically to augment the supply of water in wells.

Since cultivation has to depend entirely on lift irrigation installation of electric motors would minimise cost of production. The Electricity department was requested to expedite the extension of electricity to the farm and the installation of electric motors and pumpsets.

Manuring is one of the main items in the cost of cultivation. The planting of *Sesbania speciosa* along the field bunds to be used as green manure was adopted as a regular practice with a view to reducing the cost of manuring and stepping up yields. To attain self sufficiency in green manures *Gliricidia* was planted all along the boundary of this station and on the main bunds. All waste places were planted with green manure shrubs like *Adothoda*, *Calotropis*, *Cassia auriculata*, *Ipomea carnea* and green manure yielding trees like *Cassia siamea*, and *Indigofera teysmanii*. Composting farm waste and using it as manure has become a regular practice. This reduces the expenditure on manures like groundnut cake and ammonium sulphate.

Layers of citrus plants and grafts of mango and sapota were prepared for sale.

Since it was not possible to extend the area under paddy in the different seasons owing to the acute drought, with a view to reducing the fallow period other crops like cotton, ragi, groundnut, tapioca and vegetables which require less water were grown.

The cost of cultivation under muzdoor labour was reduced as much as possible by adopting labour-saving implements like the puddler and trampler in the cultivation of paddy.

ANNUAL REPORT OF THE PULSES BREEDING STATIONS, COIMBATORE, DHARMAPURI AND VIZIANAGARAM, FOR THE YEAR 1951-52 (FASLI 1361).

The report relates the work done on the scheme on the research on pulses at the three breeding stations at Coimbatore, Dharmapuri and Vizianagaram.

A. PULSES BREEDING STATION, COIMBATORE.

2. *Season and rainfall.*—The particulars of rainfall during the three seasons of the year, along with those of last year and the previous ten years, are summarized in the statement below:—

Season.	1951-52.		1950-51.		Average of ten years.	
	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.
South-west monsoon	4.54	11	6.46	14	4.67	11
North-east monsoon	10.34	19	11.24	13	13.55	21
Hot weather	1.70	5	4.54	11	4.89	11
Total ..	16.68	35	22.24	38	23.11	43

The total rainfall during the year was below normal and the distribution also very uneven. Though there were rains in the months of June and July they were insufficient to sow the crops, till the third week of July, when the early season pulses were sown. The monsoon instead of strengthening began to wane with the result that dry and hot weather prevailed in the months of August and September which had an adverse effect on the crops sown. The rains in September and October were helpful to sow the late season pulses in time. But the heavy rain in the first week of November was detrimental both to the early sown and late sown crops. The early cessation of the north-east monsoon rains and setting in of the dry weather in the month of November were very detrimental to all the crops. The season was abnormal and the yields obtained from some of the experimental plots were low.

3. *Redgram (Cajanus cajan Millsp.)*—(i) *Yield trial.*—Redgram was sown in the last week of July 1951 with the outbreak of the south-west monsoon. Culture No. 37 of Salem sub-station and culture No. 74 of the first batch of selections were sown along with No. 1723 and No. 2900, earlier releases of Coimbatore in replicated plots for comparison of yield for the fourth year. The crop had a set back due to the dry weather that prevailed after sowing. Pod formation was also affected by the heavy rains in the first week of November. The plots were harvested in the second week of February 1952. The differences in the yields obtained were not statistically significant, as in the previous three years. The results are given in Table I.

TABLE I.—Yield trial of redgram cultures, 1951-52.

Field No.—82.		Plot size—Gross—16' x 21'. Net—8' x 19'.				
Manure—Nil.		Spacing—4' x 9'.				
Variants—4.		Sown on—24th July 1951.				
Layout—Randomized blocks.		Harvested on—13th February 1952.				
Replications—8.						
Particulars.	No. 37.	No. 74.	No. 2900.	No. 1723 (control).	Standard error of mean.	Significance by 'F' test (P=0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Grain yield per acre in lb. ..	202	171	167	169	23	No.
Percentage on control ..	*119.5	101.2	88.8	100	..	..

Results of previous years' trials.

Year.	Grain yield in lb. per acre.				Significance by 'T' test (P = 0.05).	Critical difference.
	No. 37.	No. 74.	No. 2900.	No. 1723 (control).		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1948-49	520	571	..	560	Yes.	162
1949-50	661	524	..	429	No.	..
1950-51	810	698	574	782	No.	..

(ii) *Preliminary yield trial.*—Fifty-two cultures of the second batch of selections were compared for yield with No. 37 in preliminary yield trial plots. The differences were not statistically significant. Based on yield and other characters 24 cultures whose yields were more than the standard were retained for further trials.

(iii) *Short duration redgram.*—Twelve cultures of the Tenkasi short duration variety (4½ months) were compared with the bulk seed sample. The crop suffered badly due to the adverse seasonal conditions and the yields were very low. Hence no conclusions could be drawn from them. These 12 selections, a single plant selection from the same variety collected from Perambalur (No. 1141) and 27 fresh selections made in the Tenkasi bulk plots of the main season 1951-52 were sown under irrigation on the 14th February 1952, for study and selection. This crop also was adversely affected due to the dry weather and want of sufficient water-supply for irrigation. From the progeny of these, 24 single plants were selected from 15 families.

(iv) *Varieties and types.*—Fifty-six types of local and of extra provincial origin were sown, for maintenance of type collection.

(v) *Study of perennial habit.*—Twelve varieties and types of redgram, hill variety of Thadagam, Viravada white, Virivada brown, Gunupur, Nagpur E.B. 3, Nagpur Tur 31, N.P. 64, N.P. 80, Hawaii, culture No. 37 (Salem), culture No. 97 (Vizianagaram), and Tenkasi short duration variety were sown in August 1951 in a separate plot. Subsequently, five more selections, four from Sitammapeta agency, and one from Srungavarapukota were sown in September 1951. The majority of the plants of the early sown group survived, after the harvest of pods in March 1952. In the later sown varieties only few plants survived. Even the Tenkasi variety continued to grow, and flowered and produced pods in April-May 1952. A few plants in each were also pruned to study its effect. There was severe mealy bug attack during the summer months, and a few plants completely dried up. The study indicated that any variety of redgram could be maintained as a perennial plant, if irrigated during the hot weather period. The study is being continued with more varieties.

(vi) *Seed multiplication.*—Culture No. 37, No. 2900 and Tenkasi variety were grown for seed multiplication. The areas and the yields of the plots are furnished below:—

Variety.	Area in acres.	Sown.	Harvested.	Yield of grain.	
				Plot, lb.	Acre, lb.
No. 37 (Salem)	1.30	24 July 1951	1 February 1952	351	270
No. 2900 ..	1.45	Do.	2 February 1952	430	331
Tenkasi ..	0.60	Do.	19 January 1952	76	127

4. *Greengram (Phaseolus aureus, Roxb.)*—(i) *Yield trial.*—Out of three cultures of greengram, No. 53, No. 62 and No. 148, compared during the previous three years, the best of them, No. 62, was compared for the fourth and final year with local bulk seed. The plots were sown in the last week of July 1951. The crop was adversely affected by drought in the early stages. The mature pods were harvested

in three instalments in November-December 1951. The differences in yield were significant. Culture No. 62 maintained its superiority by yielding 34.7 per cent more than the standard. The results are furnished in Table II.

TABLE II.—Yield trial of greengram cultures, 1951-52.

Field—No. 62.	Plot size—Gross—16' × 24'.
Manure—Nil.	Net—12' × 22½'.
Variants—2.	Spacing—2' × 9".
Layout—ABBA.	Sown on—26th July 1951.
Replications—8.	Harvested on—24th November 1951, 10th December 1951 and 25th December 1951.

Particulars.	No. 62	Local.	Standard error of mean.	Significance by 'T' test (P = 0.05).	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)
Grain yield per acre in lb. ..	132	98	8	Yes.	26
Percentage on control ..	134.7	100	..	..	..
Conclusion—No. 62, Local.					

Results of previous years' trials.

Year.	Grain yield in lb. per acre.		Significance by 'T' test (P = 0.05).	Critical difference.
	No. 62.	Local.		
(1)	(2)	(3)	(4)	(5)
1948-49	655	550	Yes.	89
1949-50	..	Crop failed.	..	..
1950-51	408	315	Yes.	84

(ii) *Preliminary yield trial.*—Seven cultures of the second batch of selections carried forward from the previous years' study plots were compared for yield against culture No. 62. Six of them which were selections from Ariyalur and Perambalur types, were about a month later than No. 62. The plots were harvested in four instalments as and when they ripened. The analysis and yield data revealed that all of them were poorer than the standard. The yield data are furnished in Table III. Twelve single plant selections have been taken for further study from Ariyalur, Koilpatti and Coimbatore samples, for isolating a longer duration type.

TABLE III.—Yield trial of greengram cultures, 1951-52.

Field No.—62.	Plot size—Gross—6' × 24'.
Manure—Nil.	Net—2' × 22½'.
Variants—8.	Spacing—2' × 9".
Layout—Randomized blocks.	Sown on—26th July 1951.
Replications—4.	Harvested on—10th December 1951 and 27th December 1951.

Particulars.	No. 62.	1535.	1711.	1506.	1509.	1511.	1510.	1554.	Standard error of mean.	Significance by 'F' test (P = 0.05).	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Grain yield per acre in lb. ..	215	148	148	78	70	63	47	32	13	Yes	38
Percentage on control ..	100	68.8	68.8	36.3	32.6	29.3	21.8	15.3	..	..	..
Conclusion—No. 62, 1535, 1711, 1506, 1509, 1511, 1510, 1554.											

(iii) *Varieties and types.*—Fifty-eight types, consisting of district varieties, cultures, extra-State types and selections from crosses, were sown on dry land in July 1951, and from their progeny 43 types and ten single plants from progenies of four crosses were taken. Nine district samples were sown in dry land on 26th September 1951 and bulk seed was selected from all of them. Four hybrid progenies of greengram X blackgram received from Annamalai University along with the parents were sown in September 1951 for study. The two parents and 26 selections from the progenies of the hybrids were taken for further study. Nine types received from Indore were sown on 20th October 1951. These flowered by the end of November and were harvested during the last week of December 1951, about 70 days after sowing. All the types were carried forward for further study. Two

improved cultures, Moong Type 1 from Uttar Pradesh and Moong No. 49 from Kulu, Punjab, were tested in pots. These too were of short duration maturing in less than two months. The pods of Moong No. 49 were about 8 cm. long and the seeds nearly double the size of ordinary greengram.

(iv) *Wet land trials*.—Fifteen wet land types of the State, two of Indian Agricultural Research Institute, New Delhi, and nine from Indore were sown in wet land in January 1952, as an after-paddy crop. The plants withered away by the middle of February 1952 in spite of irrigation. Probably the soil and climatic conditions of Coimbatore are not suitable for the crops during summer.

(v) *Exotic types*.—A type of Perennial Mung from Philippines and *Phaseolus aureus* from Brazil were tried both on dry and garden land, sown at different times from the beginning of July 1951. In the plots sown in dry land by the end of July 1951 the plants did not survive due to drought subsequent to sowing. In the garden land the plants from the July sowing flowered in 150 days, while those sown one month and two months later flowered in 100 and 90 days, respectively, after sowing. These completed flowering and pod formation by the end of February 1952. Though they were regularly irrigated the plants dried up during the hot weather in April 1952. The two varieties were similar in all respects.

(vi) *Seed multiplication*.—Greengram culture No. 62 was sown on about 75 cents in July 1951, for seed multiplication, and 150 lb. of seed was obtained, which worked out at 200 lb. per acre. Due to the unfavourable seasonal conditions many plants dried up, and consequently the yield was low.

5. *Black gram*—(*Phaseolus mungo*, L.)—(i) *Yield trial*.—Two cultures, No. 212 and No. 216, of the first batch of selections, were compared for yield against the local bulk for the third year. The plots were sown in the last week of September 1951, and were harvested in two instalments, in December 1951 and January 1952. The local was about a week later to flower than the cultures. Due to the early cessation of the north-east monsoon the growth of the plants was poor and yields of grain were low. Both the cultures yielded significantly more than the standard, as in the previous two years. The results are furnished in Table IV.

TABLE IV.—Yield trial of blackgram cultures, 1951-52.

Field No.—62. Manure—Nil. Variants—3. Layout—Randomized blocks. Replications—12.	Plot size—Gross—16' × 24'. Net—12' × 22'. Spacing—2' × 9". Sown on—26th September 1951. Harvested on—31st December 1951 and 16th January 1952.					
Particulars.	No. 212.	No. 216.	Local.	Standard error of mean.	Significance (P=0.05).	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Grain yield per acre in lb. ..	142	120	54	16	Yes.	48
Percentage on control ..	263.1	222.2	100	..	..	..
Conclusion—No. 212, No. 216, Local.						

Results of previous year's trials.

Year.	Grain yield per acre in lb.			Significance by 'Z' test (P=0.05).	Critical difference per acre.
	No. 212.	No. 216.	Local.		
(1)	(2)	(3)	(4)	(5)	(6)
1949-50	210	228	151	Yes.	42
1950-51	228	238	114	Yes.	41

(ii) *Single plant selections*.—Thirty-six selections of the second batch of selections retained for further study in the previous year, were grown in non-replicated rows and studied, and 24 of them were carried forward for yield tests.

(iii) *Varieties and types*.—Sixty types, consisting of 36 from the State and 24 from outside the State were grown for the maintenance of types and selection. All the types were carried forward. Seven types received from Indore were sown in small plots in October 1951 and four types received from Gwalior were sown in pots in May 1952 and seeds multiplied. These were of short duration (75 days).

(iv) *Wet land types*.—Thirty types consisting of 21 from east and west coast districts of the State, seven from Indore and two from the Indian Agricultural Research Institute, New Delhi, along with bulk seed of Aduthurai, No. 189 of Vizianagaram and No. 212 of Coimbatore, were sown in wetland in the first week of January 1952. In spite of irrigation all the plants in the plots dried up by the middle of February 1952, and the trial had to be abandoned. As in the case of greengram probably the soil and climatic conditions of Coimbatore are not suitable for this crop also.

(v) *Seed multiplication*.—Cultures No. 212 and No. 216 were sown for seed multiplication on fifty cents and forty cents, respectively, during the last week of September 1951. The plots were harvested by the end of December 1951. One hundred pounds of seed of No. 212 and 70 lb. of seed of No. 216 were obtained. The yields were low due to the abnormal seasonal conditions.

6. *Horsegram* (*Dolichos biflorus*, L.)—(i) *Yield trial*.—Horsegram culture No. 35 was compared with D.B. 7 for the fourth year. The plots were sown in the third week of September 1951 and harvested in the second week of February 1952. Due to the unfavourable seasonal conditions the yields were low this year also. Culture No. 35 yielded nearly double that of D.B. 7. The results are furnished in Table V. Culture No. 35 has yielded more than D.B. 7 in all the previous trials also, but the difference in yield was significant only in one year.

TABLE V.—Yield trial of horsegram cultures, 1951-52.

Field No.—62. Manure—Nil. Variants—2. Layout—ABBA. Replications—18.	Plot size—Gross—12' x 36'. Net—8' x 34'. Spacing—2' x 9". Sown on—18th September 1951. Harvested on—9th February 1952.					
	Particulars.	No. 35.	D.B. 7.	Standard error of mean.	Significance 't' value. (P=0.05).	Critical difference.
	(1)	(2)	(3)	(4)	(5)	(6)
	Grain yield in lb. per acre	260	119	29	Yes.	90
	Percentage on control	218.5	100	..	..	..
Conclusion—No. 35, D.B. 7.						

Results of previous years' trials.

Year.	Grain yield per acre in lb.		Significance.	Critical difference.
	No. 35	D.B. 7		
(1)	(2)	(3)	(4)	(5)
1948-49	312	292	No.	28
1949-50	144	94	Yes.	..
1950-51	140	118	No.	..

(ii) *Preliminary yield trial*.—Twenty-four cultures were compared with D.B. 7 in Lattice Design layout for the second year. As the plants in many plots dried up due to the drought, the yield data were not recorded. Thus for the second year no results could be had on the performance of these cultures. The trial will be repeated, next season.

(iii) *Varieties and types*.—Thirty-three cultures grown for seed multiplication dried up completely and no seed could be gathered. Thirteen types including culture No. 4 of Coimbatore and No. 76 and No. 93 of Vizianagaram, were grown for study and maintenance. The Vizianagaram types were severely affected by wilt.

(iv) *Seed multiplication*.—D.B. 7 and No. 35 were grown for multiplication on one acre and fifty cents respectively. The yields of grain were 186 lb. per acre for D.B. 7 and 62 lb. per acre for culture No. 35. One hundred and seventy pounds of seed of the former and twenty-eight pounds of the latter were obtained.

7. *Bengalgram (Cicer aristinum, L.)*—(i) *Yield trial*.—Four cultures, No. 94, No. 112, No. 468 and No. 482, were compared for yield, two of them for the second year. The plots were sown during the first week of November 1951. But due to the early cessation of the rain and setting in of dry weather in December 1951, the crop was adversely affected and in some plots the plants dried up before flowering. It was also subject to caterpillar attack. Hence the yield data were not recorded.

(ii) *Preliminary yield trial*.—Twenty-five cultures, including cultures No. 94, No. 112, No. 468, No. 482 and No. 2965, were tested in Lattice Design layout. The crop in these plots also fared the same fate as in the yield trials. So the yields were not recorded.

(iii) *Varieties and types*.—One hundred and fifteen types were grown for study and maintenance.

(iv) *Seed multiplication*.—Culture No. 482 was grown on five acres and 2,167 lb. of seed was obtained.

8. *Lablab (Dolichos Lablab, L.)*—(a) *Field variety*—(i) *Preliminary yield trial*.—Forty-eight black seeded cultures were compared with D.L. 1458, and 79 cultures of different shades of colour were compared with D.L. 173 and D.L. 231 in Lattice Design layout. The plots were sown during the last week of July 1951 and harvested in January-February 1952. The crop was affected by the adverse season and was also subject to pod borer attack. The stand was very uneven. In the first set none of the cultures excelled the standard, D.L. 1458, while in the second set 12 cultures were superior to D.L. 231. The results are furnished in Tables VI and VII.

TABLE VI.—*Preliminary yield trial of lablab cultures (black seed) 1951-52.*

Field number—82. Manure—Nil. Variants—49. Layout—Lattice design. Replications—4.		Size of plot—Gross—12' × 15'. Net—4' × 13'. Spacing—4' × 1'. Sown on—25th July 1951. Harvested on—25th January 1952.			
Culture number.	Mean yield per plot in oz.	Culture number.	Mean yield per plot in oz.	Culture number.	Mean yield per plot in oz.
2545 *	11.26	2426 *	8.29	2273	6.19
2492 *	10.26	2526	7.93	2421	6.06
2485 *	10.13	2272	7.83	2535	6.01
2487 *	10.00	2418	7.83	2425	5.81
2540 *	9.83	2533	7.67	2554	5.44
2541 *	9.80	2547	7.64	2536	5.29
2270 *	9.61	2267	7.63	2428	4.86
2542 *	9.58	2466	7.58	2274	4.56
2537 *	9.53	2538	7.57	2268	4.53
2478 *	9.53	2539	7.44	2422	4.52
2546 *	9.19	2557	6.52	2423	4.48
2544 *	9.16	2555	6.47	2427	3.72
2429 *	8.92	2561	6.43	2420	3.37
2543 *	8.61	2472	6.42	2276	3.28
2271 *	8.53	2269	6.38	2275	2.88
2553 *	8.41	2419	6.31	2224	1.64
				D.L. 1458	12.63

Significance by 'F' test ($P = 0.05$)—Yes.

Standard error—1.61.

Critical difference per plot—4.58 oz.

Conclusion—17 cultures (marked *) were on a par with D.L. 1458 (Control).

TABLE VII.—*Preliminary yield trial of lablab cultures (II series).*

Field number—82. Manure—Nil. Variants—81. Layout—Lattice design. Replications—4.		Plot size—Gross—12' × 18'. Net—4' × 13'. Spacing—4' × 1'. Sown on—25th July 1951. Harvested on—14th February 1952.			
Culture number.	Mean yield per plot in oz.	Culture number.	Mean yield per plot in oz.	Culture number.	Mean yield per plot in oz.
2386 * B	10.89	2279 M	5.71	2323 R	2.82
2382 * B	10.58	2469 M	5.67	2302 R	2.74
2381 * B	10.58	2451 B	5.63	2452 B	2.73
2464 * M	9.95	2134 R	5.61	2476 M	2.45
2329 * R	9.91	2552 W	5.48	2491 M	2.37
2463 * M	9.77	2327 R	5.45	2328 R	2.36
2326 * R	9.03	2361 B	5.39	2376 B	2.31
2468 * B	8.83	2550 W	5.30	2454 M	2.01
2413 * B	8.64	2519 B	5.29	2364 B	1.69
2405 * B	8.43	2416 R	5.19	2380 B	1.46
2475 * M	8.38	2510 R	5.13	2304 R	1.38
2410 * B	8.14	D.L. 231 B	4.93	2372 B	1.32
2465 * M	7.62	2224 W	4.77	2488 M	1.12
2407 B	7.51	2473 M	4.63	2458 M	1.10
2383 B	7.44	2366 B	4.53	2412 B	0.86
2307 R	7.06	2483 M	4.39	2462 M	0.81
2463 M	7.01	2337 B	4.38	2460 M	0.54
2411 B	6.81	2363 B	4.09	2506 R	0.50
2234 R	6.71	2490 M	3.70	2277 M	0.36
2470 M	6.62	2280 M	3.63	2505 R	0.08
2332 B	6.58	2384 B	3.55	2461 M	0.05
2409 B	6.51	D.L. 173 W	3.43	2520 R	0.04
2325 R	6.28	2445 R	3.38	2365 B	..
2549 W	6.19	2448 B	3.38	2379 B	..
2440 R	6.19	2235 R	3.37	2453 R	..
2403 B	6.19	2362 B	3.34	2489 M	..
2333 B	6.06	2467 M	3.23	2503 R	..

B=Buff. R=Red. M=Mottled. W=White.

Significance by 'F' test ($P = 0.05$)—Yes.

Standard error—1.12.

Critical difference per plot—3.14 oz.

Conclusion—12 cultures (marked *) were superior to culture D.L. 231 (Standard).

(ii) *Varieties and types*.—One hundred and twenty-five cultures were grown for study and selection, and 29 of them have been selected for further study.

(b) *Vegetable type*.—Six high yielding, good quality, vegetable types were grown under irrigation for multiplying seed, and 19 lb. of seed was obtained. Seventeen types, including a new sample from a seedsman, were grown for maintenance of types. D.L. 1428, a type from a cross between field and vegetable lablab was grown for seed multiplication, and 23 lb. of seed was obtained from 18 cents.

9. *Cowpea (Vigna unguiculata, walp.)*—(a) *Field variety*—(i) *Preliminary yield trial*.—Eighty cultures from the second batch of selections were compared with C. 57 in Lattice design layout. The crop was sown during the last week of July 1951. Due to want of rain germination was uneven and low. Consequently, the plots were gappy. The yield data were statistically analysed and the results were not significant. Forty cultures were grown for multiplication of seed.

(ii) *Varieties and types*.—Thirty varieties and types were grown for maintenance of types.

(b) *Vegetable variety*.—Twenty varieties and selections were grown for study and maintenance, from July 1951 to September 1951. Three natural crosses in C. 419 were grown and ten selections were taken for study. E.C. 455—a type from Philippines, similar to C. 419—long podded type (*V. Sesquipedalis*), and E.C. 778 (a) from Burma—similar to New Era cowpea, were tested in observation plots. The pods of E.C. 455 were on the average of 16.5 inches long compared to the length of 12.5 inches of those of C. 419. E.C. 455 yielded 45 per cent more than C. 419, and E. C. 778 (a) about 30 per cent more than New Era. A type of Asparagus bean obtained from a seedsman and tested did not thrive. Forty-three pounds of C. 419 and 70 lb. of New Era were produced for distribution.

10. *Miscellaneous pulses*—(i) *Cluster bean* (*Cyamopsis tetragonoloba*, Taub).—Twenty varieties of cluster bean were grown for study and maintenance of types.

(ii) *Soyabean*.—Thirty types of soyabean including two new edible types, Tata-5 and Bansei, were sown in July-August 1951 for study. The duration of these types ranged from 85 to 180 days. Piave of Italy had the shortest duration of 85 days and was found to be very poor in growth and production. Varieties of Chinese origin and those obtained from America were early (100 to 120 days) and those of Burmese origin were late (150 to 180 days). The edible types were poor in germination as well as in growth and production.

Four short duration varieties were sown in dry land along with bengalgram in the first week of November 1951. These commenced to flower in 30 to 35 days after sowing and were harvested in 80 to 90 days. Due to the failure of the monsoon growth and development of plants and production of pods were poor. But the trial indicated that they could be grown as a dry land crop in normal seasons.

Eighteen short duration types, including a new edible type, Black Eye from Canada, were sown towards the end of November 1951, under irrigation. The duration of these ranged from 120 to 125 days, slightly longer than in the south-west monsoon season. But their growth and production, were not satisfactory as in the latter. The type Black-Eye was similar to Tata-5 in duration and size of pod and grain. The Italian variety piave did not grow well this season also.

Nineteen varieties of short duration were sown towards the end of March 1952 as a summer season crop. One failed to germinate and three varieties turned pale and dried up due to wilt (*Rhizoctonia bataticola*). The harvest of these was commenced by the end of June 1952.

(iii) *Phaseolus calcaratus*.—E.C. 988, Rice bean, obtained from Brazil was grown for study. The plant was similar to greengram, but the pods were smaller in size and glabrous.

11. *Seed distribution*.—A total quantity of 4,748 lb. of seed of different pulses were distributed during the year.

12. *Mixed cropping experiments*.—Two sets of mixed cropping experiments one sown during the south-west monsoon and the other in the north-east monsoon season, started in 1946-47, was repeated on the same lines, as in previous years. The first set in which the crops involved were redgram, greengram, cowpea, lablab, Chulam and Varagu was sown in the last week of July 1951. Germination was not satisfactory due to want of sufficient moisture in the soil and absence of rain subsequent to sowing. The plots were gappy and uneven. So no satisfactory data could be collected from this trial. The second set in which the crops were blackgram, greengram, horsegram, Tenai and Cotton was sown in the third week of September 1951. The crops were harvested as and when they matured. The yields were low due to unfavourable season. The total money value of the produce from each treatment was calculated and statistically analysed. Blackgram grown mixed with cotton gave the highest monetary return. The results are furnished in Table VIII.

TABLE VIII.—Mixed cropping trials, 1951-52.

North-east monsoon season.

Field No.—62.
Manures—Nil.
Variants—3.
Layout—Randomised blocks.
Replications—6.

Plot size—Gross—15' x 45'.
Net—11' x 44'.
Sown on—17th September 1951.
Harvested on—12th April 1952.

Serial number and particulars of treatments.	Blackgram.		Cotton.	
	Grain.	Bhusa.	Kapas.	Stalks.
1 Blackgram and cotton	64	400	423	920
	Horsegram.		Cotton.	
	Grain.	Bhusa.	Kapas.	Stalks.
2 Horsegram and cotton	7	105	402	836

Serial number and particulars of treatments.	Tenai.		Greengram.	
	Grain.	Bhusa.	Grain.	Bhusa.
3 Tenai and greengram	645	1,295	135	200
	Cotton.			
	Kapas.	Stalks.		
4 Cotton (pure)	403	950	....	
	Blackgram.			
	Grain.	Bhusa.		
5 Blackgram (pure)	183	365	....	
	Greengram.			
	Grain.	Bhusa.		
6 Greengram (pure)	293	270	....	
	Horsegram.			
	Grain.	Bhusa.		
7 Horsegram (pure)	25	75	....	
	Tenai.			
	Grain.	Bhusa.		
8 Tenai (pure)	1,135	2,635	....	

Particulars.	Calculated value per acre in rupees.
1 Blackgram and cotton	232.7
2 Horsegram and cotton	198.4
3 Greengram and tenai	163.2
4 Cotton (pure)	197.0
5 Blackgram (pure)	69.3
6 Greengram (pure)	108.9
7 Horsegram (pure)	6.5
8 Tenai (pure)	203.0
Standard error of mean	16.8
Significance	Yes.
Critical difference	47.3
Conclusion—1, 8, 2, 4, 3, 6, 5, 7.	

During the past six years during which the experiment has been in progress the early season trial was not sown in two years, and failed in three years, and results were obtained only in one year, 1948-49. The second set was not sown in one year and the crops sown failed in two years, and results were obtained only in three years. As the conditions of Coimbatore do not appear to be suitable for the conduct of these trials the experiments have been concluded.

B. PULSES BREEDING SUB-STATION, DHARMAPURI.

13. *Season*.—The work on this station was carried on on 13.61 acres of leased land. This year also the season was unfavourable for all the pulses, as in the previous three years. The south-west monsoon which commenced with light showers in the first week of July 1951 weakened later with the result that the early sown pulses suffered due to drought. Again, the north-east monsoon, which broke in the first week of October 1951, failed later with the result the late season crop of horsegram completely failed and the long duration crops of redgram and lablab were adversely affected.

14. *Redgram*—(i) *Yield trial*.—Two cultures, No. 37 and No. 2900 were compared with the local bulk. This was the fifth year of the trial of the culture No. 37. The crop was sown during the first week of July 1951 and harvested during the second week of February 1952. Culture No. 37 yielded 25 per cent more grain than the local. Though it had been yielding consistently more than

the local bulk this is the second year in which the yield differences were statistically significant. The results are furnished in Table IX.

TABLE IX.—Yield trials of redgram cultures, 1951-52.

Variants—3.			Spacing—4' × 9".			
Layout—Randomized blocks.			Sown on—6th July 1951.			
Replications—10.			Harvested on—14th February 1952.			
Plot size—Gross—24' × 24'.						
Net—16' × 21'						
Particulars.	No. 37.	No. 2900.	Local.	Standard error of mean.	Significance by 'F' test (P = 0.05).	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Grain yield per acre in lb.	579	473	463	24	Yes.	74
Percentage on control ..	125.1	102.1	100	..	..	..
Conclusion—No. 37. <u>No. 2900.</u> Local.						

Results of previous years' trials.

Year.		Grain yield per acre in lb.			Significance.	Critical difference.
(1)		No. 37	No. 2900	Local.	(5)	(6)
1947-48 ..	..	786	..	476	Yes.	162
1948-49 ..	..	215	..	210	No.	..
1949-50 ..	..	439	..	397	No.	..
1950-51 ..	..	108	..	100	No.	..

(ii) Preliminary yield trial.—Thirty-five cultures of the second batch of selections were compared against local bulk in lattice design layout. Three cultures, No. 31, No. 114 and No. 206, were found to be superior to the standard. The results are furnished in Table X.

TABLE X.—Preliminary yield trial of redgram cultures, 1951-52.

Variants—36.		Spacing—4' × 9' .			
Layout—Lattice design.		Sown on—6th July 1951.			
Replications—4.		Harvested on—13th February 1952.			
Plot size—Gros—12' × 18'					
Net—4' × 15'					
Culture number.	Mean yield per plot in oz.	Culture number.	Mean yield per plot in oz.	Culture number.	Mean yield per plot in oz.
(1)	(2)	(3)	(4)	(5)	(6)
206*	16.60	21	9.72	175	8.37
31*	12.61	172	9.44	27	8.24
114*	11.74	154	9.35	363	7.90
33	10.95	105	9.20	46	7.82
210	10.67	51	9.20	241	7.66
55	10.65	18	9.07	60	7.54
63	10.53	189	8.86	166	7.51
159	10.51	95	8.78	Local	7.20
45	10.17	23	8.72	89	7.20
53	10.14	165	8.64	273	7.10
328	10.09	26	8.56	192	4.02
39	10.08	345	8.42	61	3.90

Significance by ('F' test) (P = 0.05)—Yes.

Standard error—1.58.

Critical difference—4.47 oz.

* Conclusion—Three cultures No. 206, No. 31 and No. 114 are significantly better than local variety.

15. Lablab.—Four cultures, Nos. 44 and 92, D.L. 173 and D.L. 231, were compared with local for the fourth year. This crop was very much affected by the adverse season and yields obtained were very low. The yield differences were not significant. The results are furnished in Table XI.

TABLE XI.—Yield trial of lablab cultures, 1951-52.

Variants—5.		Spacing—4' × 1'.	
Layout—Randomized blocks.		Sown on—11th July 1951.	
Replications—10.		Harvested on—19th February 1952.	
Plot size—Gross—20' × 20'.			
Net—12' × 18'.			

Particulars.	No. 92.	No. 44.	D.L. 173.	D.L. 231.	Local.	Standard error of mean.	Significance (P = 0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Grain yield per acre in lb.	242	177	145	137	89	39	No.
Percentage on control ..	271.9	198.8	162.9	154.0	100	..	..

Results of previous years' trials.

Year.	Grain yield per acre in lb.					Significance.	Critical difference.
	No. 92.	No. 44.	D.L. 173.	D.L. 231.	Local.		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1948-49 ..	79	100	..	86	86	No.	..
1949-50 ..	339	332	280	275	300	No.	..
1950-51 ..	97	174	155	56	120	Yes.	42

16. Horsegram.—Four cultures, Nos. 86, 122, 153 and D.B. 7, were compared for yield against local bulk for the fourth year. The crop was sown in the third week of October 1951. Due to the early cessation of the north-east monsoon, the plants dried up without producing pods. Hence the trial was abandoned.

17. Mixed cropping experiment.—The mixed cropping trial with redgram, horsegram, groundnut, Chulam, Varagu and Samai, commenced in 1946-47, was repeated with the same set of fifteen treatments. Early season crops were sown in the second week of July 1951 and horsegram in the third week of October 1951. The long duration cereals and the late season crop of horsegram failed completely. So, the trial had to be abandoned this year also as in the previous year.

C. PULSES BREEDING SUB-STATION, VIZIANAGARAM.

18. Season.—The work at this station was continued on leased lands. The total rainfall recorded during the year was 47.74 inches on 56 days as against 29.52 inches on 54 days during the previous year. The rainfall was normal, and distribution was even and favourable to dry land crops. But an unusual cyclonic weather in November 1951 damaged the pulses sown in wet land after paddy.

19. Redgram.—(i) Yield trial.—Two cultures, No. 72 (medium duration) and No. 97 (long duration), were compared for yield with their respective local bulks, in separate series, for the sixth year. This year both the cultures were of about same duration, probably due to the early cessation of the north-east monsoon rains. Culture No. 72 yielded 25 per cent more grain than the local. This is the third year in which it gave significantly higher yield than the local. On the average of six years, its increased yield is about 7 per cent. In the other trial, the yield differences were not significant. Out of the six years during which this trial was conducted the culture yielded more than the standard only in three years. On the average of six years culture No. 97 has yielded 30 per cent more than the local. The results are furnished in Tables XII and XIII.

TABLE XII.—Yield trial of redgram cultures (medium duration), 1951-52.

Variants—2.
 Layout—ABBA method.
 Replications—12.
 Plot size—Gross—20' × 27'.
 Net—10' × 24'.

Spacing—5' × 18".
 Sown on—12th July 1951.
 Date of harvest—19th January 1952.

Particulars.	No. 72	Local	Standard error of mean.	Significance (P = 0.05).	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)
Grain yield per acre in lb. 	829	663	49	Yes.	154
Percentage on control 	125.0	100	..	..	..
Conclusion—No. 72, Local.					

Results of previous years' trial.

Year.	Grain yield per acre in lb.		Significance.	Critical difference.
	No. 72.	Local.		
(1)	(2)	(3)	(4)	(5)
1949-50 ..	610	658	Yes.	157
1950-51 ..	848	1,041	Yes.	132

TABLE XIII.—Yield trial of redgram cultures (long duration), 1951-52.

Variants—2.	Plot size—Gross—20' × 27'.
Layout—ABBA method.	Net—10' × 24'.
Replications—12.	Spacing—5' × 18".
	Sown on—12th July 1951.
	Harvested on—19th January 1952.

Particulars.	No. 97.	Local.	Standard error of mean.	Significance (P = 0.05).
(1)	(2)	(3)	(4)	(5)
Grain yield per acre in lb. 336	301	40	No.	
Percentage on control 111.6	100	..	..	

Conclusion—Differences in yield not significant.

Results of previous years' trial.

Year.		Grain yield per acre in lb.		Significance.	Critical difference.
(1)		No. 97.	Local.		
1946-47	..	660	290	Yes.	114
1947-48	..	620	330	Yes.	250
1948-49	..	502	395	Yes.	170
1949-50	..	494	490	No.	..
1950-51	..	848	738	No.	..

(ii) Preliminary yield trial.—Twenty-one cultures of the second batch of selections were tested in lattice design layout. None of the cultures yielded more than the 'Local-early'. Two cultures yielded more than No. 72. The best nine cultures were retained for further trial. The results are furnished in Table XIV.

TABLE XIV.—Preliminary yield trial of redgram cultures, 1951-52.

Variants—25.				Plot size—Gross—25' × 15'.			
Layout—Lattice design.				Net—15' × 12'.			
Replications—4.				Spacing—5' × 18".			
				Sown on—12th July 1951.			
				Harvested on—21st January 1952.			
Culture number.				Culture number.			
Mean yield per plot in oz.				Mean yield per plot in oz.			
264*	..	..	47.96	435	..	..	30.90
436*	..	..	45.44	437	..	..	29.56
Local (medium)	..	..	43.99	383	..	..	28.37
434*	..	..	42.19	417	..	..	28.03
250*	..	..	41.67	302	..	..	26.41
446*	..	..	41.62	327	..	..	26.13
388*	..	..	41.33	316 b	..	..	24.91
438	..	..	40.31	97 (late)	..	..	24.58
247	..	..	34.96	433	..	..	23.74
275	..	..	32.58	310	..	..	22.62
72 (medium)	..	..	31.12	415	..	..	22.37
298	..	..	31.08	316 c	..	..	21.78
				Local (late)	..	..	19.49

Significance by 'F' test (P = 0.05)—Yes.

Standard error—4.73.

Critical difference per plot—13.12 oz.

* Conclusion—6 cultures were on par with the local—medium duration.

(iii) Hill types.—Twenty-four samples consisting of selections and bulk seed of hill varieties of redgram were sown for study and further selection. These were observed to be tall and erect in habit, with big leaflets and flowers in clusters, and with pods and grain bigger in size than the ordinary type. Based on floral and pod characters, and size and colour of seed 75 single plants have been selected for further study.

20. Greengram—(a) Dry land.—Culture No. 127 which had been isolated as the strain of the station was multiplied on an area of 70 cents and 70 lb. of seed was obtained.

(b) Wet land.—Four cultures, Nos. 166, 169 188, and G.S. 11/105, were compared with local wet land type in yield trial plots, at the Agricultural Research Station, Samalkota. The crop was sown on 20th of November 1951. But due to heavy rains soon after sowing the young seedlings were destroyed. A second sowing was done on the 11 h December 1951. The plants in these also failed to establish. Consequently, no results could be obtained this year. Seventeen district samples were also grown for study and selection. These also failed and no selection could be taken. Greengram No. 188 was sown for multiplication on about an acre; only 35 lb. of seed could be collected.

(c) Perennial mung.—The perennial mung of Philippines was compared with greengram culture No. 127 in the first season followed by horsegram in the second season, and ragi in first season followed by greengram No. 127 in the second season. The greengram in the second season failed. Not only the total yield of greengram plus horsegram, but the yield of greengram alone was more than the yield of perennial mung, which took about double the time for the harvest. *Phaseolus aureus* (E.C. 969) was also grown along with perennial mung in observation plots. Both were similar in habit and growth and other characters. But they failed to survive in the hot weather.

21. Blackgram—(a) (i) Dry land.—Three cultures, Nos. 210, 221 and 239, were compared against No. 189 for the fourth year. The yield differences were not significant. The results are furnished in Table XV. The performance of the cultures were not consistent in the previous trials.

TABLE XV.—Yield trial of blackgram cultures, 1951-52.

Variants—4.		Plot size—Gross—15' × 24'					Standard error of mean.	Significance (P=0.05).
Layout—Randomized blocks.		Net—12' × 21'						
Replications—4.		Spacing—18" × 9"						
		Sown on—18th July 1951.						
		Harvested on—25th October 1951.						
Particulars.		No. 189.	No. 210.	No. 239.	No. 221.			
(1)		(2)	(3)	(4)	(5)	(6)	(7)	
Grain yield per acre in lb.	.. ..	506	502	486	445	85	No.	
Percentage on control	.. ..	100	99.6	96.0	87.9	..	..	
Conclusion—Differences in yield not significant.								

Results of previous years' trials.

Year.		Grain yield per acre in lb.				Significance.	Critical difference.
(1)		No. 189.	No. 210.	No. 239.	No. 221.		
1948-49	..	46	103	116	92	Yes.	36
1949-50	..	177	233	202	264	Yes.	58
1950-51	..	284	248	204	239	No.	..

(ii) Blackgram selections.—Fourteen district samples sown for study and selection in the early season failed. So, no selections were taken. The F-3 generation of a cross between E.B. 118 and Sompeta type was raised and 31 selections were carried forward.

(iii) Seed multiplication.—Culture No. 189 was grown for seed multiplication on an area of 40 cents, and 130 lb. of seed was obtained.

(b) Wet land.—Thirty-three cultures of the wet land type were compared for yield, against the local wet land variety of Samalkota. The crop was sown on the 22nd of November 1951. This crop also was adversely affected by cyclonic weather after sowings. Hence no results could be obtained.

22. Horsegram—(i) Yield trial.—Four cultures of buff seed type, Nos. 76, 86, 106 and D.B. 7 and two cultures of black seed, Nos. 93 and 4 of Coimbatore were compared for yield with their respective local types in separate series. The plots were sown in the first week of October 1951 and harvested towards the end of January 1952. The yield differences were significant only in the first series (Buff seed). But none of the cultures excelled the standard. Both D.B. 7 and No. 4 of Coimbatore did not fare well at this station, and yielded the lowest. The yields are furnished in Tables XVI and XVII.

TABLE XVI.—Yield trial of horsegram cultures, (buff seed), 1951-52.

Variants—5.				Plot size—Gross—12' x 27'				
Layout—Randomized blocks.				Net—9' x 25½'				
Replications—6.				Spacing—18" x 9".				
				Sown on—4th October 1951.				
				Harvested on—22nd January 1952.				
Particulars.	No. 76.	No. 86.	Local.	No. 106.	D.B. 7.	Standard error of mean.	Significance (P=0.05).	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Grain yield per acre in lb. ..	532	528	514	476	415	29	Yes.	83
Percentage on control ..	103.5	102.7	100	92.6	80.7	..	..	..

Conclusion—76, 86, Local, 106, D.B. 7.

Results of previous years' trials.

Year.	Grain yield per acre in lb.					Significance.
	No. 76.	No. 86.	No. 106.	Local.	D.B. 7.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1947-48	180	210	215	137	..	No.
1948-49	291	245	291	176	..	No.
1949-50	52	74	74	70	..	No.
1950-51	412	505	475	500	..	No.

TABLE XVII.—Yield trial of horsegram cultures (black seed)—1951-52.

Variants—3.		Spacing—18" × 9".			
Layout—Randomized blocks.		Sown on—4th October 1951.			
Replications—8.		Harvested on—No. 93 and Local on 22nd January 1952			
Plot size—Gross—18' × 15'.		No. 4 (Coimbatore) on 1st February 1952.			
Net—15' × 13½".					
Particulars.	No. 93.	Local.	No. 4.	Standard error of mean.	Significance (P = 0.05).
(1)	(2)	(3)	(5)	(4)	(5)
Grain yield per acre in lb.	327	325	280	18	No.
Percentage on control	100.4	100	86.1	..	..
Conclusion—Differences in yield not significant.					

Results of previous years' trials.

Year.	Grain yield per acre in lb.			Significance.	Critical difference.
	No. 93.	Local.	No. 4.		
(1)	(2)	(3)	(4)	(5)	(6)
1947-48	266	166	..	No.	..
1948-49	210	136	..	Yes.	65
1949-50	202	160	..	No.	..
1950-51	627	619	..	No.	..

(ii) *Seed multiplication*.—Cultures Nos. 76 and 93 were multiplied in small areas in the outskirts of the experimental plots, for want of separate land for the purpose. One hundred and seventy pounds of seed of No. 76 and 104 lb. of seed of No. 93 were collected for distribution.

23. *Mixed cropping experiment*.—The mixed cropping experiment with redgram, horsegram, dry paddy, ragi, cumbu, korra, gingelly, groundnut and cotton, commenced in 1946-47, was continued for the sixth year. Dry paddy, cumbu and gingelly did not fare well this year. The money value of produce for each treatment was calculated and the data were analysed. This year a pure crop of groundnut followed by horsegram gave the highest return. The results of the average of six years are also furnished. It will be seen that ragi, cumbu, or groundnut, as a pure crop in the first season, followed by horsegram in the second season have given higher money returns compared to other treatments. The results are furnished in Tables XVIII and XIX.

TABLE XVIII-A.—Mixed cropping experiment, 1951-52.

Particulars of treatments.	Yields per plot.					
	A.		B.		A.	
	(2)	(3)	(4)	(5)	(6)	(7)
(1)	LB. OZ.	LB. OZ.	LB. OZ.	LB. OZ.	LB. OZ.	LB. OZ.
1 Redgram + groundnut followed by horsegram	4 15 99	5	12 8 23	4	2 3 9	5
2 Redgram + gingelly followed by horsegram	4 5 75	6	2 1 16	8	7 13 25	4
3 Redgram + dry paddy followed by horsegram	4 3 83	0	0 12 1	1	5 6 25	15
4 Redgram + cumbu followed by horsegram	5 14 79	2	13 5 129	0	10 0 28	1
5 Redgram + ragi followed by horsegram	6 2 82	5	20 1 71	0	8 1 24	4
6 Redgram + korra followed by horsegram	3 11 73	3	6 3 38	11	10 0 23	12
7 Gingelly followed by horsegram	..	..	2 11 38	0	15 7 43	0
8 Dry paddy followed by horsegram	..	..	0 12 1	8	8 14 35	0
			Cumbu.		Horsegram.	

TABLE XVIII-A.—Mixed cropping experiment, 1951-52—cont.

Particulars of treatments.	Yields per plot					
	A.		B.		A.	
	(2)	(3)	(4)	(5)	(6)	(7)
(1)	LB. OZ.	LB. OZ.	LB. OZ.	LB. OZ.	LB. OZ.	LB. OZ.
9 Cumbu followed by horsegram	..	..	21 3 159	5	15 8 45	9
10 Ragi followed by horsegram	..	..	20 10 94	15	17 2 49	4
11 Groundnut followed by horsegram	..	..	41 11 68	12	6 8 18	3
12 Groundnut + korra followed by horsegram	4 8 31	1	19 14 42	5	6 4 21	0
13 Redgram and cotton	7 5 100	0	4 12 19	15	..	..
14 Redgram (pure)	11 3 141	11	..	..	..	..
15 Cotton (pure)	..	..	5 5 10	9	..	..

A = Grain, pod or kapas.

B = Stalk or bhusa.

TABLE XVIII-B.—Mixed cropping experiment, 1951-52.

Serial number and particulars of treatments.		Calculated value per acre.	
		RS. A.	P.
1 Redgram + groundnut followed by horsegram	..	236	2 0
2 Redgram + gingelly followed by horsegram	..	132	4 0
3 Redgram + dry paddy followed by horsegram	..	69	3 0
4 Redgram + cumbu followed by horsegram	..	226	9 0
5 Redgram + ragi followed by horsegram	..	217	0 0
6 Redgram + korra followed by horsegram	..	191	1 0
7 Gingelly followed by horsegram	..	167	0 0
8 Dry paddy followed by horsegram	..	40	4 0
9 Cumbu followed by horsegram	..	221	13 0
10 Ragi followed by horsegram	..	367	1 0
11 Groundnut followed by horsegram	..	854	0 0
12 Groundnut + korra followed by horsegram	..	354	10 0
13 Redgram and cotton	..	72	9 0
14 Redgram, pure	..	58	4 0
15 Cotton, pure	..	54	4 4
Standard error of mean per cent	11.		
Significance (P = 0.05)	Yes.		
Critical difference per acre	70-5-0.		

Conclusion—11, 10, 12, 1, 4, 9, 5, 6, 7, 2, 13, 3, 14, 15, 8.

Mixed cropping experiment, 1951-52.

TABLE XIX.—Mixed cropping experiment—Summary of results of six years.

Serial number and particulars of treatments.	1946-47.		1947-48.		1948-49.		1949-50.		1950-51.		1951-52.		Average of six years.
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	
(1)	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	
1 Redgram + groundnut followed by horsegram	152 0	120 0	168 7	85 6	96 14	236 2	143 2						
2 Redgram + gingelly followed by horsegram	129 4	125 0	150 13	120 0	118 6	132 4	140 4						
3 Redgram + dry paddy followed by horsegram	110 9	68 0	130 13	55 4	123 12	69 3	93 0						
4 Redgram + cumbu followed by horsegram	143 10	197 1	243 2	221 2	204 7	226 9	221 0						
5 Redgram + ragi followed by horsegram	288 0	176 11	270 14	306 8	247 0	217 9	251 0						
6 Redgram + korra followed by horsegram	104 1	105 12	187 11	123 3	111 1	191 1	162 2						
7 Gingelly followed by horsegram	239 12	272 4	110 0	121 6	84 11	167 0	165 13						
8 Dry paddy followed by horsegram	125 10	109 15	106 1	31 4	114 3	40 4	87 14						
9 Cumbu followed by horsegram	253 0	506 10	303 0	299 4	216 14	221 13	300 8						
10 Ragi followed by horsegram	396 6	435 1	341 3	205 0	224 1	367 1	328 4						
11 Groundnut followed by horsegram	141 4	272 4	280 0	52 4	164 11	854 0	294 0						
12 Groundnut + korra followed by horsegram	168 4	338 6	181 8	23 7	105 2	354 10	195 3						
13 Redgram and cotton	148 7	52 14	112 5	71 8	150 4	72 9	101 5						
14 Redgram, pure	192 5	105 12	86 1	63 2	171 14	58 4	113 0						
15 Cotton, pure	..	..	..	24 10	31 4	54 4	29 9						
Standard error on treatment mean per cent.	..	11.1	10.8	10.6	9.48	..	11						
Significance by 'F' test	..	Yes.	Yes.	Yes.	Yes.	..	..						
Critical difference	..	64/15	88/15	49/5	33/9	..	70/5						

ANNUAL REPORT OF THE PULSES BREEDING STATIONS,
COIMBATORE, DHARMAPURI AND VIZIANGAARAM.

24. A statement of receipts and expenditure for all the three stations is appended.

LAWLEY ROAD P.O., COIMBATORE,
15th September 1952.

M. A. SANKARA AYYAR,
Pulses Specialist.

APPENDIX.

STATEMENT OF RECEIPTS AND EXPENDITURE FOR THE YEAR ENDING
30TH JUNE 1952.

Receipts.

XXIX. a. Agriculture—Agricultural Receipts—

	RS.	A.	P.
By sale of farm produce	742	0	0
Value of seed transferred free to departmental officers.	778	0	0
Total ..	1,520	0	0

Expenditure.

1. Pay and allowances—			
Pay of officer	5,089	0	0
Pay of establishment	13,929	0	0
Dearness allowance	5,922	0	0
Travelling and other compensatory allowances ..	4,325	0	0
Total ..	29,256	0	0
2. Other charges—			
Lease of land	2,175	0	0
Cost of cultivation	3,378	0	0
Experimental work	2,348	0	0
Dearness allowance to menials	432	0	0
Miscellaneous charges	3,016	0	0
Other contingencies	1,736	0	0
Total ..	13,085	0	0

ANNUAL REPORT OF THE PADDY BREEDING STATION, MANGALORE,
FOR THE FASLI YEAR 1361 (JULY 1951 TO JUNE 1952).

Season and rainfall.—The year under report recorded a rainfall of 109.02 inches on 103 days as against the normal of 139.0 inches on 133 days, the deficit being mainly during the south-west monsoon season. The south-west monsoon set in on the 31st of May 1951 with heavy precipitation and was active during the first fortnight in June when the lower area got submerged on three occasions and the water in the main channel overflowed the bunds. Sudden weakening of the monsoon during the second half of June upset the cultivation of single crop lands. Distribution of rainfall during the months from August to November was favourable for the first crop of paddy and the early growth of the second crop. The dry weather which started in December, continued till the middle of April 1952. On the whole, it may be stated that the rainfall was favourable both during the first and second crop seasons. The data on rainfall are presented in Table I.

TABLE I.—Statement of rainfall.

Month.	Week.	1951-52.		1950-51.		Average of the previous ten years.	
		Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
South-west monsoon.							
June	7-13	18.76	7	5.82	6	10.65	6.5
	14-20	6.11	6	17.37	7	10.40	6.7
	21-27	5.25	4	9.60	2	9.75	6.0
June-July	28-4	2.87	5	2.94	5	8.61	6.7
	5-11	7.27	7	14.68	7	9.60	6.7
	12-18	7.41	7	19.31	7	10.38	6.9
July-August	19-25	14.29	7	9.83	7	9.54	6.2
	26-1	3.51	6	9.59	6	7.50	6.5
	2-8	3.86	7	6.94	5	5.62	5.9
August-September	9-15	5.91	5	3.11	6	5.78	6.1
	16-22	3.35	5	0.99	3	5.24	6.2
	23-29	0.23	2	0.47	3	4.66	5.4
Total ..		82.39	77	122.94	87	110.34	96.5
North-east monsoon.							
September-October	27-3	8.57	5	2.41	3	1.62	2.8
	4-10	3.97	3	2.88	3	1.74	2.6
	11-17	0.59	1	3.33	2	1.92	2.8
November	18-24	0.07	..	..	..	1.23	2.5
	25-31	0.04	..	..	..	0.78	2.0
	1-7	0.30	1	0.19	1	1.02	1.4
November-December	8-14	0.74	2	0.49	1	0.73	1.4
	15-21	0.24	1	1.08	1	0.95	1.4
	22-28	0.78	1	..	..	0.40	0.9
December-January	29-5	..	..	..	..	0.04	0.2
	6-12	..	..	..	..	0.32	0.6
	13-19	..	..	..	..	0.08	0.3
December-January	20-26	..	..	..	..	0.11	0.3
	27-3	..	..	..	..	..	..
	4-10	..	..	..	..	0.24	0.2
Total ..	11-17	..	..	..	..	..	..
	18-24	..	..	..	..	0.07	0.1
	25-31	..	..	..	..	..	..
Total ..		15.30	14	10.38	11	11.25	19.5

Month.	Week.	1951-52.		1950-51.		Average of the previous ten years.	
		Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Hot weather.							
February	1-7	..	..	..	..	0.09	0.1
	8-14	..	..	..	..	0.05	0.2
	15-21	..	..	..	..	..	..
	22-28(29)	..	..	..	..	..	..
March	1-7	..	..	..	..	0.11	0.2
	8-14	..	..	..	..	0.36	0.3
	15-21	..	..	..	..	0.03	0.1
	22-28	..	..	..	..	0.13	0.5
March-April	29-4	0.09	..	..	..	0.21	0.5
	5-11	1.46	2	2.61	2	0.60	1.3
	12-18	0.79	1	0.23	1	0.32	0.3
	19-25	..	..	..	..	0.56	0.8
April-May	26-2	0.09	..	..	..	0.19	0.5
	3-9	0.13	..	..	..	1.40	1.4
	10-16	..	..	..	..	3.12	2.5
	17-23	0.22	1	1.98	2	3.60	4.1
	24-30	2.04	4	0.80	3	6.57	4.6
May-June	31-8	5.61	4	12.27	5	..	..
Total	..	11.33	12	17.89	13	17.34	17.4
Grand total	..	109.02	103	151.21	111	133.93	133.4

2. *Cultivation routine.*—With the help of the soaking showers received during the middle of April, dry sowings of paddy were started but due to the subsequent dry weather, the sowings were continued by soaking plots with lift irrigation. With the help of soaking showers received during the second half of May, sowings were rushed through and completed. The first crop sowings started on 16th April 1951 and continued till 30th May 1951. The timely monsoon however helped the commencement of planting on 7th June 1951 which progressed steadily till the completion on 18th July 1951. The second crop sowings which were commenced on 11th August 1951 continued up to 1st October 1951. Plantings for the second crop commenced on 5th October 1951 and concluded on 8th November 1951. An area of 30 cents devoted exclusively for experiments was put under third crop from about the last week of January to the first week of May. Sowings for the first crop season of 1952-53 could be taken up with the help of showers received but these were continued largely with the help of lift irrigation. The details of sowings and plantings for the year 1951-52 are furnished below:—

Particulars.	First crop.	Second crop.	Third crop.
(a) Sowings—			
Period of sowings	16th April to 30th May 1951.	11th to 13th August and 6th September to 1st October 1951.	25th January 1952.
Total area sown	4.81 acres	3.15 acres	0.11 acre.
(b) Plantings—			
Period of planting	7th June to 18th July 1951.	5th October to 8th November 1951.	23rd February 1952.
(c) Number of experimental plots planted—			
(i) Yield trials	286	212	72
(ii) Manurial and cultural experiments.	244	336	..
(iii) Type collections	68	40	27
(iv) Observation plots	103	..	..

Particulars.	First crop.	Second crop.	Third crop.
(c) Number of experimental plots planted—cont.			
(v) Miscellaneous, including seed multiplication of cultures.	38	23	4
(vi) Hybrid progenies	..	13	..
Total units sown	739	624	103
Area of experimental plots.	4.94 acres	5.17 acres	0.30 acre.
Total area planted	17.41 ..	11.32 ..	..
Area sown (broadcast)	0.42 acre	..	..

The manurial regimen of the paddy fields during the first crop season consisted of the application of cattle manure at 2 tons per acre, or green manure at 2,000 lb. per acre, groundnut cake at 200 lb. per acre, bonemeal at 100 lb. per acre as basal dressing and 50 lb. of ammonium sulphate as top dressing one month after planting. During the second crop season, the entire bulk area received cattle manure at 2½ tons per acre, groundnut cake at 200 lb. per acre, bonemeal or super phosphate at 150 lb. per acre before planting and ammonium sulphate at 100 lb. per acre as top dressing a month after planting. The third crop received a basal dressing of cattle manure at 3 tons per acre supplemented with groundnut cake at 300 lb. per acre and super phosphate at 150 lb. per acre.

3. *Growth and yield.*—In spite of the fact that the total rainfall received was far below the normal, acre yields recorded during the first-crop season were the highest ever recorded at this station. The second-crop yields were also very encouraging in respect of major varieties like PTB. 19, Co. 3 and PTB. 20 considering the general depression in yields in the district. The average acre yield of the station for the first crop works out to 2,475 lb. while that of the second crop works out to 1,890 lb. Strain PTB. 20 over 2.65 acres has been mainly responsible for this marked increase in the average acre yield for the second crop. The acre yields recorded by the various strains are presented in Table II.

TABLE II.—Acre yields of bulk crops for the year 1951-52.

Name of the strain.	Acre yields—Grain in lb.			
	1951-52.	1950-51.	1949-50.	1948-49.
A. First crop—				
1. PTB. 9 (Thavalakkannan)	2,743	2,119	1,942	2,380
2. PTB. 14 (Mascathy)	2,079	1,873	1,859	2,040
3. PTB. 13 (Kayama—Red)	2,521	1,370	1,859	2,274
4. PTB. 11 (Halluga—White)	2,996	2,075	1,203	2,431
5. MGL. 1 (Guddubollari)	2,516	..	..	..
B. Second crop—				
1. Co. 3 (Tuluku Samba)	1,875	1,851	2,074	2,316
2. Co. 14 (Periathandu Tuluku samba)	1,439	1,474	1,569	1,651
3. PTB. 16 (Kavunginpothala)	1,256	1,456	1,435	1,140
4. PTB. 4 (Vellari)	1,660	1,690	..	1,790
5. PTB. 19 (Athikraya)	2,035	1,376	1,325	1,527
6. PTB. 20 (Chitteni)	2,071	1,699	1,850	..
7. GEB. 24 (Kichili samba)	1,894	1,385	1,927	1,758

4. *Pure-line selection.*—The improvement of rice crop of the district by the evolution of high yielding strains in the major first and second crop varieties of the

tract by pure line selection method, which was started during previous year was continued during the year under report. The trials of cultures in the different varieties during the year are discussed below :—

(i) *First crop*—(a) *Kayama*.—Three cultures in the red-riced variety and eight in the white riced variety were under yield trials at the station while two cultures in red-riced variety alone were under trial in the district. All the eight cultures were found to be significantly higher yielding than the controls MGL. 1 and PTB. 9. The results are presented in the Table III. The results of previous years are furnished in Appendix I (a).

TABLE III.—*Kayama yield trials—First crop, 1951-52.*

Plot numbers—E-16, 17 and 18.
Layout—5 × 6 randomized.
Size of strip—14' × 7'.
Planting—Singles—bulk.

Date of sowing—4th May 1951.
Date of planting—11th June 1951.
Date of harvesting—9th October 1951.

Serial number and details of cultures.	Flowering duration in days.	Acre yield grain LB.	Percentage on standard.	'Z' test satisfied or not.	Stand- ard error.	Critical difference (P=0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Series I.						
1. GB. 5920	122	2,723	92.1	Yes.	2.64	7.8
2. 1367	121	3,010	102.0			
3. 1419	122	3,044	102.9			
4. PTB. 13	125	2,773	93.8			
5. Local Kayama (stan- dard).	117	2,956	100.0			
Series II.						
1. 472	124	3,191	133.4	Yes.	3.61	10.5
2. 1444	125	3,174	132.7			
3. 1535	124	3,195	133.6			
4. 1558	125	2,900	121.2			
5. PTB. 9	124	2,599	108.7			
6. MGL. 1 (standard) ..	127	2,392	100.0			
Series III.						
1. 1452	125	3,270	131.4	Yes.	2.51	7.3
2. 1469	125	3,191	128.3			
3. 1474	126	2,966	119.7			
4. 1476	125	3,062	123.1			
5. PTB. 9	125	2,662	108.7			
6. MGL. 1 (standard) ..	126	2,488	100.0			

Conclusions—

Series I—1419, 1367, Local Kayama, PTB. 13, G.B. 5920.

Series II—1535, 472, 1444, 1558, PTB. 9, MGL. 1.

Series III—1452, 1469, 1476, 1474, PTB. 9, MGL. 1.

(b) *Mascathy*.—Eleven cultures were under yield trials at the station, two of which were under trial in the district also. None of the cultures was outstanding in performance in the yield trials at the station. Culture 3,159, though has not given higher yields, is earlier than the local and PTB. 14. This is an advantage especially in the bettu areas dependent upon rainfall precarious in this

type of soils. The results are presented in Table IV. The results of previous years are furnished in Appendix I (a).

TABLE IV.—*Mascathy yield trials—First crop, 1951-52.*

Plot numbers—E. 19, 24 and 25.
Layout—5 and 6 × 6 randomized.
Size of strip—14' × 7'.
Planting—single bulk.

Sown—9th May 1951.
Planted—11th June 1951.
Harvested—Different dates, one month after flowering.

Serial number and details of cultures.	Flowering duration in days.	Acre yield grain.	Percentage on standard.	'Z' test satisfied or not.	Standard error.	Critical difference (P = 0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)
LB.						
Series I.						
1. 827	113	2,415	97.9	Yes.	2.74	8.1
2. 2882	108	2,071	83.9			
3. 3159	104	2,533	102.7			
4. PTB. 14	110	2,528	102.6			
5. Local	110	2,465	100.0			
Series II.						
1. 2884	103	2,142	95.3	No.	..	..
2. 2887	112	2,201	97.8			
3. 2932	120	2,145	95.3			
4. 2941	113	2,143	99.6			
5. PTB. 14	114	2,024	90.1			
6. Local Mascathy ..	112	2,251	100.0			
Series III.						
1. 2874	108	2,966	97.6	Yes.	2.82	7.7
2. 3052	104	2,568	84.5			
3. 2129	112	2,827	93.00			
4. 2937	113	2,774	91.3			
5. PTB. 14	110	2,938	96.70			
6. Local	110	3,038	100.00			

Conclusions—

Series I—3159, PTB. 14, Local, 827, 2882.

Series III—Local 2874, PTB. 14, 2129, 2937, 3052.

(c) *Halluga*.—Four cultures were under yield trials. Culture 1828, which was also under trial in the district, recorded significantly higher yield over local as well as strain PTB. 11. The results are presented in Table V. The results of previous years are furnished in Appendix I (a).

TABLE V.—*Halluga yield trials—First crop, 1951-52.*

Layout—6 × 6 randomized.
Size of strip—14' × 6'.
Planting—Singles bulk.

Sown—4th May 1951.
Planted—13th June 1951.
Harvested—23rd October 1951.

Serial number and details of cultures.	Flowering duration in days.	Acre yield grain.	Percentage on standard.	'Z' test satisfied or not.	Standard error.	Critical difference (P=0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)
LB.						
1. 1744	137	3,053	112.00	Yes.	..	7.6
2. 1792	139	2,976	109.12			
3. 1805	138	2,483	90.97			
4. 1828	140	3,096	113.45			
5. PTB. 11	137	2,640	96.73			
6. Local Halluga ..	137	2,729	100.00			

Conclusion—1828, 1744, 1792, Local Halluga, PTB. 11, 1805.

(d) *Kanwa*.—Three cultures carried forward from the preliminary yield trials laid out in the previous year were put under second year yield trials with culture 1958 which had already completed three years of yield trials at the station. In the yield trials at the station, culture 3589 was found to be outstanding in performance and has been marked out for trial in the district. The results are presented in Table VI. The results of previous years are furnished in Appendix I (a).

TABLE VI.—*Kanwa* yield trials—First crop, 1951-52.

Layout—5 × 6 randomized. Size of strip—18' × 6'. Planting—Singles bulk.				Sowing—10th May 1951. Planting—14th June 1951. Harvesting—6th October 1951.		
Serial number and details of cultures.	Flowering duration in days.	Acre yield grain.	Percentage on standard.	'Z' test satisfied or not.	Standard error.	Critical difference (P=0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)
LB.						
1. 1958	111	3,362	114.85	Yes.	3.15	9.3
2. 3574	111	3,067	104.8			
3. 3589	113	3,616	123.5			
4. 3590	109	3,086	105.4			
5. Kanwa Local	116	2,927	100.00			

Conclusion—3589, 1958, 3590, 3574, Kanwa local.

(ii) *Second crop*—(a) *Athikraya*.—Nine cultures were under yield trials at the station during the year, two of which were under trial in the district also. Culture 2482, the performance of which was outstanding, has been marked out for trial in the district. The performance of culture 859 was once again encouraging. The results are presented in Table VII. The results of previous years are furnished in Appendix I (b).

TABLE VII.—*Athikraya* yield trials—Second crop, 1951-52.

Layout—5 × 6 randomized. Size of strip—20' × 7'. Planting—Singles bulk.				Sown on—10th September 1951. Planted on—18th October 1951. Harvested on—On different dates, one month after flowering.		
Serial number and details of cultures.	Flowering duration in days.	Acre yield grain.	Percentage on standard.	'Z' test satisfied or not.	Standard error.	Critical difference. (P = 0.05).
(1)	(2)	(3)	(4)	(5)	(6)	(7)
LB.						
Series I.						
1. 3440	102	1,879	115.7	Yes.	3.00	8.76
2. 3475	107	2,198	135.3			
3. 3507	104	1,828	112.5			
4. PTB. 19	107	1,839	113.2			
5. Local	102	1,624	100.0			
Series II.						
1. 859	110	1,891	123.3	Yes.	2.51	7.3
2. 904	110	1,690	110.2			
3. 2411	110	1,590	103.7			
4. PTB. 19	110	1,369	89.2			
5. Local	104	1,534	100.0			
Series III.						
1. 2482	108	1,856	134.1	Yes.	3.55	10.3
2. 3432	101	1,543	111.5			
3. 3444	112	1,708	123.4			
4. PTB. 19	110	1,348	97.4			
5. Local	104	1,384	100.00			

Conclusions—

Series I—3475, 3440, PTB. 19, 3507, Local Athikraya.

Series II—859, 904, 2411, Local Athikraya, PTB. 19.

Series III—2482, 3444, 3432, Local Athikraya, PTB. 19

(b) *Kandrakutty*.—Culture 1065 that has passed through the final stages of yield trial was again compared against PTB. 4 under early sown condition. The results presented in Table VIII show that this culture is longer in duration than PTB. 4 by about a week but there is no corresponding increase in yield. Since the grains of this culture are awnless and fine, the culture will be maintained over a small area at the station. This culture was also under trial in the district and the results are discussed separately.

TABLE VIII.—*Kandrakutty* yield trials—Second crop, 1951-52.

Serial number and details of cultures.	Acre yield grain.	Flowering duration in days.	Percentage on standard.	'Z' test satisfied or not.	Critical difference (P=0.05).
(1)	(2)	(3)	(4)	(5)	(6)
LB.					
1. Muthusamba 8348 dry ..	2,090	138	107.4	Yes.	11.9
2. Muthusamba 8348 wet ..	2,102	144	108.4		
3. 1065 dry	1,953	152	100.4		
4. PTB. 4 dry	2,112	144	108.6		
5. PTB. 16 dry	1,464	135	75.25		

Conclusion—4, 2, 1, 3, 5.

5. *District trials*.—Two promising cultures in each of *Kayama* and *Mascathy*, and one in each of *Halluga* and *Kanwa* during the first crop season as also two cultures in *Athikraya* and one in each of *Kandrakutty* and *Kavinginpothala* natural cross during the second-crop season were under trial in the district during the year. The performance of the various cultures is presented in Tables IX to XV. *Kayama* culture 1367 which has recorded markedly higher yields over the local in the majority of centres and which is also earlier in duration compared with PTB. 13 is ready for release as a strain. The two cultures in *Mascathy* were not promising but culture 3,159 was earlier than the local by 6—7 days. In variety *Halluga*, though the culture has recorded higher yields than the standards, in all the three trials, it has been decided to draw conclusions after one more year of trial. The culture in variety *Kanwa* has recorded consistently higher yields over local bulk but not over PTB. 9. Since one more culture in the yield trials at the station has been found to be promising, it has been decided to continue trials in the district for one more season. In the trials laid out during the second crop season, culture 859 in *Athikraya* was found to record markedly higher yields than the standard in four out of the six centres, but the trials are proposed to be continued for one more year for confirmation of results. The culture in *Kandrakutty* did not record consistently higher yields over the local and generally failed to impress the ryots. *Kavinginpothala* natural cross culture No. 8360 which is non deteriorating in germination was found to be as high yielding as Co. 3 but information about its viability under local methods of storage would be recorded in the next report.

TABLE IX.—Performance of *Kayama* cultures in the district—First crop, 1951-52.

Name of the centre.	1367.	1419.	Local Kayama.	PTB. 13
(1)	(2)	(3)	(4)	(5)
Mangalore taluk—Moolky ..	Acre yield	3,600	3,150	3,350
	Per cent	107.5	94.04	100.0
Alape ..	Acre yield	4,350	3,600	3,300
	Per cent	131.8	109.1	100.0
Puttur taluk—Tekkila ..	Acre yield	3,025	2,722	2,873
	Per cent	105.2	94.71	100.0
Ujre ..	Acre yield	..	3,300	3,150
	Per cent	..	104.7	100.0
Mundaje ..	Acre yield	3,000	..	2,925
	Per cent	102.6	..	100.0

Name of the centre.	1937.	1949.	Local Rayama.	PTB. 13.
(1)	(2)	(3)	(4)	(5)
Karkala taluk—Sanur	Acre yield 2,663	2,325	2,156	..
	Per cent 123.8	108.1	100.0	..
Marpady	Acre yield 2,250	2,143	2,036	..
	Per cent 110.5	105.2	100.0	..
Kasargod—Nileshwar	Acre yield 2,730	2,400	..	2,130
	Per cent 128.1	112.7	..	100.0
Kudlu	Acre yield 4,443	4,275	..	4,106
	Per cent 108.2	104.1	..	100.0

Remarks.—The ryots were favourably impressed with culture 1367 at all centres.

TABLE X.—Performance of Mascathy cultures in the district—First crop, 1951-52.

Name of the Centre.	827	8159	Local Mascathy.
(1)	(2)	(3)	(4)
Mangalore taluk—Moolky	Acre yield 3,713	3,868	3,675
	Per cent 101.0	105.1	100.0
Alape	Acre yield 4,050	3,450	3,900
	Per cent 103.9	88.45	100.0
Karkala taluk—Hariangady	Acre yield 1,734	1,453	1,556
	Per cent 111.2	93.4	100.0
Tenka Mijar	Acre yield 3,046	2,897	2,831
	Per cent 107.6	102.3	100.0
Puttur taluk—Uppinangady	Acre yield 2,200	3,225	2,375
	Per cent 92.64	135.8	100.0
Kuvettu	Acre yield ..	1,300	1,275
	Per cent ..	102.0	100.0
Laila	Acre yield 1,800	..	1,750
	Per cent 102.9	..	100.0

Remarks.—Since culture 827 has failed to register any consistently higher yields over the local for the second year in succession it has been rejected.

TABLE XI.—Performance of Halluga cultures in the district—First crop, 1951-52.

Name of the Centre.	1828	PTB. 11	Local Halluga.
(1)	(2)	(3)	(4)
Udipi—Kudekar (1)	Acre yield 2,325	2,280	1,890
	Per cent 123.0	120.6	100.00
Kudekar (2)	Acre yield 2,300	2,300	2,280
	per cent 100.9	100.9	100.00
Coondapoor Koteswar	Acre yield 1,680	1,460	..
	Per cent 115.0	100.0	..

TABLE XII.—Performance of Kanwa cultures in the district—First crop, 1951-52.

Name of the centre.	1958.	Local Kanwa.	PTB. 9.
Udipi—Bommarabettu	Acre yield 2,250	2,100	..
	Per cent. 100.7	100.00	..
Chantaru	Acre yield 1,950	1,650	..
	Per cent. 118.1	100.0	..
Kota	Acre yield 2,550	2,250	..
	Per cent. 113.3	100.0	..
Coondapoor taluk—Koteswar	Acre yield 1,520	..	1,760
	Per cent 86.36	..	100.0
Beejady	Acre yield 1,680	..	1,760
	Per cent 80.9	..	100.0
Basrur	Acre yield 2,100	..	1,800
	Per cent 116.6	..	100.0

TABLE XIII.—Performance of Athikraya cultures in the district—Second crop, 1951-52.

Name of the centre.	859.	904.	PTB. 19.	Local Athikraya.
Mangalore taluk—Mangalore ..	Acre yield 2,240	2,210	..	2,100
	Per cent 106.7	105.0	..	100.0
Kembral	Acre yield 2,650	2,737	..	2,250
	Per cent 118.0	121.6	..	100.0
Karkala taluk—Karkala	Acre yield 1,015	..	969	649
	Per cent 156.4	..	149.3	100.0
Tenkamijar	Acre yield 2,606	..	2,375	2,372
	Per cent 125.6	..	114.6	100.0
Puttur taluk	Acre yield 2,080	..	2,400	2,500
	Per cent 83.2	..	96.0	100.0
Kasargod taluk	Acre yield 2,458	..	1,875	..
	Per cent 131.1	..	100.0	..

TABLE XIV.—Performance of Kundrakkutty culture in the district—Second crop, 1951-52.

Name of the centre.	1065.	PTB. 4.	Kundrak- kutti culture local.
Karkala taluk—Sanur	Acre yield 3,098	..	2,850
	Per cent 108.7	..	100.0
Mangalore taluk—Alape	Acre yield 2,300	..	2,275
	Per cent 101.1	..	100.0
Derebail	Acre yield 2,628	..	2,833
	Per cent 92.8	..	100.0
Kasargod taluk—Koipady	Acre yield 1,550	2,200	1,833
	Per cent 84.6	120.0	100.0
Kudlu	Acre yield 1,300	1,350	1,200
	Per cent 108.3	112.5	100.0

Remarks.—Culture 1065 has generally failed to impress the ryots.

TABLE XV.—Performance of Kavunginpothala natural cross culture in the district.

Name of the centre.	Culture 8360.	Co. 3.
Mangalore	Acre yield 2,360	2,250
	Per cent 104.9	100.0

6. Hybridization.—The following crosses were effected during the year:—

First crop .. MGL. 1 × MTU. 3 To evolve a non-lodging type resembling MGL. 1.

PTB. 11 × MTU. 4 To evolve non-lodging Halluga.

Second crop .. Co. 3 × PTB. 20 }
Co. 3 × PTB. 4 } To evolve a non-deteriorating type of Co. 3.
8448 × Co. 3 }

Crossed seeds were gathered and the F₁s will be grown next season.

In the yield trials laid out with four economic progenies of Co. 3 × PTB. 19 the results of which are presented in Table XVI, it is seen that none of the cultures was promising. The eight single plant cultures isolated from culture 8899 in the previous year were found to be uniform in stand. When culture 8899 which had been found to be promising in the yield trials of the previous year were stored in *mura* after the local method, it was found to record a germination percentage of only 60 as against 90 recorded by PTB. 19. The existing economic

progenies of Co. 3 $\times$ PTB. 19 are therefore considered not worthy of being carried forward.

TABLE XVI.—Yield trials of Co. 3 $\times$ PTB. 19.—Second crop, 1951-52.

Layout—5 $\times$ 8 randomized.
Size of strip—25' $\times$ 6'.
Planting—Singles bulk.

Sown on—14th September 1951.
Planted on—25th October 1951.
Harvested on—2nd February 1952.

Serial number and details of cultures.	Flowering duration in days.	Acre yield grain lb.	Percentage on standard.	'Z' test satisfied or not.	Standard error.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 8897	109	1,480	87.4	Yes	2.37	6.88
2 8899	108	1,433	84.6			
3 8900	102	1,589	93.8			
4 Co. 3 standard ..	107	1,698	100.00			
Conclusion—CO3 std.	8900	8897	8899			

Six *Kavunginpothala* natural cross cultures carried forward from the previous year were put under yield trial for the third year with Co. 3 as standard, the results of which are presented in Table XVII. Culture 8448 which recorded about 5 per cent less than Co. 3 was found to record a germination percentage of 91 as against 90 by PTB. 19 standard when stored in *mura* and tested at the end of the season. This culture therefore shows promise of fulfilling the long felt need for a non-deteriorating type of Co. 3. The results of previous years are furnished in Appendix I (c).

TABLE XVII.—Yield trials of *Kavunginpothala* natural crosses.—Second crop, 1951-52.

Layout—7 $\times$ 8 randomised.
Size of strip—23' $\times$ 8'.
Planting—Singles bulk.

Sown on—10th September 1951.
Planted on—20th September 1951.
Harvested on—30th January 1952.

Serial number and details of cultures.	Flowering duration in days.	Acre yield grain lb.	Percentage on standard.	'Z' test satisfied or not.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)
1 2523	102	2,018	95.2		
2 2550	102	2,068	97.5		
3 8414	102	2,045	96.5		
4 8360	102	2,034	95.9	No.	2.1
5 8363	105	1,943	91.7		
6 8448	195	2,007	94.6		
7 Co. 3	105	2,120	100.0		

7. *New introductions.*—A total of 109 pure lines were obtained from Coimbatore and other research stations and studied during the first, second and third-crop seasons of the year under report. A total of seven, eight and six promising cultures have been marked out for intervarietal trials during the coming first, second and third-crop seasons, respectively. Strains MTU. 9, MTU. 15 and Co. 13, though later in duration, appear to be suitable for the third crop in such places as have an abundant water-supply.

8. *Manurial trials.*—(i) *Efficacy of the application of lime.*—The residual effects of the application of 0, 1,000, 2,000 and 3,000 lb. of lime in the previous three seasons were under observation during the first and second-crop seasons of the year under report. The results which are presented in Tables XVIII and XIX show that though no residual effects were felt during the first-crop season, distinct residual effects were present during the second-crop season. It may be explained however that while no phosphates had been applied during the first-crop season,

super phosphate was applied at 200 lb. per acre to the sub-plots during the second-crop season. The residual effect seen may be due more to the indirect action of lime through superphosphate than to any direct effect.

TABLE XVIII.—Liming residual effects—First crop—1951-52.

Plot—No. G. 2.

Layout—
Split plot.
Leaf at 4,000 lb. per acre and no leaf—Main plot treatments.
Lime doses of 0, 1,000, 2,000 and 3,000 lb. per acre.
Sub-plot treatments.

Size of strip—45' $\times$ 6'.
Planting—Doubles, bulk.
Variety—PTB. 13.
Sown—16th April 1951.
Planted—3th June 1951.
Flowered—7th September 1951.
Harvested—16th October 1951.

Serial number and treatments.	Acre yield grain lb.	Percentage on general mean.
(i) Leaf v. no leaf.		
1 No leaf	2,602	99.1
2 Leaf at 4,000 lb. per acre	2,650	100.0
3 General mean	2,626	100.0
4 Whether 'Z' test satisfied or not $P = 0.05$	No.	
5 Critical difference	753	28.67

Serial number and treatments.	Acre yield grain lb.	Percentage on general mean.	Percentage on control.
(ii) Doses of lime.			
1 Lime 0	2,560	97.5	100.0
2 Lime at 1,000 lb. per acre	2,666	101.5	104.1
3 Lime at 2,000 lb. per acre	2,640	100.6	103.2
4 Lime at 3,000 lb. per acre	2,640	100.6	103.2
5 General mean	2,625	100.0	102.6
6 Whether 'Z' test satisfied or not	No	No	No
7 Critical difference	219	8.35	8

(iii) Interaction.			
1 No leaf lime 0	2,558	97.4	
2 Do. lime at 1,000 lb. per acre	2,606	99.2	
3 Do. lime at 2,000 lb. per acre	2,581	98.3	
4 Do. lime at 3,000 lb. per acre	2,663	101.4	
5 No leaf at 4,000 lb. per acre, lime 0	2,562	97.6	
6 No leaf lime at 1,000 lb. per acre	2,726	103.8	
7 Do. lime at 2,000 lb. per acre	2,699	102.8	
8 Do. lime at 3,000 lb. per acre	2,617	99.7	
9 General mean	2,626	100.00	
10 Whether Z test satisfied or not	No.		

TABLE XIX.—Liming experiments—Residual effect of—Second crop—1951-52.

Field—No. G. 2.

Layout—
Split plot.
Leaf at 4,000 lb. per acre and no leaf main plot treatments.
Lime doses of 0, 1,000, 2,000 and 3,000 lb. per acre.
Sub-plot treatments.
Lime and leaf applied to second crop of 1950-51.

Layout—cont.
Replications—Four.
Size of the strip—45' $\times$ 5'.
Variety—PTB. 19.
Sown—17th September 1951.
Planted—2nd November 1951.
Harvested—8th February 1952.

Serial number and treatments.	Acre yield grain lb.	Percentage on general mean.	Percentage on control.
(i) Leaf v. no leaf.			
1 No leaf	1,529	99.1	
2 Leaf	1,532	100.9	
3 General mean	1,530.5	100.00	
4 Whether 'Z' test satisfied or not $P = 0.05$	No		
5 Critical difference	219	14.3	

Serial number and treatments.	Acre yield grain lb.	Percentage on general mean.	Percentage on control.
(ii) Doses of lime.			
1 Lime at 3,000 lb. per acre	1,668	108.9	116.7
2 Lime at 2,000 lb. per acre	1,591	103.8	111.3
3 Lime at 1,000 lb. per acre	1,435	93.7	100.45
4 Control	1,428	93.3	100.00
5 General mean	1,530	100.0	107.2
6 Whether 'Z' test satisfied or not $P = 0.05$.	Yes.	Yes.	Yes.
7 Critical difference	125	8.2	8.8

(iii) Interaction.			
1 No leaf lime 0	1,457	95.2	100.00
2 Do. lime at 1,000 lb. per acre	1,422	92.9	97.60
3 Do. lime at 2,000 lb. per acre	1,590	103.9	109.20
4 Do. lime at 3,000 lb. per acre	1,661	108.5	114.00
5 Leaf at 4,000 lb. per acre, lime 0	1,399	91.4	96.10
6 Leaf at 4,000 lb. lime 1,000 lb. per acre	1,449	94.7	99.40
7 Do. lime 2,000 lb. per acre	1,593	104.1	109.30
8 Do. lime 3,000 lb. per acre	1,675	109.4	115.00
9 General mean	1,531	100.00	105.0
10 Whether 'Z' test satisfied or not $P = 0.05$.	No.		

(ii) *Efficacy of fused phosphate.*—An experiment laid out in the double-crop area during the previous first-crop season to compare the relative merits of fused phosphate, a proprietary product supplied by Messrs. Parry & Co. and superphosphate, was laid out during the year in the single-crop land during the first-crop season and in double-crop land during the second-crop season. The results presented in Tables XX and XXI confirm the previous year's finding that neither superphosphate nor fused phosphate at the dose of 30 lb. P_2O_5 , either alone or in combination with ammonium sulphate is capable of producing significantly higher yields than leaf alone at 2,500 lb. per acre.

TABLE XX.—Fused Phosphate v. Super—1951–52—First crop.

Plot—Nos. B-5 to B-8 (Single crop land).
Layout—9 × 4 randomized.
Size of strip—34' × 9'.
Planting—Doubles, bulk.

Variety—PTB. 14.
Sown—18th May 1951.
Planted—29th June 1951.
Harvested—15th October 1951.

Serial number and treatments.	Acre yield grain lb.	Percentage on general mean.	Percentage on control.	Flowering duration in days.
1 Leaf at 2,500 lb. per acre	1,588	103.13	100.00	109
2 Ammonium sulphate at 30 lb. N. per acre.	1,255	81.56	79.00	116
3 Leaf at 2,500 lb. per acre, super at 30 lb. P_{205} per acre.	1,641	110.66	107.3	108
4 Leaf at 2,500 lb. per acre, 1 fused phosphate at 30 lb. P_{205} per acre.	1,593	107.44	104.2	108
5 Ammonium sulphate at 30 lb. N. per acre, super at 30 lb. P_{205} per acre.	1,179	79.46	77.00	115
6 Ammonium sulphate at 30 lb. N. per acre, fused phosphate at 30 lb. P_{205} per acre.	1,229	82.3	80.3	115

Serial number and treatments.	Acre yield grain lb.	Percentage on general mean.	Percentage on control.	Flowering duration in days.
7 Leaf at 2,500 lb. per acre, ammonium sulphate at 30 lb. N. per acre (ammonium sulphate leaf).	1,473	99.3	96.3	114
8 Leaf at 2,500 lb. per acre, ammonium sulphate at 30 lb. N. per acre, super at 30 lb. P_{205} per acre.	1,735	116.95	113.5	113
9 Leaf at 2,500 lb. per acre, ammonium sulphate at 30 lb. N. per acre fused phosphate at 30 lb. P_{205} per acre.	1,658	111.80	108.4	114
10 General mean	1,483	100.0	96.97	
11 Whether 'Z' test satisfied or not.	Yes.	Yes.	Yes.	
12 Critical difference $P = 0.05$	316	21.3	19.9	
Conclusions—8 9 3 4 1 7 6 2 5				

TABLE XXI.—Fused phosphate v. Super—Second crop, 1951–52.

Plot Nos.—E 16 to 19.
Layout—9 × 4 randomized.
Size of strip—45' × 7'.
Planting—Doubles bulk.
Variety—PTB 20.

Sown—17th September 1941.
Planted—24th October 1951.
Flowered—13th December 1951.
Harvested—14th January 1952.

Serial number and treatments.	Acre yield in grain lb.	Percentage on general mean.	Percentage on control.
(1)	(2)	(3)	(4)
1 Leaf at 2,500 lb. per acre	1,810	96.5	100.00
2 Ammonium sulphate at 30 lb. N. per acre.	1,847	98.4	102.1
3 Leaf at 2,500 lb. super at 30 lb. P_{205} per acre	1,892	100.9	104.59
4 Leaf at 2,500 lb. fused phosphate at 30 lb. P_{205} per acre	1,791	95.5	98.96
5 Ammonium sulphate at 30 lb. N. per acre, super at 30 lb. P_{205} per acre	1,803	96.07	99.59
6 Ammonium sulphate at 30 lb. N. per acre, fused phosphate at 30 lb. P_{205} per acre.	1,803	96.07	99.59
7 Leaf at 2,500 lb. per acre, ammonium sulphate at 30 lb. N. per acre	1,941	103.46	107.25
8 Leaf at 2,500 lb. per acre, ammonium sulphate at 30 lb. N. per acre, super at 30 lb. P_{205} per acre	1,928	102.8	106.53
9 Leaf at 2,500 lb. per acre, ammonium sulphate at 30 lb. N. per acre, fused phosphate at 30 lb. P_{205} per acre	2,070	110.36	114.4
10 General mean	1,876	100.00	103.6
11 Whether 'Z' test satisfied or not	No.	..	..
12 Critical difference $P = 0.05$	169	9.00	9.3

Conclusions—'Z' test not satisfied.

(iii) *Efficacy of phosphate as manure for paddy.*—The experiment started during the second-crop season of the previous year to compare the relative merits of phosphate was laid out during the first and second-crop seasons of the year under report with certain modifications. This experiment was designed to find out the relative merits of bonemeal and super phosphate at 30 lb. and 45 lb. P_{205} per acre over a basal dressing of green leaf at 4,000 lb. or cattle manure at 4,000 lb. per acre. The results presented in Tables XXII and XXIII show that

only bonemeal at the level of 45 lb. P205 per acre is capable of producing significantly increased yields, the negative response to the 'Z' test during the second-crop season being attributable to vitiating factors.

TABLE XXII.—Efficacy of phosphatic manures first crop—1951-52.

Plot Nos.—A2 to 5.
Layout split plot—Leaf at 4,000 lb. per acre and cattle manure at 4,000 lb. per acre—Main plot treatments.

Doses of phosphate (ref. table below) sub-plot treatments.

Size of sub-plot—40' x 7'.

Size of strip—38' x 4'.

Planting—Doubles, bulk.

Sown—13th May 1951.

Planted—2nd July 1951.

Harvested—9th October 1951.

(i) Leaf v. Cattle manure.

Serial number and treatments.	Acre yield grain lb.	Percentage on general mean.	Percentage on control.
(1)	(2)	(3)	(4)
1 Leaf at 4,000 lb. per acre	1,297	117	..
2 Cattle manure at 4,000 lb. per acre ..	918	83	..
3 General mean	1,108	100	..
4 Whether 'Z' test satisfied or not $P = 0.05$.	Yes.	..	..
5 Critical difference	236	21.3	..

(ii) Doses of phosphate.

1 Bonemeal 45 lb. P205	1,241	111.8	125.4
2 Bonemeal 30 lb. P205	1,170	105.6	118.3
3 Super 45 lb. P205	1,176	106.1	118.9
4 Super 30 lb. P205	966	87.15	97.6
5 Control (No phosphate)	989	89.3	100.0
6 General mean	1,108	100	112
7 Whether 'Z' test satisfied or not	Yes.	..	..
8 Critical difference	192	17.32	19.4

(iii) Interactions.

1 Super 45 lb. P205 per acre	1,002	90.5	..
2 Super at 30 lb. P205 per acre	829	74.9	..
3 Bonemeal at 45 lb. P205 per acre	1,014	91.6	..
4 Bonemeal at 30 lb. P205 per acre	959	86.6	..
5 Control (No phosphate)	786	70.9	..
6 Super at 45 lb. P205 per acre	1,348	121.8	..
7 Super at 30 lb. P205 per acre	1,100	99.4	..
8 Bonemeal at 45 lb. P205 per acre	1,458	132.0	..
9 Bonemeal at 30 lb. P205 per acre	1,379	124.6	..
10 Control (No phosphate)	1,191	107.6	..
11 General mean	1,108	100	..
12 Whether 'Z' test satisfied or not	No.	..	..
13 Critical difference	..	..	..

Conclusions—

(1) Leaf v cattle manure—Leaf > Cattle manure.

(2) Doses of phosphate—1 3 2 5 4

TABLE XXIII.—Efficacy of phosphatic manures—Second crop, 1951-52.

Layout—Split plot—leaf at 4,000 lb. per acre and cattle manure at 4,000 lb. per acre—Main plot treatments.
Doses of phosphate (see table).
Sub-plot treatments—
Number of replication—6.
Size of strip—24' x 10'.

Planting—Doubles, bulk.
Main plot treatments—
Variety—Co. 3.
Sown—15th September 1951.
Planted—26th October 1951.
Harvested—30th January 1952.

Serial number and treatments.	Acre yield grain in lb.	Percentage on general mean.	Percentage on control.
(1)	(2)	(3)	(4)
(i) Leaf v. Cattle manure.			
1 Leaf at 4,000 lb. per acre	1,475	101.7	..
2 Cattle manure at 4,000 lb. per acre ..	1,427	98.3	..
3 General mean	1,451	100.00	..
4 Whether 'Z' test satisfied or not	No	No	..
5 Critical difference	274	18.9	..

(ii) Doses of phosphate.

1 Bonemeal at 45 lb. P205 per acre	1,495	103.1	108.9
2 Do. 30 lb. P205 per acre	1,469	101.25	106.9
3 Superphosphate at 45 lb. P205 per acre ..	1,454	100.2	106.0
4 Do. 30 lb. P205 per acre	1,462	100.7	106.4
5 No phosphate	1,374	94.7	100.0
6 General mean	1,450.8	100.00	105.6
7 Whether 'Z' test satisfied or not	No	..	..
8 Critical difference	..	5.9	6.2

(iii) Interaction.

1 Cattle manure at 4,000 lb. per acre, super at 45 lb. P205 per acre	1,405	96.9	..
2 Cattle manure at 4,000 lb. per acre, super at 30 lb. P205 per acre	1,423	98.1	..
3 Cattle manure at 4,000 lb. per acre, bonemeal at 45 lb. per acre	1,523	105.03	..
4 Cattle manure at 4,000 lb. per acre, bonemeal at 30 lb. P205 per acre	1,428	98.4	..
5 Control (No phosphate)	1,354	93.4	..
6 Green leaf at 4,000 lb. per acre, super at 45 lb. P205 per acre	1,502	103.5	..
7 Green leaf at 4,000 lb. per acre, super at 30 lb. P205 per acre	1,500	103.49	..
8 Green leaf at 4,000 lb. per acre, bonemeal at 45 lb. P205 per acre	1,467	101.00	..
9 Green leaf at 4,000 lb. per acre, bonemeal at 30 lb. P205 per acre	1,509	104.05	..
10 Green leaf at 4,000 per acre, control (No phosphate)	1,393	96.00	..
11 General mean	1,420.4	100.00	..
12 Critical difference	..	..	..
13 Whether 'Z' test satisfied or not	..	No	..

(iv) Deleterious effects (if any) of the continuous application of ammonium sulphate.—This experiment to study the effects of the continuous application of ammonium sulphate on yield as well as the soil, was started during the first-crop season of the year under report and was continued during the second-crop season.

The results are presented in Tables XXIV and XXV. As this is a long-range experiment, conclusions can be drawn at the end of a period of at least three years.

TABLE XXIV.—*Deleterious effects (if any) of the continuous application of ammonium sulphate—First crop—1951-52.*

Plot number—F 13. Layout—4 × 6 randomized. Size of strip—26' × 11'. Planting—Doubles, bulk.		Sown—10th May 1951. Planted—22 June 1951. Harvested—3rd October 1951.			
Serial number and treatments.		Flowering duration in days.	Acre yield grain in lb.	Percentage on general mean.	Percentage on control.
(1)		(2)	(3)	(4)	(5)
1 Leaf at 2,500 lb per acre	..	104	2,839	104.6	108.2
2 Ammonium sulphate at 100 lb. per acre	..	105	2,636	97.4	100.5
3 Leaf at 2,500 lb. ammonium sulphate at 100 lb. per acre	..	105	2,749	101.31	104.76
4 Control (no manure)	..	104	2,624	96.7	100
5 General mean	..	..	2,712	100.0	103.4
6 Whether 'Z' test satisfied or not P=0.05	..	..	No	No	No
7 Critical difference P=0.05	..	..	228	8.4	8.7

General remarks.—This is the first year of the application of ammonium sulphate and hence no conclusions can be drawn on the deleterious effects (if any) of the application of ammonium sulphate.

TABLE XXV.—*Continuous application of ammonium sulphate—Deleterious effect (if any)—Second crop—1951-52.*

Plot number—F 13. Layout—4 × 6 randomized. Size of strip—26' × 10'. Planting—Doubles, bulk. Variety—GEB. 24.		Sown—8th September 1951. Planted—13th October 1951. Flowered—29th November 1951. Harvested—4th January 1952.			
Serial number and treatments.		Acre yield grain in lb.	Percentage on general mean.	Percentage on control.	
(1)		(2)	(3)	(4)	
1 Leaf at 2,500 lb. per acre	..	1,702	103.91	123.1	
2 Ammonium sulphate at 150 lb. per acre ..	..	1,722	105.15	124.6	
3 Leaf and ammonium sulphate	..	1,746	106.6	126.3	
4 Control (no manure)	..	1,382	84.4	100.00	
5 General mean	..	1,638	100.0	118.5	
6 Whether 'Z' test satisfied or not P=0.05.	Yes.	Yes.	Yes.	Yes.	
7 Critical difference	..	171	10.44	12.00	

General remarks.—This is the second season of the application of ammonium sulphate, the plots having been kept constant under each treatment. The present stage of the experiment is considered too early for the interpretation of results.

(v) *Effect of high yielding strains on soil fertility.*—An experiment to study the effect of high yielding strains on soil fertility under ryots methods of manuring and heavy manured condition was started during the first-crop season and continued during the second-crop season. The results are presented in Table XXVI and

XXVII. There again, conclusions can be drawn only at the end of the period of a number of years.

TABLE XXVI.—*Effect of high yielding strains on soil fertility—First crop, 1951-52.*

Plot No. D-1. Layout—Split plot— Ryots' manuring—(2,000 lb. cattle manure only per acre)—Main plot treatments. Heavy manuring—4,000 lb. green leaf, 200 lb. bonemeal, 56 lb. Ammonium sulphate per acre—Main plot treatments. Sub-plot treatment— 1. Local (Kayama) to be followed by local (Athikraya). 2. Local (Kayama) to be followed by high yielder (Co. 3).		Sub-plot treatment—cont. 3. High yielder (MGL. 1) to be followed by local (Athikraya). 4. High yielder (MGL. 1) to be followed by high yielder (Co. 3). Size of strip—21' × 11'. Planting—Doubles, bulk. Varieties—Local Kayama and MGL. 1. Sown—5th May 1951. Planted—15th June 1951. Harvested—11th October 1951.	
Serial number and treatments.		Acre yield grain LB.	Percentage on general mean.
(i) Ryots' v. Heavy manuring.			
1. Ryots' manuring	..	2,237	94.7
2. Heavy manuring	..	2,487	105.3
3. General mean	..	2,362	100.00
4. Whether 'Z' test satisfied or not P = 0.05	..	No.	No.
5. Critical difference	..	382	16.2
(ii) Subplot treatments.			
1. } As noted above	}	2,131	90.26
2. }		2,241	94.92
3. }		2,544	107.73
4. }		2,527	107.1
5. General mean	..	2,361	100.00
6. Whether 'Z' test satisfied or not	..	No.	..
7. Critical difference	..	602	25.5
(iii) Interaction.			

Treatments—			
1. Ryots manuring × Local Kayama	..	2,084	88.1
2. Do. × Do.	..	2,140	90.5
3. Do. × MGL. 1	..	2,388	100.9
4. Do. × Do.	..	2,350	99.3
5. Heavy manuring × Local Kayama	..	2,186	92.4
6. Do. × Do.	..	2,352	99.4
7. Do. × MGL. 1	..	2,710	114.7
8. Do. × Do.	..	2,716	114.8
9. General mean	..	2,365	100.00
10. Whether 'Z' test satisfied or not	..	No.	..
11. Critical difference	..	..	..

TABLE XXVII.—*Effect of high yielding strains on soil fertility—Second crop, 1951-52.*

Plot No. D-1. Layout—Split plot— Ryots' manuring—(2,000 lb. cattle manure only per acre)—Main plot treatments. Heavy manuring—4,000 lb. green leaf, 200 lb. bonemeal, 56 lb. Ammonium sulphate per acre—Main plot treatments. Sub-plot treatments— 1. Local (Athikraya) following local (Kayama). 2. High yielder (Co. 3) following local (Kayama). 3. Local (Athikraya) following high yielder (MGL. 1). 4. High yielder (Co. 3) following high yielder (MGL. 1). Size of strip—24' × 10'. Planting—Doubles, bulk. Varieties—Athikraya and Co. 3. Sown—15th September 1951. Planted—28th October 1951. Harvested—31st January 1952.			
Serial number and treatments.		Acre yield grain LB.	Percentage on general mean.

(i) Ryots v. Heavy manuring.			
1. Ryots' manuring	..	1,112	94.6
2. Heavy manuring	..	1,237	105.4
3. General mean	..	1,174	100.00
4. Whether 'Z' test satisfied or not	..	No.	No.
5. Critical difference	..	127	10.85

Serial number and treatments.	Acre yield grain in lb.	Percentage on general mean.
(ii) Sub-plot treatments.		
1. } As noted above	1,140	97.1
2. }	1,205	102.5
3. }	1,172	99.75
4. }	1,183	100.6
5. General mean	1,175	100.0
6. Whether 'Z' test satisfied or not $P = 0.05$	No.	
7. Critical difference	92	7.8
(iii) Interaction.		
1. Ryots' manuring $\times$ Local Athikraya	1,126	95.8
2. Do. $\times$ Co. 3	1,103	99.7
3. Do. $\times$ Local Athikraya	1,172	93.8
4. Do. $\times$ Co. 3	1,047	89.0
5. Heavy manuring $\times$ Local Athikraya	1,154	98.0
6. Do. $\times$ Co. 3	1,306	99.7
7. Do. $\times$ Local Athikraya	1,172	111.1
8. Do. $\times$ Co. 3	1,318	112.2
9. General mean	1,175	100.0
10. Whether 'Z' test satisfied or not $P = 0.05$	Yes.	Yes.
11. Critical difference	..	..

(vi) *Efficacy of common manures.*—As per the instructions of the Director of Agriculture, an observation plot had been laid out in the previous year to assess the merits of cattle manure, ash and burnt earth (*Sudu mannu*), in increasing the yield of paddy. A replicated trial was started during the year under report to assess the merits of the above manures when applied to the main plot, to the nursery as well as to both. A dose of 8,000 lb. of cattle manure was taken as the basis and burnt earth and ash were obtained by burning the cattle manure with and without the addition of soil respectively. The results presented in Table XXVIII indicate that cattle manure is best applied as such. Since the application of burnt earth failed to produce significant increases in yield and its preparation cannot be standardized, this experiment would be discontinued as per orders of the Director of Agriculture. During the second-crop season no residual effects were observed in the main plot treatments.

TABLE XXVIII.—Common manures—Efficacy of—First crop—1951-52.

Plot No.—F-1. Layout.—Split plot.		Above manures applied to nursery—Sub-plot treatments.	
1. Cattle manure at 8,000 lb. per acre.	Main plot treatment.	Size of strip—23' $\times$ 5'.	
2. Ash obtained from above (1,00 lb.).		Planting—Doubles, bulk.	
3. Burnt earth (<i>sudu mannu</i>) obtained from above (2,50 lb.).		Variety—PTB. 14.	
4. Control.		Sown on—15th May 1951.	
		Planted on—20th June 1951.	
		Harvested on—6th October 1951.	
Serial number and treatment.		Acre yield grain in lb.	Percentage on general mean.
(1)		(2)	(3)
(i) Main plot treatments.			
1. Cattle manure at 8,000 lb. per acre		2,876	190.8
2. Ash		2,519	96.2
3. Burnt earth		2,009	99.6
4. Control		2,475	94.50
5. General mean		2,620	100.00
6. Whether 'Z' test satisfied or not $P = 0.05$		Yes.	Yes.
7. Critical difference		207	7.9

Serial number and treatment.	Acre yield grain in lb.	Percentage on general mean.	Percentage on control.
(1)	(2)	(3)	(4)
(ii) Sub-plot treatments.			
1. Cattle manure to nursery	2,662	101.5	
2. Ash to nursery	2,594	98.9	
3. Burnt earth to nursery	2,607	100.1	
4. Control no manure to nursery	2,625	99.4	
5. General mean	2,623	100.00	
6. Whether 'Z' test satisfied or not	No.	No.	
7. Critical difference	110	4.22	
(iii) Interaction.			
1. Cattle manure at 8,000 lb. to main plot cattle manure to nursery	2,944	112.3	119.9
2. Do. Ash to nursery	2,907	110.9	118.5
3. Do. Burnt earth to nursery	2,853	108.9	116.3
4. Do. Control no manure	2,806	107.1	114.4
5. Ash (from 8000 lb. cattle manure) cattle manure to nursery	2,526	96.4	102.9
6. Do. Ash to nursery	2,591	98.9	105.7
7. Do. Burnt earth to nursery	2,452	93.5	100.0
8. Do. No manure to nursery	2,513	95.9	102.5
9. Burnt earth (from 8000 lb. cattle manure to main plot) Cattle manure to nursery	2,646	101.0	107.9
10. Do. Ash to nursery	2,478	94.6	101.0
11. Do. Burnt earth to nursery	2,588	98.8	105.6
12. Do. No manure to nursery	2,725	104.00	111.10
13. Control no manure to main plot Cattle manure to nursery	2,526	96.4	102.9
14. Do. Ash to nursery	2,397	91.5	97.8
15. Do. Burnt earth to nursery	2,526	96.4	102.9
16. Do. No manure to nursery	2,452	93.6	100.0
17. General mean	..	100.00	106.8
18. Whether 'Z' test satisfied or not	No.		
19. Critical difference	..	..	..

(vii) *The application of phosphates to paddy through green manures.*—With a view to study the effect of application of phosphates to paddy crop either direct or through the application to green manures preceding a paddy crop, this experiment with one phosphatic fertiliser, superphosphate and one green manure *Kolinji* (*Tephrosia purpurea*) was started after the harvest of the second-crop of paddy in January 1952. The crop of *Kolinji* grown over the area, which had come up well, was ploughed in and a crop of paddy has been planted in June 1952. The results of the trial consisting of eight treatments, replicated four times would be embodied in the next report.

9. *Cultural trial.*—Two systems of raising second-crop nursery are adopted in this district. In the first system (semidry), the sowings are done early in August in wet nurseries in the single crop area and the nurseries are treated dry later on. In the second system (wet) the sowings are done in September in the double crop area and the seedlings are raised in wet nursery which are kept wet till the seedlings are pulled out. In the first system, a thicker seed rate is adopted and the seedlings are retained in the nursery up to 60-75 days after sowing, while in the second system, the seedlings have to be pulled out within 30-40 days after sowing. Previous trials had indicated that the yields of popular strains were influenced by

the system of sowing. An experiment was therefore designed during the year under report, to test the suitability of newly introduced strain Co. 25 under the above two systems of sowing.

(i) *Wet v. dry nursery*.—The results of the trial presented in Table XXIX show that strain Co. 25 recorded significantly better yields under early semidry conditions. Though the total flowering duration appears to be longer under dry sown conditions by about 24 days due to its earlier sowing, it actually flowered a week earlier than under wet sown condition.

TABLE XXIX.—*Wet v. semi-dry nursery—Yield trials—Second crop—1951-52.*

Plot No.—G-4.
Layout—10 × 6 randomized.
Size of strip—17' × 4'.
Planting—Singles, bulk.

Sown—Semi dry nursery 11th August 1951.
Wet nursery 10th September 1951.
Planted—21st October 1951.
Harvested—On different days a month after flowering.

Serial number and details of culture.						Flowering duration in days.	Acre yield grain in lb.	Percentage on general mean.
(1)						(2)	(3)	(4)
1	8448	{	Wet	..	..	107	2,014	97.3
2		{	Dry	..	..	132	2,101	101.5
3	8360	{	Wet	..	..	105	2,049	99.0
4		{	Dry	..	..	130	1,819	87.9
5	Co. 3	{	Wet	..	..	102	2,069	100.00
6		{	Dry	..	..	121	1,831	88.4
7	Co. 14	{	Wet	..	..	114	2,123	102.6
8		{	Dry	..	..	128	2,046	98.3
9	Co. 25	{	Wet	..	..	127	2,083	100.6
10		{	Dry	..	..	151	2,725	124.0
11	General mean					..	2,086	100.00
12	Whether 'Z' test satisfied or not					..	Yes.	Yes.
13	Critical difference $P=0.05$					..	190	9.15

10. *Other crops*—(a) *Green manure crops*—(i) *Sesbania speciosa*.—The work on this crop consisted mainly of growing the plants along the periphery of paddy plots both in the single crop and double crop area. The plants in the double crop area came up well and attained an average height of about 6 feet to 8 feet while some plants attained a height of even 12 feet to 14 feet and were utilized as green manure for second crop area. Due to gaps and planting them 1½ feet to 2 feet apart the green matter obtained worked out to about 600 lb. per acre. With closer planting and better establishment, this plant shows good promise and is expected to yield at least one ton of green matter per acre. The plants in the single crop area which were left for seed production came up fairly well till about the end of October, when they were in flower. Due to complete absence of moisture in the plots from November onwards, there was a set back and the plants dried up by the end of December. The single crop plots can therefore be utilized only for supplying green matter for the double crop area in October. The seedlings were again planted on the periphery of plots during the second-crop season. There again the plants came up fairly well, though not as good as during the first-crop season, the average height attained at the time of flowering being about 4 feet to 6 feet. There again due to sudden drying up of the plots and lack of moisture, there was a set back. In favourable situations however, the plants produced on an average of 2/3 ounce of seed and a total of 131 lb. of seed was collected during the year.

Seeds were sown in a plot of about 20 cents in the double crop area at the beginning of February after the harvest of the second crop to find out the quantity of green matter that would be obtained when raised with one initial irrigation and with periodic irrigations. The germination was very poor and the stand uneven as a result of which the crop gave a low-acre yield of 2,350 lb. of green matter, while in the previous two years, the crop yielded 18,000–20,000 lb. of green matter.

The low germination and the poor stand were due to the fresh seed used and its dormancy, since studies conducted at a later stage showed that the seeds showed dormancy for some period, the exact period of dormancy being still under study. The suitability of growing this as a pure crop in the dry and single crop area during the south-west monsoon season to supply green leaf for the second crop in October is under investigation during 1952-53 first-crop season and the results would be embodied in the next report.

(ii) *Kolingi*.—*Wild indigo* (*Tephrosia purpurea*).—Kolinji was sown over an area of 5.33 acres during the year comprising 3.38 acres of single crop land and 1.95 acres of double crop area at the end of the first and second crops of paddy respectively. While the crop in the single crop land did not come up well for want of sufficient moisture in the plots, the crop in the double crop area came up luxuriantly and yielded green matter at 5,200 lb. per acre.

(iii) *Sunn hemp*.—A crop of sunn hemp was raised in one of the plots in the higher double crop area over 14 cents between the months of December and February with the help of three irrigations. The crop recorded an acre yield of 4,800 lb. of green leaf when cut immediately after flowering. The green stuff was partially dried and mixed with straw for being fed to cattle. An area of 98 cents comprising 68 cents of single crop wet land and 30 cents of double crop area were sown to sunn hemp during the last week of April after the receipt of summer showers. While the crop in the single crop area failed to come up for want of sufficient moisture, the crop in the double crop area recorded an acre yield of 5,100 lb. when cut just before flowering.

(iv) *Gliricidia maculata*.—Plants along the road way in the dry area and those on the channel bunds in the double crop area continued to grow well and generally yielded larger quantity of leaves than in the previous years. As the plants were given only a light pruning at the end of previous first crop season, as heavy pruning had been found to interfere with seed production, a total of 20 lb. of seed was collected and the entire quantity was utilized for raising seedlings both for planting at the station and distribution. A total of 5,000 seedlings were planted all along the sides of roadway, bunds and vacant places at the end of the period under report. The plants were pruned completely and a total of three tons of green matter has so far been obtained and the yield from the remaining plants is expected to be about three tons. The yields from the larger plants ranged from 20 lb. to 60 lb.

(v) *Indigofera teysmanii*.—Seven plants were raised from a small quantity of seeds sown on 1st December 1951 and were kept in pots till 7th June 1952 when they were transferred to the permanent place. The plants have attained an average height of 2½ feet and are progressing satisfactorily.

(b) *Pulse crops*—(i) *Blackgram*.—Fourteen varieties of blackgram supplied by the Pulses Specialist, Coimbatore, were put under yield trial during the two seasons from November to January after the harvest of first crop paddy and from February to April after the harvest of second crop paddy. Due to unfavourable seasonal conditions, the crop failed during both the seasons recording very low yields. This was also raised as a bulk crop over 43 cents in the double crop area where it recorded an acre yield of 135 lb. of grain.

(ii) *Horsegram*.—The year under report was also not favourable for this crop due to the failure of the north-east monsoon and a very long and continuous period of dry weather till the middle of April 1952. From an area of 1.1 acres sown to this crop, 45 lb. of grain was harvested which works out to an acre yield of 41 lb.

(iii) *Cowpea*.—New Era Cowpea was sown in odd corners of the dry area over about 5 cents and a total of 14 lb. seeds was collected. This was again sown over about 20 cents in the double crop area during the third crop season when it was raised under the irrigated conditions and it recorded an acre yield of 320 lb. of grain.

(c) *Sweet potato*.—After the transfer of the scheme on tuber crops financed by Indian Council of Agricultural Research from Nileshwar to this station, the intervarietal trials conducted during the previous year were merged in the new scheme. However the manurial trials and the cultural trials started during the previous year were continued during both the first and second crop seasons of the year in a slightly modified form with an addition of one treatment in the manurial trial (treatment 3) and two treatments in the cultural trial (treatments 2 and 4).

Manurial trial.—With a view to find out the best time for the application of manure for sweet potato, an experiment consisting of three treatments where the dose of manure is applied (i) full dose at planting, (ii) full dose one month after at earthing up, (iii) half the dose at planting and the other half one month after, was laid out during both the first and second crop seasons of the year. The full dose of manure consisted of ash at 3,000 lb., superphosphate at 300 lb. and groundnut cake at 400 lb. per acre. The results presented in Table XXX show that while the yield differences were not significant during the first crop season, treatments 1 and 2 were significantly better than treatment 3 during the second crop season.

TABLE XXX.—*Sweet potato manurial trials—First crop season 1951-52.*

Field number—B-15.
Layout—3 × 8 Randomized.
Size of strip—2½' × 24'.
Method of planting—9" apart in singles.
Date of planting—26th June 1951.
Date of harvest—12th November 1951.
Treatments—
A. Full dose of manure at planting.
B. Full dose of manure at earthing up one month after.
C. Half the dose at planting and half the dose at earthing up.
Quantity of manure applied (full dose)—
3,000 lb. ash per acre,
300 lb. of super phosphate per acre,
400 lb. of groundnut cake per acre.

Treatments.	A (Control.)	B	C	'Z' test satisfied or not.
(1)	(2)	(3)	(4)	(5)
Acre yield in lb. ..	11,340	10,470	12,910	No.
Percentage on control ..	100.0	92.3	102.1	No.

Second crop season, 1951-52.

Field number—C-5.
Layout—3 × 16 randomized.
Size of strip—18' × 3'.
Method of planting—Single 9" apart.
Date of planting—17th November 1951.
Date of harvest—24th February 1952.
Treatment—Same as above.
Quantity of manure applied—Same as above.

Treatments.	A (control.)	B	C	'Z' test satisfied or not.	Standard error.	Critical difference.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Acre yield in lb. ..	9,135	9,147	7,046	Yes.	..	..
Percentage on control ..	100.0	100.1	77.1	Yes.	3.74	11.23

Conclusion—A B C

Cultural trial.—With a view to find out the best method of planting, an experiment consisting of the following four treatments was laid out during both the first and second crop seasons :—

- (1) Long setts 2 feet—3 feet planted flat in singles.
- (2) Do. planted flat in doubles.
- (3) Normal setts 9 inches long planted erect in singles.
- (4) Do. planted erect in doubles.

The results are presented in Table XXXI. Though the results were not significant in both the seasons, there were indications to show that while vertical

method of planting proved better during the first crop season, the flat method appeared to be better during the second-crop season.

TABLE XXXI.—*Sweet potato culture trials—First crop, 1951-52.*

Field number—D-15.
Layout—4 × 6 randomized.
Size of strip—25' × 24'.
Method of planting—(Vide treatments).
Date of planting—27th June 1951.
Date of harvesting—12th November 1951.
Treatments—
A. Planting 2'—3' cuttings horizontally in singles.
B. Planting—2'—3' cuttings horizontally in doubles.
C. Planting 9" cuttings, 9" apart in singles.
D. Planting 9" cuttings, 9" apart in doubles.

	Treatments.				General mean.	'Z' test satisfied or not.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Acre yield in lb. ..	8,710	8,476	8,128	10,220	8,334	No.
Percentage on general mean.	98.0	95.4	91.5	115.0	100.0	No.

Second crop season, 1951-52.

Field number—C-5.
Layout—4 × 12 randomized.
Size of strip—18' × 3'.
Method of planting—(Vide treatments).
Date of planting—17th November 1951.
Date of harvest—15th February 1952.
Treatments—Same as above.

	Treatments.				General mean.	'Z' test satisfied or not.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Acre yield in lb. ..	13,660	14,330	12,270	13,120	13,120	No.
Percentage on general mean.	104.1	100.7	89.3	100.0	100.0	No.

(d) *Cotton in rice fallows*.—The following three trials on cotton suggested by the Cotton Specialist were laid out in the single crop area after the harvest of the first crop to find out whether the early American varieties could be fitted up in rice fallows as an off-season crop :—

(i) Time of sowing and manuring on P 216 F variety under irrigated conditions.

(ii) Varietal trial A with seven varieties.

(iii) Varietal trial B with 70 varieties.

The results of the trials have been communicated to the Cotton Specialist. From the yield data it is seen that in the varietal trial A, culture 7682 (MU. 2) has recorded the highest acre yield of 305 lb. of kapas. In the manurial-cum-time of sowing trial, it is seen that later sown manure plot has recorded the highest acre yield of 161 lb. The crop received 14 irrigations at intervals of ten days. Considering the high cost of irrigation, and the low acre yield, the prospects of introducing cotton in rice fallows do not appear to be bright in this tract.

(e) *Groundnut*.—Trials were laid out during the year to explore the possibilities of raising a crop of short duration groundnut (TMV. 2) in single crop land after the harvest of first crop paddy and in double crop area after the harvest of the second crop of paddy. Due to unfavourable seasonal factors, the crop failed to come up well in the single crop area. In the double crop land, however, the crop came up well without the help of irrigation and formed pods of good size, though rather late in the season. Since the germination had been very sparse, no data could be gathered on the acre yield recorded.

(f) *Fodder grasses*.—The three grasses, Buffalo grass, Guinea grass and Cumbu Napier hybrid grass were maintained during the year. Since the lower double crop area was found unsuitable for these grasses, these were planted out in another plot in block H (single-crop area with facilities for irrigation) on 1st December 1951. Thin Napier grass was also planted along with this to find out its behaviour under irrigated conditions. Buffalo grass was cut twice, 4 months and 9 months after planting in the first plot in the double crop area and it gave a total green matter of 23,287 lb. per acre. Cumbu Napier hybrid grass when cut on

24th July 1951, recorded 13,500 lb. of green grass. Though no definite information is available about its feeding value, two or three persons who are growing this on a small scale have reported that this grass has increased the yield of milch cattle, as a result of which there is a demand for slips for planting purposes. Elephant grass was added to the collection of grasses on 26th April 1952. With the onset of monsoon, in 1952, all the grasses have established well. It is proposed to take regular cuttings during the coming year to find out the exact quantities of green grass that would be got from the different grasses.

(g) *Bananas*.—The crop of bananas, in the lower double crop area planted during the previous year and which made good progress till the end of the previous year, suddenly turned yellow in the month of July 1951 in spite of deep trenches all round the plot and surface planting of the suckers, due to ill-drained conditions. Another plot measuring 30 cents in the newly acquired area (block H) which had better drainage facilities and could be irrigated during the off-season was therefore prepared and suckers of Mauritius, a curry variety (Avande) and Nendran were planted out in September 1951. The general progress of this crop is satisfactory. At the end of the year seven nendran plants had put forth bunches.

(h) *Vegetables*.—Local bendai, a long podded variety, and the New Era Cowpea were the only two vegetables grown on a limited scale during the first and third crop seasons of the year. From an area of about 35 cents 20 lb. of bendai seed was collected during the year. New Era Cowpea grown over 19 cents recorded an acre yield of 320 lb. of grain and a total of 76 lb. of seed was collected during the year. Cucumber was also raised as a summer crop over 37 cents. Due to severe attack of borers in the initial stages, this crop failed completely recording a low acre yield of 1,680 lb. of mature cucumbers.

(i) *Fruit plants*.—Three hundred rooted cuttings of Malta lemon plants were raised during the year. Out of 12,000 mango nuts received from the agricultural demonstrators of the district and sown in specially prepared nurseries, in June 1951, about 1,000 seedlings were obtained and these were removed from the ground and tied in coconut fibre receptacles and are ready for being utilized for grafting purposes.

11. *Miscellaneous plants*—(i) *Balsa wood*.—Out of the sixteen seedlings raised during the previous year and planted on the main channel bund in June 1951, twelve plants established well and have attained an average height 8 feet 2 inches with an average girth (1 foot from the base) of 5.7 inches at the end of the period under report, the maximum height and girth attained being 15 feet and 9 inches respectively.

(ii) *Kapok*.—One of the plants of special variety planted in 1949 and which produced two pods of good length during the previous year, produced a total of 22 pods during the year.

(iii) *Cover crops*.—Tropical Kudzu (*Peuraria javanica*). This vine which was first introduced into the station in 1947, is coming up well and has formed a nice carpet over the slopes of one terraced field. This can be raised both from seeds as well as cuttings. A total of 20 oz. of seed collected during the year was transferred to other research stations for trial.

Calopogonium mucunoides, another plant used as a cover crop, and which comes up well in a few places on the West Coast, has also been introduced at the end of the period under report. Seedlings of both the above cover crops raised during the summer months, have been planted out all along the sides of newly terraced fields after the onset of monsoon in June 1952.

12. *Miscellaneous*—*Dormancy studies in Sesbania speciosa*.—Studies were conducted during the year to observe the period of dormancy in *Sesbania speciosa* seed and to test the efficacy of hot water treatment in breaking the dormancy the seeds having been stored in gunny and in tin soon after harvest. While the percentage of germination was found to be 40 in the freshly harvested seed, it

increased to 76 when stored in tin for 3 months and to 60 when stored in gunny. Treating the seed with hot water at 70° C for 15 minutes improved the percentage of germination by nearly 50 per cent in the earlier stages, the effect being less with the decrease in the dormancy of the seed. This study is still in progress.

13. *Seed distribution*.—The quantities of seed paddy and other produce distributed are given in Table XXXII.

TABLE XXXII.—Quantities of seed paddy and other produce distributed during 1951-52.

Paddy seeds	.. .. .	34,897 lb.
Blackgram seeds	.. .. .	116 "
Bendai seeds	.. .. .	19 "
New era cowpea seeds	.. .. .	15 "
Glyricidia seeds	.. .. .	4 1/2 "
Sesbania speciosa seeds	.. .. .	9 "
Kudzu seeds	.. .. .	21 oz.
Paddy seedlings in bundles	.. .. .	2,500
Glyricidia seedlings and cuttings	.. .. .	7,750 No.
Vegetable seedlings	.. .. .	621 "
Kudzu cuttings	.. .. .	700 "
Banana suckers and fruit plants	.. .. .	467 "

14. The financial statement is given in Appendix II.

15. The steps taken to increase the revenue of the station, and the cost of cultivation of bulk crop of paddy are furnished in Appendices III and IV respectively.

PADDY BREEDING STATION,
MANGALORE-2,
23rd July 1952.

K. HANUMANTHA ROW,
Superintendent.

LAWLEY ROAD P.O., COIMBATORE,
9th August 1952.

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

APPENDIX I (a).

PREVIOUS YEARS' RESULTS OF FIRST-CROP CULTURES UNDER TRIAL DURING 1951-52.

(Percentage increase over standard.)			
Culture number.	1950-51.	1949-50.	1948-49.
Kayama cultures (vide Table III)—			
Series 1—1367	106.4	113.3	105.5
1419	121.6	101.8	113.1
Series 2—472	113.4	109.8	110.4
1444	111.2	101.4	115.9
1535	115.5	110.8	108.6
1558	114.2	110.1	119.0

Culture number.	1950-51.	1949-50.	1948-49.
Kayama cultures (vide Table III)—cont.			
Series 3—1452	109.6	100.0	117.4
1469	108.6	111.9	111.5
1474	117.2	109.5	111.9
1476	105.7	112.6	111.9
Macathy cultures (vide Table IV)—			
Series 1— 827	112.5	105.1	114.0
2882	91.9	104.0	..
3159	100.4	112.3	..
Series 2—2884	96.2	106.0	..
2887	97.3	109.0	..
2932	93.0	114.9	..
2941	94.6	108.7	..
Series 3—2129	100.7	97.3	..
2874	93.7	104.0	..
2937	98.7	105.2	..
3052	104.4	108.0	..
Halluga cultures (vide Table V)—			
1744	119.0	100.2	..
1792	116.6	99.8	..
1805	121.8	97.4	..
1828	117.9	105.0	..
Kanwa cultures (vide Table VI)—			
1958	123.5	126.5	..
3574	106.0	..	..
3589	119.0	..	..
3590	99.4	..	..

APPENDIX I-B.

PREVIOUS YEARS' RESULTS OF SECOND-CROP CULTURES UNDER TRIAL DURING 1951-52.

(Percentage increase over standard.)

Culture number.	1950-51.	1949-50.	1948-49.
Athikraya cultures (vide Table VII)—			
Series 1—			
3440	107.0	115.2	..
3475	105.8	110.5	..
3507	111.5	103.0	..
Series 2—			
859	103.3	104.5	110.2
904	110.5	113.4	..
2411	105.2	108.7	121.6
Series 3—			
2432	106.6	110.3	113.4
3432	106.2	108.3	..
3444	103.3	121.4	..
Hybrid cultures (vide Table XVII)—			
2523	92.2	97.8	..
2550	90.9	103.0	..
8414	93.1	108.7	..
8360	98.8	99.0	..
8363	90.2	84.9	..
8443	95.5	95.5	..

APPENDIX II.

FINANCIAL STATEMENT OF THE PADDY BREEDING STATION, MANGALORE, FOR THE FISCAL YEAR 1361 (1951-52).

A. Expenditure.		Amount.
		RS. A. P.
1 Pay and allowances—		
Pay of officer .. .. .	.. .. .	3,070 10 0
Pay of establishment .. .. .	.. .. .	7,356 4 0
Dearness allowance .. .. .	.. .. .	3,499 9 0
House-rent allowance .. .. .	.. .. .	964 6 0
Travelling allowance .. .. .	.. .. .	960 3 0
Total .. .. .	.. .. .	15,851 0 0
2 Contingencies—		
C.A. 2—Office Contingencies—		
Rates and taxes .. .. .	.. .. .	16 8 0
Other contingencies .. .. .	.. .. .	94 12 6
Dearness allowance to menials .. .. .	.. .. .	3,447 10 0
Total .. .. .	.. .. .	3,558 14 6
C.A. 3—Other Charges—		
Petty construction and repairs .. .. .	.. .. .	10,388 6 0
Cost of land, live and deadstock .. .. .	.. .. .	1,825 13 9
Apparatus and materials .. .. .	.. .. .	51 5 9
Working expenses .. .. .	.. .. .	19,270 0 3
Total .. .. .	.. .. .	31,535 9 9
B. Receipts		
XXIX. Agriculture—		
Agricultural stations .. .. .	.. .. .	2,899 9 6
Miscellaneous .. .. .	.. .. .	387 14 0
Value of seed transferred .. .. .	.. .. .	4,531 10 6
Rent on buildings .. .. .	.. .. .	3 0 0
Total .. .. .	.. .. .	7,822 6 0

APPENDIX III.

STEPS TAKEN FOR INCREASING THE REVENUE OF THE PADDY BREEDING STATION, MANGALORE, DURING 1951-52.

(a) *Improving irrigation facilities.*—Two new wells with good supply of water were constructed and completed during the year. Since these wells are situated at a higher level in the dry area, they are expected to ensure one crop of paddy in the single crop land over 8 acres which had no other source of water-supply previously and also enable growing of some irrigated crop in rice fallows over about 10 acres.

(b) During the fallow period a total area of 13 acres was brought under crops like green manures, sweet potato, vegetables, pulses and cotton.

(c) Strict economy in expenditure was observed. Out of a total approved grant of Rs. 25,000 under working expenses, a saving of Rs. 5,000 was effected.

(d) It has not been possible to reduce the cost of production in paddy though the margin of profit was maintained at the same level as in the previous year. However, efforts are being made in this direction by increasing the production of organic manure and effect a saving in the manure bill and thus reduce the cost of production proportionately.

APPENDIX IV.

COST OF CULTIVATION OF PADDY AT THE PADDY BREEDING STATION, MANGALORE,
DURING 1951-52.

Particulars.	First crop.			Second crop.		
	Total bulk area. 12.91 acres.	Per acre.		Total bulk area. 5.15 acres.	Per acre.	
(1)	(2)	(3)		(4)	(5)	
<i>Expenditure.</i>						
	RS. A. P.	RS. A. P.		RS. A. P.	RS. A. P.	
Preparatory cultivation ..	542 4 0	42 0 7		280 10 0	45 10 1	
Manures and manuring ..	917 11 0	71 2 3		536 1 6	97 10 11	
Seeds and sowing ..	868 11 0	67 5 5		401 15 10	66 15 11	
After cultivation ..	228 1 0	17 10 10		27 12 0	4 8 2	
Harvesting, threshing, etc. ..	594 11 5	46 1 8		261 2 0	42 7 4	
Irrigation ..	..	..		49 0 0	7 15 6	
Total expenditure ..	3,151 6 5	244 4 9		1,606 9 4	265 3 11	
<i>Receipts.</i>						
Grain yield—						
I Crop—24,336 lb. ..	3,630 10 8	231 7 2	1,484 6 2	241 5 10		
II Crop—10,862 lb. ..						
Straw yield—						
Straw ..	391 4 0	30 5 3	429 9 3	69 13 4		
Total receipts ..	4,021 14 8	311 12 5	1,913 15 5	311 3 2		
<i>Profit or loss.</i>						
Total receipts ..	4,021 14 8	311 12 5	1,913 15 5	311 3 2		
Total expenditure ..	3,151 6 5	244 4 9	1,606 9 4	265 3 11		
Balance—Net profit ..	870 8 3	67 7 8	307 6 1	45 15 3		

ANNUAL REPORT OF THE AGRICULTURAL COLLEGE FARM, BAPATLA
(GUNTUR DISTRICT), FOR 1951-52 (FASLI 1361).

Season and rainfall.—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.

Five and a quarter 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 was helpful for the preparatory cultivation of *punasa* crops and reclamation of the newly acquired lands.

The maximum temperature during the fasli year ranged from 80° F in September 1951 to 111.6° F in May 1952 which was the highest recorded during the year as against 106° F recorded in June 1951. The minimum temperature ranged between 52° F recorded in December 1951 and 86° F in June 1952. To sum up, the south-west monsoon period was favourable and the north-east monsoon was the reverse (Table I).

TABLE I.—Rainfall statement.

Month.	Week.	Fasli 1360 (1950-51).		Fasli 1361 (1951-52).	
		Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.
(1)	(2)	(3)	(4)	(5)	(6)
South-west monsoon.					
June	7-13	1.28	3	0.28	2
	14-20	0.23	1	..	..
	21-27	0.39	1	4.91	5
June-July	28-4	0.42	1	..	..
	5-11	2.83	6	1.72	3
	12-18	0.29	1	3.59	2
	19-25	2.23	3	0.43	1
July-August	26-1	0.08	..	0.21	1
	2-8	0.60	1	1.77	1
	9-15	..	..	2.17	4
	16-22	..	..	0.44	1
	23-29	2.55	3	1.22	3
August-September ..	30-5	1.17	2	0.48	2
	6-12	2.04	5	1.68	2
	13-19	..	..	..	..
	20-26	3.41	2	0.20	1
	Total ..	17.52	29	19.10	28
North-east monsoon.					
September-October ..	27-3	0.50	2	3.19	4
	4-10	0.66	1	0.12	1
	11-17	0.96	1	..	..
	18-24	1.45	3	0.55	1

Month.	Week.	Fasli 1360 (1950-51).		Fasli 1361 (1951-52).	
		Rainfall in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.
(1)	(2)	(3)	(4)	(5)	(6)
North-east monsoon—cont.					
October-November	25-31	..	..	0.60	2
	1-7	2.08	3	0.78	2
	8-14	..	..	..	..
	15-21	..	..	0.01	..
November-December	22-28	..	..	..	..
	29-5	..	..	..	..
	6-12	..	..	..	..
	13-19	..	..	..	..
December-January	20-26	..	..	..	..
	27-3	..	..	..	..
	4-10	..	..	..	..
	11-17	..	..	..	..
	18-24	..	..	..	..
	25-31	..	..	..	..
	Total	5.65	10	5.25	10
Hot weather.					
February	1-7	..	..	..	..
	8-14	..	..	..	..
	15-21	..	..	..	..
	22-28	..	..	..	..
March	1-7	..	..	..	..
	8-14	..	..	..	..
	15-21	..	..	..	..
	22-28	0.09	..	0.40	1
March-April	29-4	0.32	2	..	..
	5-11	..	..	..	..
	12-18	..	..	..	..
	19-25	1.78	1	..	..
April-May	26-2	0.10	1	..	..
	3-9	..	..	..	..
	10-16	..	..	..	..
	17-23	..	..	2.87	4
May-June	24-30	0.14	1	4.50	3
	31-6	0.38	2	2.04	3
	Total	2.81	7	9.81	11
	Grand total	25.98	46	34.16	49

I. RESEARCH WORK.

2. *Paddy*—(a) *Study of the first-crop paddy varieties*.—The performance of sixty-five paddy strains released from different stations was studied. 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 6,000 lb. of grain per acre.

(b) *Study of the second-crop paddy varieties*.—Of the eight varieties under trial Co. 20 gave the maximum yield of 2,740 lb. followed by SLO. 12 and MTU. 15 with 1,920 lb. and 1,466 lb. per acre respectively.

(c) *Study of varieties suitable for partial submersion*.—AKP. 12 and MTU. 16 with an acre yield of 5,600 lb. and 5,200 lb. of grain were found to be the best among the four varieties under trial. Lodging was noticed in MTU. 12 and MTU. 6, the strains commonly used under such conditions in the locality.

3. *Determination of a suitable strain for jaggery making for the sandy tract*.—Five varieties Co. 527, Co. 475, Co. 471, Co. 449 and Co. 419 were studied both under plant and ratoon crop conditions under restricted supply of water. In the plant

crop Co. 449 gave the maximum yield closely followed by Co. 527 with 29.5 tons and 27.29 tons per acre respectively. In the ratoon crop Co. 527 topped the list with 20.2 tons. The setting of jaggery in plant and ratoon crop was good in Co. 527 and Co. 471 satisfactory in Co. 475 and Co. 449 and bad in Co. 419. Co. 419 failed to set in the previous season as well.

4. *Study of ragi strains*.—A trial was laid out to study the performance of Anakapalle ragi strains AKP. 2 and AKP. 6 in comparison with local during the punasa and pyru seasons in the sandy soils. The yield data is given in Table II below. In the punasa season under rainfed conditions, AKP. 2 recorded a maximum grain yield of 2,450 lb. per acre. In the pyru season under splash irrigation AKP. 6 was the maximum yielder with 2,789 lb. per acre. The duration of local was comparatively longer and the yields recorded were also low.

TABLE II.—Yield of ragi in lb. per acre.

Variety.	Punasa.		Pyru.	
	Yield.	Duration.	Yield.	Duration.
AKP. 2	2,450	98	2,747	92
AKP. 6	1,533	127	2,789	107
Local	835	149	2,227	114

5. *Banana*—*Determination of suitable varieties for the locality*.—Sixteen varieties comprising of eight fruit and eight curry varieties were studied. Amrutapani was the best among the fruit varieties with an average weight of 21 lb. per bunch and among curry varieties Boodida batheesa topped the list with an average bunch weight of 20 lb. The performance of the popular cirar varieties Karpura Chakrakeli, Tella Chakrakeli and Vamanakeli was poor with an average bunch weight of 7.2 lb., 5 lb. and 8.5 lb. respectively.

6. *Study of redgram cultures*.—Four improved strains of redgram were compared with the local in 16 cent observation plots. The yield data is given in Table III below. All the cultures commenced flowering in the third week of November. The drought that prevailed during the north-east monsoon period affected the growth, flowering, fertilization and yield.

Culture 2900, 1723 and local resisted drought better than the rest. Culture 2900 and 2745 recorded 13.6 per cent increased yield over local.

TABLE III.—Yield of redgram cultures.

Culture number.	Date of sowing.	Date of harvest.	Acre yield in lb.		
			Pulse.	Bhusa.	Stalks.
1723	25th June 1951.	17th January 1952.	109	120	556
2900	Do.	Do.	138	156	562
2745	Do.	Do.	138	200	1,100
3009	Do.	Do.	97	188	1,993
Local	Do.	Do.	118	131	794

7. *Horsegram*—*Determination of high yielding strains*.—Five strains were compared with local in an yield trial for the first time. The rainfall recorded during the crop growth was 0.79 inches and as a consequence of which the growth, flowering and setting was very poor. Culture No. 116 gave the maximum yield and culture Nos. 76, 116, local were found to withstand drought better than the rest. The 'Z' test was not satisfied. The yield data is given in Table IV.

TABLE IV.—Summary of results.

Particulars.	No. 116.	DB. 7.	No. 76.	Local.	No. 93.	No. 35.	Whether 'Z' test is satisfied or not.
Mean yield of grain in lb. per acre.	143	127	121	114	106	43	No.
Mean yield of bhusa per acre.	217	227	143	194	186	153	..

8. *Greengram*—Study on the performance of improved strains after paddy.—Two greengram strains Nos. 188 and 127 were compared with the local variety in observation plots after the harvest of paddy. Culture No. 188 gave 40 per cent increased yield over local with 350 lb. of pulse per acre.

9. *Groundnut*—Study of improved strains.—Three strains, TMV. 1, TMV. 2 and TMV. 3 were grown along with local in observation plots in sandy soils and sandy loams, under rainfed conditions. In sandy soils the performance was studied under early and late sowings. Local and TMV. 3 gave identical yields in sandy loams. Early sowings in sandy soils gave nearly three times increased yields over late sowings. Local gave the maximum yield under early sowings and TMV. 1 and TMV. 3 topped the list under late sowings. The results are given in Table V.

TABLE V.—Performance of groundnut strains.

Varieties.	Nature of soil.	Date of sowing.	Date of harvest.	Yield in lb. per acre.
(1)	(2)	(3)	(4)	(5)
TMV. 1 ..	Sandy soil ..	22nd June 1951 ..	28th October 1951 ..	755
Do. ..	Do. ..	10th July 1951 ..	9th November 1951 ..	304
Do. ..	Sandy loam ..	22nd June 1951 ..	5th November 1951 ..	1,210
TMV. 2 ..	Sandy soil ..	22nd June 1951 ..	4th October 1951 ..	360
Do. ..	Do. ..	10th July 1951 ..	18th October 1951 ..	250
Do. ..	Sandy loam ..	22nd June 1951 ..	15th October 1951 ..	1,200
TMV. 3 ..	Sandy soil ..	22nd June 1951 ..	4th October 1951 ..	920
Do. ..	Do. ..	10th July 1951 ..	12th November 1951 ..	290
Do. ..	Sandy loam ..	22nd June 1951 ..	10th November 1951 ..	1,550
Local ..	Sandy soil ..	22nd June 1951 ..	29th October 1951 ..	1,409
Do. ..	Do. ..	10th July 1951 ..	13th November 1951 ..	260
Do. ..	Sandy loam ..	22nd June 1951 ..	8th November 1951 ..	1,566

10. *Linseed*—Study of the performance of high yielding strains.—Three strains, IP. 86, NP. 10 and K2 were studied in observation plots in *pyru* season. K2 was found to be the best of the three strains. The yield data and other observations are given in Table VI.

TABLE VI.—Yield data.

Strain number.	Date of sowing.	Date of flowering.	Date of harvest.	Yield of grain in lb. per acre.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)
IP. 68 ..	10th November 1951.	Second week of January.	29th January 1952.	39	Plants 6" to 9" in height, flowers light blue.
NP. 10 ..	Do.	Fourth week of December.	24th February 1952.	33	Plants 6" to 9" in height, flowers violet.
K2 ..	Do.	First week of January.	Do.	150	Plants 1' to 1' 6" in height; flowers white.

11. *Gogu*—Study on the performance of gogu varieties.—Four varieties of gogu were studied under rainfed conditions—Kasi-gogu and Kaki-gogu were found to

record maximum yields among the varieties under trial. The yield and other particulars are given in Table VII.

TABLE VII.—Yield of fibre in lb. per acre.

Name of variety.	Average height of plants in feet.	Duration in days.	Yield.	Profit per acre.
(1)	(2)	(3)	(4)	(5)
				RS.
Kasi-gogu (Hibiscus sabdariffa var.-allissina-wester).	8.1	189	1,600	242
Kaki-gogu (Hibiscus cannabinus form-intensica).	6.3	151	1,100	68
Yerra-gogu (Hibiscus cannabinus var.-purpuree).	4.3	130	400	38
Tella-gogu (Hibiscus cannabinus var.-Howard) ..	4.5	131	432	51

12. *Cotton*—Study of the performance of P. 216 F in rice fallows under irrigated conditions.—An experiment to determine the optimum time of sowing and assess the response to manuring with nitrogen using the variety P. 216 F was laid out in randomized plots for the first time in the locality (Table VIII).

TABLE VIII.—Details of layout.

System of layout—Split plot design—Replicated four times.	Date of sowing—Treatment 1—21st December 1951.
Size of plot—Gross—0.50 cents.	2—5th January 1952.
Net—0.285 cents.	3—20th January 1952.
Spacing—2' between rows and 6" between plants in a row.	4—4th February 1952.
Major treatments—Four—(1) Sowing within three days after the harvest of paddy.	Date of flowering—Treatment 1—Second week of March 1952.
(2), (3) and (4) Sowings at intervals of one, two and three fortnights after treatment 1 respectively.	2—Third week of March 1952.
Minor treatments—Two—(1) No manure and (2) Manuring with 40 lb. of nitrogen in the form of ammonium sulphate to be applied in two doses of 20 lb. each—First dose to be applied at the time of first irrigation and Second dose to be applied at the time of flowering.	3—Last week of March 1952.
	4—First week of April 1952.
	Date of picking—Between 27th April 1952 to 18th July 1952.
	Date of harvest—23rd July 1952.

Summary of results (Main treatments).

Mean yield of kapas.	Treatment 3.	Treatment 2.	Treatment 1.	Treatment 4.	General mean.	Standard error of treatment mean.	Critical difference (P=0.05).	Whether 'Z' test is satisfactory or not.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
In lb. per acre ..	583	557	527	311	490	28	64	Yes.
As percentage on general mean.	115	114	108	64	100	..	..	..

Conclusion—T. 3, T. 2, T. 1 and T. 4.

Summary of results (Minor treatments).

Mean yield of kapas.	Manured.	Unmanured.	General mean.	Standard error of treatment mean.	Critical difference (P=0.05).	Whether 'Z' test is satisfactory or not.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
In lb. per acre ..	537	442	490	28	62	Yes.
As percentage on control ..	122	100	111	..	..	..

Conclusion—Manured, Unmanured.

13. Study of tomato varieties (Tables IX) and (X)—

A. Trial No. 1—

- (a) Year of trial—II year.
 (b) Object—Selection of a high yielding type from crosses with a South American wild species *Lycopersicon Pimpinellifolium*.
 (c) Layout—7 × 6 randomized blocks.
 (d) Treatments—Seven varieties.
 Hybrid—2.
 Hybrid—4.
 Hybrid—6.
 Hybrid—8.
 Hybrid—9.
 Deshi (a commercial variety of Delhi).
 Local.
 (e) Size of plot—Net 0.625 cent.
 (f) Soil—Sandy loam.
 (g) Date of sowing—23rd July 1951.
 (h) Date of transplanting—30th August 1951.
 (i) Commencement of harvest—28th November 1951.
 (j) Completion of harvest—31st January 1952.
 (k) Germination of seed—Good.
 (l) Damage by damping off disease and others—Damping off disease was noticed in the seed beds on a minor scale and was controlled by spraying Bordeaux mixture. There was an attack of Blight disease at fruiting stage caused by *Stemphylium solani* and preventive measures were adopted.
 (m) Flowering—Types H2—H4—H9 commenced flowering from 15th October 1951—H 6, H 8 Deshi and local flowered on 30th October 1951.
 (n) Ripening—Types H 8 H 9 and local were the earliest to come for picking from 26th November 1951 and the rest from 3rd December 1951.

TABLE IX.—Summary of Results.

	H9.	Deshi.	H4.	Local.	H2.	H8.	H6.	General mean.	Standard error of treatment mean.	Critical difference (P=0.05).	Whether test is satisfied or not.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Mean yield in lb. per acre.	4,381	3,726	3,432	3,121	3,001	2,686	1,830	3,140	88.5	181	Yes.
As percent on general mean.	140.	119	109	99	96	86	52	100	..	..	..

Conclusions—

1951-52—H9, Deshi, H4, Local, H2, H8 and H6.

1951-52—Deshi, H8, H4, Local, H6, H2 and H9.

B. Trial No. 2—

- (a) Year of trial—II year.
 (b) Object—A Study on the performance of promising commercial varieties introduced from abroad for determining a high yielding variety for the locality.
 (c) Treatments—16 numbers.
 (d) Layout—Row plots.
 (e) Net size of plot—0.63 cent.
 (f) Date of sowing—23rd July 1951.
 (g) Date of planting—6th September 1951.
 (h) Completion of harvest—31st January 1952.

TABLE X.—Yield data of tomato varieties.

Variety.	Yield in lb. per acre.
Turlalba	5,184
Red cloud	4,118
Hybrid 1	5,753
Hybrid 5	4,421
Rutgers	2,602
Pearsons	5,975
Tattinter	3,181
Hybrid 8	3,925
Porters pride	4,163
Sioux	3,696
Red marhie	2,997
Devilins choice	5,662
Earliana	4,228
Hybrid No. 3	7,639
Washington state	4,725
Local	6,131

Conclusions—

1. Deshi and local recorded good performance in both the seasons in Trial I and II.

2. Hybrid number 9 and Hybrid number 3 closely followed by Deshi and Local topped the list during the year under report in Trial I and II.

II. GENERAL.

14. *Paddy*.—Paddy was planted in an area of 60.89 acres during the year under report as against 1.50 acres planted in the previous first crop season. The average yield of paddy and straw per acre over the non-experimental area was 3,042 lb. and 4,720 lb. for early planting and 1,779 lb. and 3,520 lb. for late planting. Late planting was inevitable in view of the late handing over of 51.70 acres of wet land on August 13 by the Revenue Department. The season was favourable throughout the period of the crop growth. The acre yield of strains grown for seed multiplication are given hereunder (Table XI).

TABLE XI.—Yield of Strains.

Serial number and strain number.		Duration.	Yield of grain in lb. per acre.	
			Early planting July 15th to August 1st.	Late planting August 15th to September 1st.
(1)	(2)	(3)	(4)	(5)
1 MTU 3		Early	3,544	..
2 SR 26B		Medium	3,239	..
3 PK 4688		Late	2,620	..
4 AKP 12		Do.	2,935	..
5 MTU 7		Do.	2,777	..
6 MTU 6		Do.	2,290	2,025
7 MTU 12		Do.	3,566	1,576
8 MTU 19		Do.	3,362	1,735

15. *Wheat*.—Glumed wheat sown after paddy in December first week grew to a height of 4 feet with three to five tillers and gave an acre yield of 365 lb. grain and 875 lb. of straw.

16. *Jonna*.—N1 and G1 *Jonna* were sown in an area of 5.15 acres under rainfed conditions in the pyru season. The north-east monsoon was ill distributed and the crop passed through severe drought from November to February—132 lb. and 225 lb. of grain and 1,420 lb. and 2,070 lb. of straw was recorded by G1 and N1.

17. *Sajja*.—AKP. 1 and Co 1 *Sajja* seedlings were planted behind country plough in July. Five lb. of sunnhemp was broadcasted prior to planting of *Sajja*. AKP. 1 and Co 1 *Sajja* gave 152 lb. and 140 lb. of grain yield per acre. Two thousand eight hundred pounds of sunnhemp fodder per acre were also recorded.

18. *Korra*.—N1 and G1 *Korra* were grown as mixtures with cotton in *punasa* season under rainfed conditions. Of the two N1 gave the maximum yield of 546 lb. while G1 gave 252 lb. of grain per acre.

19. *Pulses*.—Local green gram and black gram were grown over an area of 6 acres after paddy and an acre yield of 171 lb. and 100 lb. was recorded respectively. since the soils are slightly alkaline the yields are considered to be satisfactory. Redgram strain No. 2900 was grown as a pure and mixed crop with *Korra*, *arika* and cowpea in the *punasa* season and the yields are given (in Table XII) below.

TABLE XII.—Yield of redgram and other mixtures.

Serial number and nature of cropping.	Acre yield in lb.				Remarks.
	Grain.	Bhusa.	Stalks.	Straw or fodder.	
(1)	(2)	(3)	(4)	(5)	(6)
1 Redgram Strain No. 2900 pure crop.	570	550	3,550	..	Sandy loam soil.
2 Redgram strain No. 2900 + Korra. N1.	250	220	2,050	300	Sandy soils.
3 Redgram strain No. 1723 + Arika (Local) Pulse	379	380	1,863	1,403	Sandy soils.
4 Redgram + Cowpea Pulse Strain No. 2900 Cowpea (Local)	207	270	2,118	1,222	Do.

A few seeds of soyabean type Tata 5, received for trial was sown on 3rd September 1951. Though the germination was satisfactory 60 per cent of the plants failed to establish in the sandy soils. The height of the survivors ranged from 6 inches to 8 inches. Flowering was noticed on 16th October 1951. The pod formation was poor with an average of two pods per plant.

Seven varieties of beans DL. 250, 259, 269, 279, 389, 453 and 692 were sown in the first week of August 1951. The growth and spread was good in DL. 692 and 453, poor in DL. 269 and satisfactory for the rest. DL. 692 and 453 commenced flowering on 15th November 1951 followed by DL. 250 on 20th November 1951. The rest commenced flowering on 30th November 1951. Harvesting took place between 30th December 1951 and 25th March 1952 (Table XIII).

TABLE XIII.—Details of yield.

Serial number and strain number. (1)	Number of basins/Number of plants. (2)	Total yield of green pods in lb. and oz. (3)
1 250	57/165	71— 7
2 259	30/75	55— 8
3 269	19/69	19— 5
4 279	43/98	38— 4
5 389	26/60	24— 8
6 453	54/159	60—14
7 692	38/104	34— 7

20. *Cotton*.—Three strains of cotton, C1, N14 and 336 B were sown under rainfed conditions early in *punasa*, as a mixture with *Korra* over an area of 1.13 acres. N14 gave the maximum yield of kapas at 125 lb. followed by C1 with 76 lb. 336 B gave only 35 lb. per acre.

P 216 F grown as a bulk crop between December 3rd week and July 3rd week under irrigated conditions in rice fallows after the harvest of paddy crop gave an acre yield of 490 lb. kapas. The performance of the crop can be considered to be satisfactory as the crop was grown in the newly reclaimed alkaline area and under inadequate water supply conditions.

21. *Orchard*.—Out of the proposed 18 acres of the orchard area, 10 acres were cleared of unwanted plants, levelled and laid out into plots. The following are the areas and fruit plants planted during the period of report (Table XIV):—

TABLE XIV.—Variety, number and area of fruit plants planted.

Serial number and variety of fruit. (1)	Number of plants. (2)	Area in acres. (3)	Remarks. (4)
1 Mango	65	3.00	Cherukurasam, Kottapallikobbari, Panchadarakalsa, Panakalu, Swarnarekha, Firangiladwa, Banganapalli, Himayuddin, Alampur Baneshan, Mulgoa, Rajamannu, KO. 11, KO. 7/5, KO. 3/1, KO. 4/3, and KO. 9/3.
2 Coconut	68	0.90	Eastcoast tall, Westcoast tall, Tall x Dwarf, Andamans ordinary.
3 Citrus	55	0.75	Sathgudi on Jamberi, Batavian on Marmalade, Batavian on Acidlime, Batavian on Jamberi, Gajanimma, Marmalade orange, Citron, Kumquat and Jamberi.

Serial number and variety of fruit. (1)	Number of plants. (2)	Area in acres. (3)	Remarks. (4)
4 Miscellaneous fruit plants	30	0.40	Jack-Bagupanasa, Elugubanti-panasa, Vanapuram, Phyllanthus emblica, Phyllanthus distichus, Pomegranate-Doulka, Bulls heart, Carambola sweet and sour, Rambutan, Litchi, Mangosteen and Roseapple.
5 Pineapple	500	In the allies of coconut.	Simhachalam variety.
6 Papaya	396	Along the road margins.	Hawaiian, Washington, Honeydew and Ranchi.

Progress of growth was satisfactory in all the varieties. *Phyllanthus distichus*, *Pomegranate*, *Jack* and *Bulls heart* showed reasonable progress with an average of two feet growth in six months.

Performance of old fruit trees.—The fruit trees existing in the garden at the time of acquisition in 1950 were either diseased or neglected. Unthrifty and diseased trees were removed and the rest were well manured and irrigated with an oil engine. The following are the average yields per fruit tree (Table XV):—

TABLE XV.—Performance of old fruit trees.

Vadlapudi. 29 lb.	Lime. 69 fruits.	Sapota. 170 fruits.	Guava. 21 lb.	Coconut. 14 fruits.
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Production of fruit plants.—The following fruit plants were raised:—

Cashewnut—250, Papaya—429, Jack—25, Mango—60, Moringa—500, *Phyllanthus*—575.

22. *Vegetables*.—*Punasa* and *pyru* vegetables were grown over an area of five acres. The performance is recorded below. One hundred and seventy-one pounds and seven oz. of seed were produced (Table XVI).

TABLE XVI.—Performance of vegetables.

Serial number and vegetable. (1)	Acre yield in lb. (2)	Remarks. (3)
1 Snake gourd	8,788	Sandy loam.
2 Ribbed gourd (pyru)	1,480	Sandy soils.
3 (a) Bottle gourd	9,350	Sandy loam.
(b) Do.	7,650	Sandy soil.
4 Pumpkin	6,550	Do.
5 (a) Cucumber local	1,725	Do.
(b) Cucumber Wynaad	10,800	Do.
6 Bellary onion	11,725	Sandy soil.
7 Garlic	4,100	Do.
8 Chilli (pyru)	1,108	Do.
9 Elephant yam	6,100	Sandy loam.
10 Dioscorea	5,300	Do.

The performance of Wynaad cucumber was six times to the local yield, in *punasa* and identical in the *pyru* season.

23. *Fodder crops*.—Perennial fodders were grown over an area of 0.98 acre and the following yields were recorded (Table XVII):—

TABLE XVII.—Performance of fodder grasses.

Variety. (1)	Yield of fodder in lb. per acre. (2)	Remarks. (3)
Napier grass	36,140	Sandy loam, six cuttings.
Gunjea grass	19,900	Three cuttings.
Buffalo grass	30,430	Do.

Sunn hemp was sown in the standing crop of paddy, before harvest, over an area of 24.50 acres and an acre yield of 1,284 lb. of hay was obtained. *Pillipesara*, sown like sunn hemp, over an area of 12 acres, recorded 4,000 lb. of green fodder though there was a failure of water supply. Cowpea was grown as a pure and mixed crop with *Jonna* under rainfed conditions in sandy soils. Early sowings in June recorded an acre yield of 15,000 lb. of green matter and late sowings in July resulted in 5,000 to 10,000 lb. of green fodder per acre. Cowpea grown as mixture with *Jonna* in the levelled sandy loam area of the orchard under rainfed conditions recorded an acre yield of 2,015 lb. and 3,000 lb. hay per acre.

24. *Green manures*.—Fifty thousand seedlings of *Glyricidia maculata* and *Sesbania speciosa* were planted at suitable places. The growth of *Sesbania* was not satisfactory in sandy soils. The growth was luxuriant reaching a height of 10 to 12 feet in wet land area. The growth of *Glyricidia* in wet land area was marked between November and June. Of the two, *Sesbania* was found to grow well in alkaline soils. *Crotalaria striata* was grown in the basins of coconut trees and incorporated. An acre yield of 5,800 lb. of green matter was estimated. *Sesbania speciosa* sown for green manure in the standing crop of paddy prior to harvest recorded an acre yield of 54,800 lb. of green matter. Cowpea was sown in the basins of coconut plants and the green matter of 50 lb. received in each basin was incorporated. Wild Indigo grown in wet lands after paddy recorded an acre yield of 6,000 lb. Seven hundred pounds of green manure seed was collected on the farm for future sowings.

III. MISCELLANEOUS.

25. *H.S. 9 Tobacco Scheme*.—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. The object of the scheme is to maintain purity in Virginia tobacco seed. The object of raising nursery in the college farm is to avoid dependence on private nursery men. A total number of 414,000 seedlings were supplied to the 60 acre seed farm ryots and the excess production of 137,000 were sold to other ryots in the district. A net profit of Rs. 91 per acre was realized.

26. *Alkathine film lined gunny bag trial*.—A trial was conducted on storage of super-phosphate in Alkathine gunnies as against the normal storage with single and double gunnies to investigate whether the claim that Alkathine layer provided as a lining to the bags supplied by Imperial Chemical Industries, Limited, will give sufficient acid proof protection to the out side hessian and that by the use of these bags, the loss in storage due to wear and tear of the gunnies can safely be eliminated.

The conclusions drawn from the trial were—

(1) That the Alkathine film lining was found to withstand the acid action of super-phosphate even up to a period of one year. The lining was not damaged and the hessian covering did not give away.

(2) That the treatment where single gunnies were used, the gunnies got deteriorated in two to two and half months period and the gunnies gave away completely within three months.

(3) That the treatment where double gunnies were used, the gunny that was in contact with the chemical manure got deteriorated in two to two and half months and the outer gunny was not damaged till three and half to four months.

(4) That there was a reduction in the weight of the contents during the first fortnight due to the loss of moisture. The variations recorded on subsequent dates were too small to indicate any significance.

27. *Vanamahotsava*.—The officers and students of the college and public took part in the planting of fruit plants and economic tree seedlings. Of the 5,955 seedlings planted in 1951, 5,862 numbers survived. Other seedlings of economic importance over a tune of 50,000 were planted in the farm and 90 per cent of them survived. Six thousand seven hundred seedlings of fruit and other trees of economic importance and 8 lb. of seed were supplied to districts.

28. *Live fence*.—*Prosopis juliflora* was sown in July–August over a length of 2,000 feet along the northern and southern borders of orchard and the eastern boundary of S. Nos. 484 and 486. Inga dulce seedlings were transplanted over a distance of 910 feet along the eastern border of orchard. Of the two, Inga dulce is found to grow quickly and withstand drought better. The height of *Prosopis* is one foot and it received two prunings. Inga dulce reached a height of 2 feet and received 3 prunings. The live fence along the eastern borders of 'A' block was strengthened by closing gaps with *chillakampa*.

29. *Exhibitions*.—Four exhibitions were conducted along with the quarterly farmers day celebration. Suitable prizes were distributed to the best exhibitors. Demonstrations of improved implements, green manure production, fruit propagation, etc., were conducted for the benefit of the ryots.

30. *Cattle*.—At the beginning of the year there were 32 work animals. One animal was auctioned and one pair was transferred. Three pairs were purchased and two pairs were received from the dairy. The number of work animals at the end of the year was 39.

31. *Tapping under-ground water with filter points*.—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 was recorded with a 2-horse power petrol engine pumpset. The feasibility of driving filter points at suitable places for irrigating vegetables, fruit plants and nurseries will be pursued based on the performance of the filter point fixed in the orchard.

32. *Pests and diseases—Coconut*.—*Pestalotia palmarum* was noticed on a heavy scale and it was controlled by Bordeaux mixture spraying.

Rhinoceros beetle attack was noticed on a large scale during the summer period. They are hooked out and destroyed.

Brinjal.—A trial with calcium arsenate, lead arsenate, Gammexano, and DDT + 50 sulphur for the control of *Epilachna* and mite attack was conducted and the results indicated DDT + 50 sulphur was very effective followed by arsenate sprayings as the next best among the treatments.

IV. COLLEGE DAIRY.

33. The dairy and poultry unit attached to it is run solely for educational purposes to the students in the science and practice of dairying and poultry management.

(i) *(a) Strength of the herd*.—At the beginning of the year there were 82 animals consisting of 25 adult females, 47 calves, three breeding bulls and seven work animals. During the year there were 16 births including one twin heifers birth to Scindhi Cow No. 6, besides other additions, of four animals comprising one Ongole breeding bull one Ongole heifer calf and two work animals from the College Dairy, Coimbatore, and College Farm. There were nine deaths due to, Black quarter, Peritonitis, Toxaemia and Distomiasis. Eleven unwanted animals were auctioned and eight animals were transferred. The number in each of the different breeds and ages of animals in the herd at the end of the period of review is given hereunder (Table XVIII).

Statement showing the particulars of livestock during the year.

TABLE XVIII.—Statement showing the particulars of livestock during the year.

Breed.	Stock on 1st July 1951.						Stock on 30th June 1952.					
	Adult animals.	Calves below one year.	Calves above one year.	Breeding bulls.	Work animals.	Total.	Adult animals.	Calves below one year.	Calves above one year.	Breeding bulls.	Work animals.	Total.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1 Scindhi ..	6	6	5	1	..	18	7	5	11	2	..	25
2 Ongole ..	7	4	10	1	7	29	8	6	5	..	..	29
3 Murrah ..	8	5	9	1	..	23	8	..	5	..	..	13
4 Local ..	4	3	5	..	..	12	3	1	2	..	..	6
Total ..	25	18	29	3	7	82	26	12	23	2	..	75

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(b) Statement showing the particulars of milk production (Table XIX).

TABLE XIX.—Statement showing the particulars of milk production.

Particulars.	Cows.		Buffaloes.		Total.
	Ongole.	Scindh.	Murrah.	Country.	
(1)	(2)	(3)	(4)	(5)	(6)
(i) Average number of animals in herd	7.59	6.50	8.00	3.62	25.71
(ii) Average number of animals in milk	4.96	3.93	3.17	1.00	13.06
(iii) Average number of animals in dry	2.63	2.57	4.83	2.62	12.65
(iv) Percentage of animals in milk	65.2	60.6	39.6	28.2	50.8
(v) Total milk yield for the year in lb. and oz. .. .	16,543.0	11,033.0	9,123.0	2,116.8	38,815.8
(vi) Herd average per day per animal	5.96	4.65	3.10	1.62	4.14
(vii) Average yield per cow in milk per day	9.15	7.67	7.88	5.69	8.12
(viii) Average milk yield per day.	45.32	30.23	24.00	5.50	105.05

(c) Maximum yields of milk per day (Table XX).

TABLE XX.—Maximum yields of milk per day.

Breed.	Number of animal.	Yield in lb. per day.
1 Ongole	Cow No. 13	24
2 Scindh	" 14	21
3 Murrah	Buffalo 2	29
4 Country	" 5	15

(d) The receipts and disposals of the dairy products are shown Table XXI below :—

TABLE XXI.—Receipts and disposal of milk.

	LB.	OZ.
(1) Receipts during the year	38,815	8
Disposals—		
(i) By sale	35,664	4
(ii) Entomology section	128	12
(iii) Curd making	2,060	8
(iv) Fed to stock	51	0
(v) Class use for separation	691	4
(vi) Miscellaneous	219	12
Total	38,815	8
(2) Receipts and disposals of skim-milk—		
Receipts during the year	179	0
Disposals	179	0
Closing balance	Nil.	
(3) Receipts and disposals of cream—		
Receipts during the year	30	9½
Disposals—		
(i) Butter making	22	10½
(ii) Practical class	7	15
Total	30	9½

	LB.	OZ.
(4) Receipts and disposals of butter—		
Receipts during the year	132	3½
Disposals—		
(i) Sales	20	6½
(ii) Ghee making	103	1½
(iii) Miscellaneous	8	11½
Total	132	9½
(5) Ghee—		
Receipts during the year	73	10½
Disposals—		
(i) Sale	73	3½
(ii) Practical class	0	7
Total	73	10½
(6) Butter milk—		
Receipts during the year	4,448	0
Disposals—		
(i) Sale	3,051	0
(ii) Fed to poultry	1,397	0
Total	4,448	0
(7) Kova—		
(i) Receipts	9	9½
(ii) Practical class	9	9½
Nil.		
(8) Ice cream—		
(i) Receipts	15	1
(ii) Practical class	15	1
Nil.		

(e) Services.—One hundred and thirty-seven services were recorded and the same are given in Table XXII below :—

TABLE XXII.—Statement showing the particulars of services.

Services.	Scindh.	Ongole.	Murrah.	Total.
1 Dairy animals	7	5	5	17
2 Outside animals	13	7	100	120
Total	20	12	105	137

(f) General.—During the year all the cattle-sheds and their surroundings were periodically disinfected against lice, ticks flies, etc., by spraying kerosene emulsion with and without DDT and by dusting gammexane.

All the calves were given treatment against intestinal worms at regular intervals.

Feeding.—The main concentrates during the year were, cotton seed, groundnut cake, dhall husk, rice bran, and wheat bran. The roughages were paddy straw, jonna hay and sunnhemp, besides green fodder.

34. *Poultry*—(a) *Strength*.—The stock at the beginning of the fasli year was 28 birds consisting of 15 chicks and 13 adults.

(b) *Receipts*.—Twenty white leghorn chicks, one W.L.H. cockrel and 5 R.I.R. chicks were added to the stock.

(c) *Disposals*.—Seven adult birds and six chicks died due to fowl pox, crop bound, sunstroke and intestinal worms.

Sales.—Eleven birds were auctioned and one was sold during the year.

(d) *Present stock*.—At the end of the fasli year under report the strength was 29, with 28 adults and one chick as shown in Table XXIII below:—

TABLE XXIII.—Statement showing the strength of poultry under each breed.

Description.	Stock on 1st July 1951.			Receipts, 1951-52.			Disposals, 1951-52.			Stock on 30th June 1952.			Total.
	White leghorn.	Island Rhode red.	Local.	White leghorn.	Island Rhode red.	Local.	White leghorn.	Island Rhode red.	Local.	White leghorn.	Island Rhode red.	Local.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1 Cocks	1	2	..	1	..	..	5	4	..	3	3	..	6
2 Hens	2	4	4	..	..	..	4	6	..	8	11	3	22
3 Chicks from outside	..	11	..	20	..	..	3	..	..	..	..	..	..
4 Chicks hatched out	..	4	..	..	5	..	..	3	..	..	1	..	1
Total	3	21	4	21	5	..	12	13	..	11	15	3	29

SS.

(e) *Receipts and disposals of eggs*—

Receipt of eggs	..	..	..	..	..	..	1,315
Brought forward from last year	..	..	..	..	..	..	2
Total	..	..	..	..	..	..	1,317

Disposals—

1 Hatching	..	..	..	..	..	..	527
2 Table	..	..	..	..	..	..	771
3 Hatching in dairy	..	..	..	..	..	..	8
4 Chemistry section	..	..	..	..	..	..	6
5 Ice cream	..	..	..	..	..	..	4

Balance on 30th June 1952 1

Total .. 1,317

(f) *Health of poultry*.—Regular disinfection was carried out throughout the year. All the birds were treated against worms at regular intervals.

(g) *Feeding*.—This constituted mainly of stock mash, millets, onions and greens.

Practical classes.—During the year 108 practical classes were conducted.

COLLEGE FARM, BAPATLA,

25th July 1952.

BAPATLA,

6th November 1952.

C. HANUMANTHA RAO,

Superintendent.

R. BALASUBRAMANIAN,

Principal, Agricultural College.

APPENDIX I.

SEED DISTRIBUTION STATEMENT.

Serial number and particulars.	Quantity in lb. or numbers.	Serial number and particulars.	Quantity in lb. or numbers.
1 MUT 3 Paddy	1,000	18 Plantain suckers	100
2 MTU. 6	160	19 Cashewnut seedlings	169
3 MTU. 7	4,800	20 Papaya	429
4 MTU. 9	50	21 Jack seedlings	27
5 MTU. 12	4,420	22 Drumstic	130
6 MTU. 19	6,900	23 Teak	84
7 SR. 26 B.	1,960	24 Usiri	575
8 P. 4,688	341	25 Lucena glauc	1,150
9 Ragi AKP. 2	240	26 Soapnut	33
10 Ragi AKP. 6	240	27 Casuarina	500
11 Korra N. 1	15	28 Sesbania	3,500
12 Korra G. 1	15	29 Chillakampa cuttings	2,000
13 Redgram 2,900	10	30 Tobacco seedlings	5,51,000
14 Gingelly TMV. 1	55	31 Vegetable	16,726
15 Gingelly TMV. 3	50	32 Perennial grass slips	4,500
16 Groundnut TMV. 2	120	33 Vegetable seed	594
17 Cashewnut seed	80	34 Vegetable seed packets	184

APPENDIX II.

A SHORT NOTE ON THE ORIGIN AND OBJECT OF THE COLLEGE FARM, BAPATLA.

The main object of the college farm is for imparting instruction to the students of the B.Sc. (Ag.) course in the science and practice of agriculture.

Location.—The College Farm is situated on the Bapatla-Guntur road (between mile stone 29—30) at a distance of 1½ miles from the Agricultural College. The East swamp drain passes between the wet land and the dry land areas. The College Dairy is temporary situated in the College estate and will have to be shifted to the College Farm area after the construction of buildings.

Acquisition.—Out of the 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 Madras Southern Maratta Railway line. The lands situated on the northern side of the railway line are for cultivation of crops and on southern side 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.

Soils.—The southern block comprises mostly sandy soils with black clay soil near the drain. The orchard block is made up of sandy loam soil suited for fruit cultivation. The wet land block is made up of black clay soil with saline pockets of land, besides black loamy soil adjoining the east swamp drain. The soil in the northern block is half and half sandy and sandy loam soil. The soils adjacent to the east swamp drain, are loamy due to the continuous disposition of silt from the adjoining drain.

Buildings.—There is one dilapidated building in the area selected for residential area and one small building in the other block. As the construction of the buildings for the farm office, cattle, dead stock and implements is not yet taken up, the entire equipment had been accommodated in thatched sheds. For this purpose three cattle sheds, four implement sheds, and one students shed were constructed for use. A temporary shed was constructed for healing fruit plants in orchard block.

Roads.—Earthen roads 12 feet in width were formed over a total length of 2,400 feet inside the orchard area. The main road up to S. No. 690 and the office orchard road were gravelled.

Reclamation.—Formation of bunds and channels in the new area diverted for paddy cultivation, levelling in orchard block and S. Nos. 482 and 775 in northern block, strengthening and formation of a pathway on the drain bund, and deepening of tank in S. No. 690 were the various items of reclamation attended to during the year.

APPENDIX III.

A SHORT NOTE ON THE LOCAL AGRICULTURAL PRACTICES.

The tract gets the benefit of both the monsoons, with an average annual rainfall of 37.12 inches. The local seasons are two, viz., *punasa* (June to December) and *pyru* (December to March).

Wet lands.—The wet lands carry a single long duration variety of paddy. *Buddakusuma* is the important variety grown in the locality. Its suitability for low-lying conditions, the non-shedding habit, non-lodging and palatability of straw are all the points in favour of its popularity. The other varieties grown are *Atragada* and *Molakolukulu*.

After the harvest of the first crop paddy, the ryots take a crop of pulse or sunnhemp during the *pyru* season.

Garden lands.—There are no regular garden lands, except the small areas not exceeding 20 cents commanded by *doruvu*. The water is lifted by human labour in pots and hand watering is done by splashing the water on the plants. The following is the cropping adopted under *doruvu*—

Season.	Crop.
May-July	Paddy nurseries.
August-November	Tobacco nurseries.
December-March	Ragi.
December-July	Chillies, Brinjal.

Dry lands.—In the dry land area, groundnut is the important crop grown. Other *punasa* crops like *ragi* were under cultivation till recently. But due to the soaring prices of groundnut, the ryots have taken up mostly to the cultivation of groundnut during the *punasa* season (June to December). Cowpea is also grown in the sandy areas for fodder purposes during this season. During the *pyru* season, horsegram is grown for fodder and seed.

GLOSSARY.

Serial number and local name.	Scientific name.
1 Agathi	<i>Sesbania grandiflora</i> .
2 Amaranthus	<i>Amaranthus spp.</i>
3 Arika	<i>Paspalum scrobiculatum</i> .
4 Banana	<i>Musa paradisiaca</i> .
5 Beans	<i>Dolichos lablab</i> .
6 Benda	<i>Hibiscus esculentus</i> .
7 Bengal Jute	<i>Corchorus sp.</i>
8 Bengalgram	<i>Cicer arietinum</i> .
9 Blackgram	<i>Phaseolus mungo</i> .
10 Bottle gourd	<i>Lagenaria vulgaris</i> .
11 Brinjal	<i>Solanum melangena</i> .
12 Buffalo grass	<i>Brachiaria mutica</i> .
13 Cashewnut	<i>Anacardium occidentale</i> .
14 Casuarina	<i>Casuarina equisetifolia</i> .
15 Chillakampa	<i>Commiphora berryi</i> .
16 Chillies	<i>Capsicum annum</i> .
17 Chukkakura	<i>Rumex vesicaria</i> .
18 Clusterbean	<i>Cyamopsis tetragonoloba</i> .
19 Coconut	<i>Cocos nucifera</i> .
20 Cotton	<i>Gossypium sp.</i>
21 Cowpea	<i>Vigna unguiculata</i> .
22 Cucumber	<i>Cucumis sativus</i> .
23 Daincha	<i>Sesbania bispinosa</i> .
24 Elephant yam	<i>Amorphophallus campanulatus</i> .
25 Garlic	<i>Allium sativum</i> .
26 Gogu	<i>Hibiscus cannabinus</i> .
27 Gooseberry	<i>Emblica officinalis</i> .
28 Green grass	<i>Phaseolus radiatus</i> .
29 Guava	<i>Psidium guajava</i> .
30 Guinea grass	<i>Panicum maximum</i> .
31 Jonna	<i>Sorghum sp.</i>
32 Korra	<i>Setaria italica</i> .
33 Lime	<i>Citrus aurantifolia</i> .
34 Linseed	<i>Linum usitatissimum</i> .
35 Mango	<i>Mangifera indica</i> .
36 Napier grass	<i>Pennisetum purpureum</i> .
37 Onion	<i>Allium cepa</i> .
38 Orange (Vadlapudi)	<i>Citrus madaraspatamia</i> .

Serial number and local name.	Scientific name.
39 Paddy	<i>Oryza sativa</i> .
40 Papaya	<i>Carica papaya</i> .
41 Pillipesara	<i>Phaseolus trilobus</i> .
42 Pineapple	<i>Ananas sativus</i> .
43 Pumpkin	<i>Cucurbita pepo</i> .
44 Radish	<i>Raphanus sativus</i> .
45 Ragi	<i>Elysiue caracana</i> .
46 Redgram	<i>Cajanus cajan</i> .
47 Ribbed gourd	<i>Luffa acutangula</i> .
48 Sajja	<i>Pennisetum typhoides</i> .
49 Sapota	<i>Achras sapota</i> .
50 Snake gourd	<i>Trichosanthes anguina</i> .
51 Soapnut	<i>Sapindus emarginatus</i> .
52 Soyabean	<i>Glycine max</i> .
53 Sugarcane	<i>Saccharum officinarum</i> .
54 Sweet potato	<i>Ipomea batatas</i> .
55 Tobacco	<i>Nicotiana tabacum</i> .
56 Tomato	<i>Lycopersicum esculentum</i> .
57 Water melon	<i>Cucumis melo</i> .
58 Wild indigo	<i>Tephrosia purpurea</i> .
59 Wheat	<i>Triticum vulgare</i> .
60 Doruvu	A small pond, 20' in diameter at top and 6' diameter at bottom with height of 6' to 10'.
61 Punasa	June to December period.
62 Pyru	January to June period.

APPENDIX IV.

FINANCIAL STATEMENT FOR THE YEAR 1951-52 (FASLI 1361).

Statement of Charges—40-E. Agriculture—Agricultural—Education—Post-war Reconstruction—Agricultural College—Bapatla.

Head of account.	1950-51.				1951-52.			
	Expenditure for students training.	Expenditure for the Farm.	Special expenditure due to new Farm.	Total amount.	Expenditure for students training.	Expenditure for the Farm.	Special expenditure due to new Farm.	Total amount.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.
Wages to menials ..	1,440	2,004	..	3,444	1,728	4,161	..	5,889
Dearness allowance to menials.	2,400	2,117	..	4,517	2,832	4,609	..	7,441
Working expenses—								
Repairs and up keep.	365	2,000	1,000	3,365	410	2,893	2,460	5,763
Maintenance of cattle.	38,200	4,910	..	43,110	31,359	4,000	..	35,359
Casual muzdoor..	..	9,585	..	9,585	..	18,057	..	18,057
Miscellaneous cultivation expenses.	2,027	2,000	3,000	7,027	2,000	5,302	7,000	14,302
Manures and chemicals.	..	1,546	..	1,546	..	7,601	..	7,601
Seeds and plants.	..	516	..	516	..	2,791	..	2,791
Sundries	..	60	..	60	..	320	..	320
Livestock	..	17	..	17	4,350	..	..	4,350
Layout	..	..	3,294	3,294	..	..	8,049	8,049
Deadstock	1,000	1,768	2,000	4,768	2,000	2,818	3,000	7,818
Petty constructions and repairs.	..	..	6,031	6,031	..	663	2,000	2,663
Total ..	45,432	26,523	15,325	87,280	44,679	53,215	22,509	120,403

Statement of Receipts—Under XXIX. Agriculture—Agricultural Receipts—Post-war Reconstruction—Agricultural Education—Agricultural College, Bapatla.

Particulars.	1950-51 Receipts.			1951-52 Receipts.		
	RS.	A.	P.	RS.	A.	P.
By sale of milk and milk products	9,892	10	0	10,715	15	11
Cost of paddy seed transferred	262	6	0	2,539	0	0
Cost of seeds and seedlings and other farm and diary transfers.	761	0	0	7,141	6	0
By sale of other farm produce	6,534	0	0	12,620	3	7
By transfer of livestock	..	..	..	330	0	0
By transfer of milk and milk products	..	..	..	41	3	0
Total ..	17,450	0	0	33,387	12	6

APPENDIX V.

STATEMENT SHOWING COSTS OF CULTIVATION AND RECEIPTS FOR MAJOR BULK CROPS GROWN DURING 1951-52 AT THE AGRICULTURAL COLLEGE FARM, BAPATLA.

Crop.	Area.	Preparatory cultiva- tion.	Manures and manuring.	Seeds and sowing.	After cultivation.
(1)	(2)	(3)	(4)	(5)	(6)
	ACS.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
Paddy	61'07	1,606 13 0	4,469 4 4	2,490 11 3	589 6 0
Ragi	1'00	15 10 0	46 0 0	59 3 6	.. ..
Redgram and Arika	0'93	4 11 0	.. ..	10 7 0	7 13 0
Groundnut	2'85	21 14 0	157 10 6	133 7 6	21 5 0
Gogu	1'30	12 9 0	29 4 0	34 11 0	7 4 0
Gingelly and Sunnhemp	2'00	24 3 0	.. ..	38 7 0	.. ..
Tobacco seed beds	2'00	98 2 6	234 6 6	41 1 0	329 9 0
Cowpea fodder	4'80	33 0 0	.. ..	84 12 4	.. ..
Mixture	10'16	23 9 0	16 5 6	136 2 5	0 11 0
Sunn hemp	24'50	10 13 0	.. ..	197 11 6	.. ..
	Irrigation.	Harvesting, etc.	Total expenditure.	Receipts.	Profits.
	(7)	(8)	(9)	(10)	(11)
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
Paddy	610 8 0	1,833 1 0	11,599 11 7	17,465 8 2	5,865 12 7
Ragi .. ..	.. ..	42 3 6	163 1 0	243 0 0	79 15 0
Redgram and Arika .. ..	.. ..	45 13 0	68 12 0	127 12 0	59 0 0
Groundnut .. ..	.. ..	65 13 6	390 2 6	859 6 0	469 3 6
Gogu .. ..	.. ..	199 4 6	283 0 6	576 5 4	293 4 10
Gingelly and Sunnhemp .. ..	.. ..	46 12 6	104 6 6	256 13 9	152 7 3
Tobacco seed beds	1,441 12 3	.. ..	2,144 15 3	2,327 0 0	182 0 9
Cowpea fodder .. ..	.. ..	86 15 6	204 11 10	398 14 0	194 2 2
Mixture .. ..	.. ..	131 0 0	307 11 11	505 15 11	198 4 0
Sunn hemp .. ..	.. ..	135 6 0	343 14 6	2,107 0 0	1,763 1 6

APPENDIX VI.

ACTION TAKEN FOR STEPPING UP THE REVENUES OF THE COLLEGE FARM, BAPATLA.

1. Reclamation work was taken up and an area of 5'37 acres of waste land was brought under paddy cultivation.
2. Suitable strains of paddy were planted in alkaline and low lying areas and increased yields were obtained from the same.
3. The tank in S. No. 690 was deepened for increasing the storage capacity.
4. Green manure plants like Glyricidia and Sesbania were planted on field bunds, drain bunds and other waste spaces. Thirty tons of compost of waste materials was prepared.
5. Attempts were made for improving water resources at cheaper cost by driving filter points and one filter point was driven in the orchard area.
6. The purchase of green fodder for dairy was discontinued by growing rainfed fodder crops on the sandy areas of the farm during punasa season.
7. Planting of coconut trees on road sides was undertaken.
8. One hundred and seventy-one pounds of vegetable seeds were produced and supplied to the districts.
9. *Prosopis juliflora*, *Inga dulce*, was raised as live fence enclosing the two sides of the orchard block of 20 acres.

ANNUAL REPORT OF THE AGRICULTURAL RESEARCH STATION, LAM, FOR THE FASLI YEAR 1361 (1951-52).

I. SEASON.

A total rainfall of 25.20 inches was recorded during the year distributed over 44 days as against 33.59 inches distributed over 50 days for the corresponding period of last year. The average rainfall for the past 29 years was 33.18 inches. The details of weekly distribution of rain for the year are furnished in Table I below :—

TABLE I.—Weekly statement of rainfall, Agricultural Research Station, Lam, 1951-52.

Months.	Weeks.	1951-52.		1950-51.		Average for the past ten years.		Average for the past twenty years.	
		Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
South-west monsoon.									
June	7-13	..	..	1.01	2	1.09	2.7	0.82	1.9
	14-20	0.28	1	0.10	1	0.25	1.7	0.02	2.1
	21-27	3.70	5	2.27	1	1.59	2.0	1.37	2.7
June-July	28-4	..	..	2.04	2	1.38	2.9	1.27	3.5
	5-11	0.83	2	3.19	3	1.82	3.6	1.41	3.4
	12-18	5.00	3	0.40	1	0.85	2.7	1.14	2.7
July-August	19-25	1.31	6	1.60	4	2.53	4.1	1.72	4.2
	26-1	0.25	1	0.16	1	1.05	3.0	1.77	3.0
	2-8	0.87	2	0.39	2	0.78	1.8	1.27	1.8
August-September	9-15	0.83	1	..	..	1.19	2.7	0.69	2.8
	16-22	..	..	0.42	1	1.23	2.2	0.89	2.8
	23-29	0.35	1	3.31	3	2.35	3.4	1.49	3.1
August-September	30-5	0.87	3	0.87	5	1.11	2.8	1.38	2.5
	6-12	0.60	1	4.68	4	2.13	3.1	1.23	2.9
	13-19	0.10	1	0.04	..	0.71	1.9	1.38	3.2
Total	20-26	0.47	2	..	..	1.20	2.8	1.16	2.6
		15.46	29	20.57	30	21.26	43.4	19.31	45.2
North-east monsoon.									
September-October	27-3	0.98	3	0.62	2	0.75	1.8	1.25	2.6
	4-10	0.62	1	3.67	2	1.18	1.8	1.27	1.9
	11-17	3.75	3	0.16	1	1.27	2.6	1.18	2.3
November	18-24	0.65	..	0.17	1	0.73	1.9	1.01	1.7
	25-31	0.07	..	0.15	1	0.81	1.3	1.52	1.3
	1-7	0.13	1	1.61	3	1.02	1.6	1.12	1.6
November-December	8-14	..	..	..	..	0.42	0.7	0.55	1.2
	15-21	..	..	..	..	0.46	0.8	0.01	1.4
	22-28	..	..	..	..	0.18	0.3	0.23	0.8
December-January	29-5	..	..	..	..	0.04	0.2	0.03	0.3
	6-12	..	..	..	..	0.02	0.2	0.01	0.5
	13-19	..	..	..	..	0.31	0.5	0.03	0.2
December-January	20-26	..	..	..	..	0.03	0.2	0.05	..
	27-3	..	..	..	..	..	..	0.03	..
	4-10	..	..	..	..	..	..	..	..
Total	11-17	..	..	..	..	..	..	..	..
	18-24	..	..	..	..	..	..	..	..
	25-31	..	..	..	..	..	..	0.02	0.2
Total		5.60	8	5.78	10	7.22	13.9	9.21	16.0

Months.	Weeks.	1951-52.		1950-51.		Average for the past ten years.		Average for the past twenty years.	
		Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.	Quantity in inches.	Number of rainy days.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Hot weather.									
February	1-7	..	..	..	..	..	..	0.09	0.3
	8-14	..	..	..	..	..	..	0.11	0.3
	15-21	..	..	..	..	..	..	0.12	0.2
	22-29	0.67	1	..	..	0.10	0.1	0.34	0.2
March	1-7	..	..	..	..	0.14	1.0	0.06	0.1
	8-14	..	..	..	..	0.04	0.2	0.13	0.2
	15-21	..	..	..	..	0.02	0.1	0.06	0.1
	22-28	..	..	0.22	1	0.16	0.2	0.15	0.1
	29-4	..	..	0.46	1	0.36	3.3	0.18	0.3
March-April	5-11	..	..	..	..	0.29	0.3	0.28	0.4
	12-18	..	..	2.33	1	0.96	0.7	0.24	0.3
	19-25	..	..	0.16	1	0.11	0.6	0.19	1.0
	26-2	0.80	1	1.21	1	0.25	0.8	0.17	0.4
April-May	3-9	0.23	1	0.65	2	0.51	1.2	0.38	0.8
	10-16	0.16	1	..	..	0.22	1.1	0.37	0.8
	17-23	0.98	2	..	..	0.12	0.5	0.58	1.2
	24-30	1.30	1	1.95	2	1.25	1.5	0.66	1.0
May-June	31-6	..	..	0.26	1	6.68	1.5	0.55	1.4
Total		4.14	7	7.24	10	11.21	13.1	4.66	9.1
Grand Total		25.20	44	33.59	50	39.69	70.4	33.18	70.3

2. *South-west monsoon*.—There was a total rainfall of 15.46 inches distributed over 29 days. The receipt of rain in the month of August which coincided with the flowering period of jonna G. 3 and G. 4 affected the setting of seed. In spite of remedial measures calocoris attack could not be effectively controlled and setting of grain was poor with low yields.

3. *North-east monsoon*.—A total 5.60 inches of rain was recorded on 8 days. The rainfall was below normal and all the pyru season crops were adversely affected by drought. Only 0.47 inches of rain was recorded in the second fortnight of September when chilli crop was planted at the normal season. This resulted in scarcity of water in ponds at the time of transplanting chilli. There was no rain after the first week of November as a result of which chilli crop could not put on normal vegetative growth. The plants were stunted in growth and added to this thrips attack and white ant damage were considerable which resulted in very poor yields.

4. *Hot weather season*.—A total 4.14 inches of rain was received on 7 days. With the help of these showers, preparatory cultivation for the punasa crops of succeeding year was commenced in last week of May.

II. CROP IMPROVEMENT.

5. (a) *Breeding of chilli, jonna and cotton*.—The improvement of chilli crop was continued under a scheme financed by the Indian Council of Agricultural Research and Madras State. The Assistant Cotton Specialist, Lam, was in-charge of the scheme and a detailed report on the progress of the scheme was separately submitted by him. Scheme for the evolution of a striga-resistant strain of sorghum was continued on the station under the technical and administrative control of the

Assistant Millet Specialist, Nandyal. The seed multiplication of millet strains G.1, G.2, G.3, G.4, jonna and G.1, korra evolved on the station in previous years, was continued. Breeding work on the improvement of Cocanadas cotton was revived and carried on under the control of the Assistant Cotton Specialist, Narasaraopet. The progress of various schemes during the year are summarised below.

6. *Scheme for the improvement of chillies*.—The season was extremely adverse to chilli crop on the station owing to prolonged drought after transplanting and heavy incidence from thrips.

7. The trial on cultivators' holdings with G.1 and 1402 was repeated during 1951-52 for a second year in succession. The yield data from sixteen centres, successfully harvested revealed the superiority of the strains over the local in tract average. The mean yields of dried chilli per acre were 1,194 lb. for 1402 and 1143 for G. 1 compared to 772 for local. This confirmed the results of the previous year. The new strain 1402 recorded an average increase of 55 per cent over the local on tract average.

8. G. 1-19-3, a re-selection in G.1 was more productive than the parent and 1402. Culture Goa. 20-1 was poorer in yield than G.1. Kendrapuradubara was only as good as G. 1 both in yield and thrips resistance. This is believed to be due to the effect of annual selection of the types in the Kendrapuradubara bulk leading to a progressive accumulation of the less resistant components.

9. The selection G.1-19-3 failed to maintain its superiority in the family block trial. This was due to the variability noted among the sibs of the family. Sib-G. 1. 19-3-4 was the most productive among them. None of the varieties or strains was completely resistant to thrips.

10. Six out of 412 cultures studied under replicated progeny rows, gave significant increases in yield over the control. Three of these are re-selections from Kendrapuradubara and three from G. 1.

11. One hundred and fifty-four varietal bulks from different parts of India and abroad were studied. These included 50 varieties said to be the best stock from the United States of America. None of these were found to excel local chillies in yield. Owing to adverse season, failure in establishment of seedlings was high in all the varieties. No variety was free from thrips. Varieties from Sabour (Bihar) were relatively slow to break down under thrips attack. One hundred and fifty-three crossed pods were obtained from 1485 crosses made. These included crosses for studying hybrid vigour in F. 1. In the F. 2. of the hybrid between G.1 and Nallapadu one plant had a brighter red colour than G.1. or 1402 and retained this colour for two months. Among the F. 1's raised there was greater homozygosity in the progeny of the cross between G.1 and 2150 than in the crosses between G.1 and other varietal bulks.

12. A study of the histological leaf structures of different varieties in chilli did not reveal any striking structural differences to which could be attributed ability to resist breaking down to thrips curl observed in some varieties like Kendrapuradubara. During the year under report this variety too broke down as early as others. Under conditions obtaining at Guntur, thrips damage to chilli is inevitable. Afzul Hussain, Puri and Trehan (Current Science Volume 4, 1936) have reported that the preference of the white fly in cotton (*Bemisia gossypiperda*) is due to differences in cell sap acidity between young and old leaves. It is suggested that in a similar manner, there is something in the constitution of the cell sap in the young leaves of certain varieties of chilli which makes them less vulnerable to the sucking influence of thrips than other varieties.

13. Leaves affected by thrips get arrested in development. Growth rate is first slowed and finally arrested. The arrested leaf gets burnt up and withers away.

14. The data on thrips grade for the hundred plants collected in 1950-51 were rearranged so as to bring out the agreement between frequency distribution of the new grade values correct to the first decimal place and the number corresponding to the old method for each observer separately. Similar data were gathered for 200 plants in 1402 during 1951-52. These data showed that barring a few occasional deviations the agreement between the old and new grades was close.

15. On a review of the attempts and trials made so far in estimating thrips damage, it would appear that for purposes of eliminating susceptible types in the early stages of breeding as in the replicated progeny rows and family blocks, scoring for thrips damage on the basis of the entire plant being taken as a unit would meet the purpose of the breeder, and in stages like small bulk trial where large populations can be expected, samples of 100 leaves in each plot and variety under replication can be graded and the percentages of grade '3' condition analysed using the inverse line of transformation of percentages.

16. Estimates by tastes for pungency were not helpful in bringing out differences within the hot group. It was possible to tell mild pods like Baroda chilli from the pungent Guntur chilli, but within Guntur chilli this test was not helpful. Samples of chilli varieties were sent to the Lecturer in Chemistry, Agricultural College, Bapatla, who obtained indications of a relationship between nitrogen content and pungency in the course of preliminary investigation. The results will be available for the next report. In regard to localisation of pungency within the pod, it was found that placenta and the base of the placenta were the hottest parts of the pod.

17. The experiment on controlling thrips with B.H.C. confirmed the previous finding, namely, advantage of B.H.C. 50 per cent (P 520 spray) in checking deterioration of the crop to grade '3' damage and enhancing crop yield. Allowing for costs of extra insecticides and labour for application, the extra profit per acre accruing from the treatment worked out to Rs. 32-15-0.

18. The results of spacing trials combined with number of seedlings to the bunch showed that planting in bunches was just as good as planting in singles and on grounds of economy, it was profitable to adopt single planting in preference to bunch planting. The experiment needs repetition as the season was abnormal during 1951-52.

19. *Scheme for the improvement of Cocanadas cotton.*—The strain C.2 cotton was compared with eight improved coloured and ten white arboreum types. Except R.H. 25 all the other coloured cottons gave less yield than C.2. The types 35/6 and C. 520/2 among white types were equal to control in yield and the rest were inferior in yield to C. 2 cotton.

20. Ten promising families were tried in family blocks with a corresponding set of small bulk trial. In family block trial, families 336 D. 3-2-1-3, 336 D. 3-4-4-6 and 336 H. 2-1-32 were equal to C.2 cotton in yield. In small bulk trials, X. 2545-D-5-4 was significantly poorer than C.2 in yield while all the others were equal. In replicated row yield trials progenies 336 H. 2-8, 336 D 3-2-2-2 and 336 D: 3-2-2-3 were found to be significantly better than C.2 in yield. A total of 385 fresh crosses were made during the year.

21. (a) *Striga Scheme.*—The scheme was started with the object of evolving a homozygous strain of Sorghum resistant to striga-attack and to find out suitable agronomic methods to control striga attack on Sorghum. The incidence of striga was very sparse in spite of artificial infection of the soil with striga seed. Forty-five selections were tried in replicated row yields plots and 18 selections that showed good grain setting and compact panicles were carried forward for further trials. In pure culture plots, A.S. 4003 (Bonganhilo) a strain reported to be resistant to striga was stunted in growth and late with poor grain setting. Sixteen crosses of G.1 and A.S. 4003 and 18 crosses of G.2 and A.S. 4003 were effected during the year.

22. *Coriander.*—The improvement work on coriander for isolation of a high yielding quality strain was continued. Twelve bulk samples from Andhra Desa and twelve bulk samples from Tamilnad were studied in replicated plots for a third season. The yield differences were found to be significant only in the trial of samples from Tamilnad. The performance of the samples is furnished in Tables II and III below:—

TABLE II.—*Coriander yield trials, 1951-52.*

Field No.—2 A.—
Object—To compare yields of varietal bulks.
Layout—Randomized blocks replicated six times.
Varieties—13 as in table below.
Sown—21st October 1951.

Harvested—22nd and 24th January 1952.
Previous crop—G.I. Jonna.
Size of each plot—
Gross—0.255 cent (30 L x 8 1/3 L.)
Nett 0.133 cent (24 L x 5.5/9 L.)

Andhra Desa samples.

Serial number.	Sample number.	Yield in pounds of mericarp per acre.	Percentage on control.
(1)	(2)	(3)	(4)
1	Bellary	317	89
2	Do.	396	111
3	Anantapur	366	103
4	Do.	354	99
5	Guntur	278	78
6	Do.	374	105
7	Do.	284	79
8	Do.	417	117
9	Do.	354	99
10	Do.	396	111
11	Do.	360	100
12	Do.	335	94
13	Local (Ongole)	356	100
	Significance $p = 0.05$	No.	..
	S.E. per cent	..	9.5

TABLE III.—*Coriander yield trials, 1951-52.*

Field No.—2 A.
Object—To compare yields of varietal bulks.
Layout—Randomized blocks replicated six times.
Varieties—13 as in table below.
Sown—21st October 1951.

Harvested—28th January 1952.
Previous crop—G.I. Jonna.
Size of each plot—
Gross—0.255 cents. (30 L x 8 1/3 L.)
Nett—0.133 cents. (24 L x 5.5/9 L.)

Tamilnad samples.

Serial number.	Sample number.	Yield in pounds of mericarp per acre.	Per centage on control.
(1)	(2)	(3)	(4)
1	Ariyalur	433	125
2	Perambalur	349	100
3	Mudukulattur	423	122
4	Aruppukottai	335	97
5	Udamulpet	406	117
6	Koipatti	435	125
7	Do.	304	88
8	Mysore	433	125
9	Dindigul	297	86
10	Nagpur	280	80
11	Basim	378	109
12	Koipatti	341	98
13	Local Ongole	347	100
	Significance $P = 0.05$	Yes.	..
	Standard error percentage	..	8.5
	Critical difference	88	25

Conclusions—6, 1, 8, 3, 5, 11, 2, 13, 12, 4, 7, 9, 10.

It is seen from the above table that sample Koipatti 15 is significantly better in yield than local Ongole. A review of performance of both Tamilnad and Andhra Desa samples for three successive seasons revealed that Guntur 14 bulk

of Guntur district and Koilpatti bulk of Tirunelveli district are better than the Ongole type in yield. The performance of the samples is summarized in Tables IV and V below:—

TABLE IV.—*Trial of samples of Andhra Desa—Yield of mericarp.*

Serial number and name of the sample.	1949-50.		1950-51.		1951-52.	
	Yield in lb. of mericarp per acre.	Percentage on control.	Yield in lb. of mericarp per acre.	Percentage on control.	Yield in lb. of mericarp per acre.	Percentage on control.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 Bellary 2	487	106	564	104	317	89
2 Do. 3	437	96	613	113	396	111
3 Anantapur 5	409	89	615	114	366	103
4 Do. 7	459	100	587	109	354	99
5 Guntur 13	403	87	566	105	278	78
6 Do. 14	409	89	685	127	374	105
7 Do. 15	453	99	676	125	284	79
8 Do. 18	455	99	572	106	417	117
9 Do. 19	399	87	599	111	354	99
10 Do. 20	388	85	556	103	396	111
11 Do. 21	449	98	587	109	360	100
12 Do. 22	459	100	611	113	335	94
13 Ongole local	..	..	540	100	356	100
Significance P = 0.05 ..	Yes.	..	Yes.	..	No.	..
Standard error percentage ..	..	7.5	..	8.9	..	9.5
Critical difference ..	84	18	149	26	..	..

Conclusions—

Column—3—1, 4, 12, 8, 7, 11, 2, 3, 6, 6, 9, 10, 10

Column—5—6, 7, 3, 2, 12, 9, 4, 11, 8, 6, 1, 10, 13

TABLE V.—*Trial of samples of Tamilnad—Yield of mericarp.*

Serial number and name of the sample.	1949-50.		1950-51.		1951-52.	
	Yield in lb. of mericarp per acre.	Percentage on control.	Yield in lb. of mericarp per acre.	Percentage on control.	Yield in lb. of mericarp per acre.	Percentage on control.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 Ariyalur 3	262	90	675	118	438	125
2 Perambalur 4	273	96	599	105	349	100
3 Mudukalathur 9	249	86	579	102	423	122
4 Aruppukottai 11	247	85	748	132	335	97
5 Udumalpet 12	307	106	678	119	406	117
6 Koilpatti 15	266	92	775	136	435	125
7 Do. 34	225	78	603	106	304	88
8 Mysore 18	273	94	673	118	433	125
9 Dindigul 19	278	96	588	104	297	86
10 Nagpur 25	256	88	638	111	280	80
11 Basim 26	290	100	588	104	378	109
12 Koilpatti 731	270	94	681	120	341	98
13 .. local	290	100	..	..	..	..
14 Ongole local	..	..	568	100	347	100
Significance P = 0.05 ..	No.	..	Yes.	..	Yes.	..
Standard error percentage ..	..	10.28	..	9.5	..	8.5
Critical difference ..	..	..	161	28	88	25

Conclusions—

Column—5—8, 4, 12, 12, 5, 1, 8, 10, 7, 2, 9, 11, 3, 14

Column—7—6, 1, 8, 3, 5, 11, 2, 14, 12, 4, 7, 9, 10

FOOTNOTE.—In 1949-50, samples were compared with local type. In 1950-51 and 1951-52 Ongole local was adopted as control for comparative studies.

23. There were 56 cultures in replicated row yield trials. Thirteen cultures were rejected in the field on the basis of poor body build and low productivity. Among the cultures, harvested single plant selection from Guntur 14 bulk was found to be significantly better than local, while all the other cultures were equal to the standard.

24. Twenty-seven samples of coriander from different parts of India were obtained during the year. Two of these were received from foreign countries. Only ten samples that were obtained before sowing season were raised in non-replicated observation plots. Sheopur local sample from Madhya Bharat possessed bold mericarps while all the rest showed smaller mericarps than local type. Except Dharwar sample of Madhya Bharat, all the others are late. Samples from Poona and Kashmir recorded poor yields. Raichur sample of Hyderabad, Dhanwan and Dhanian samples from Uttar Pradesh were outstanding for yield when compared with local. The other samples will be grown in the coming year and studied.

25. (C) Cotton other than scheme—*Maintenance and multiplication of C-1 and C-2 cotton.*—As in previous years, a two acre block of Cocoadas I cotton was raised with selfed seed of last season. The plot was rogued for off-types and flowers selfed with the funds provided by Indian Central Cotton Committee. A total of 705 lb. of kappas including 210 lb. of selfed kappas was obtained. The kappas was cleaned and ginned. A total of 380 lb. of seed including 126 lb. of selfed seed was obtained. After reserving 24 lb. of non-selfed seed for farm needs, the entire quantity of 126 lb. of selfed and 230 lb. of non-selfed seed was transferred to the Agricultural Demonstrator, Gurzala, for inner seed farms.

26. An acre of C-2 cotton was also raised with selfed seed of previous year for maintenance and seed multiplication. After roguing for off-types the flowers were selfed. A total of 378 lb. of kappas including 100 lb. of selfed kappas was obtained. On ginning 68 lb. of selfed and 156 lb. of non-selfed seed were obtained.

27. *Trial of early cottons.*—Observation trials 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 conducted in punasa season to study the earliness and to get enough seed for chilli cotton mixed cropping trial in subsequent year. T. Bk. 8 was found to be late. An average acre yield of 379 lb. was obtained from Tadpatri varieties. Surat khaki type was susceptible to jassid attack and recorded very low yield of 267 lb. per acre.

28. *Perennial cottons.*—The six perennial cotton types, Moco, Quebradinho, Barbados types I, II, III and IV were maintained. Moco continued to show its superiority over other types in yield as in previous years. The performance of the types for three seasons revealed that one of the single plants of Moco recorded an average yield of 6.61 ounce with 28 mm. holo-length and 38 per cent ginning.

29. *Groundnut.*—The trial of five high yielding bunch varieties, viz. A.H. 4111, A.H. 4218, A.H. 4515, A.H. 6481 and TMV. 2 recommended by Oil Seeds Specialist was repeated during the year. The yields recorded for the varieties could not be analysed since the produce of the varieties got mixed up. The trials will be repeated next season.

30. *Millets.*—The mainwork on millets on the station was confined to maintenance and multiplication of millets strains G.1, G.2, G.4 jonna and G.1 korra. The season was adverse to the Punasa crops. Flowering period of jonna coincided with the receipt of rain and hence setting was adversely affected. Calocoris bug attack was severe in spite of remedial measures and this added to the poor setting of grain. G.1, G.2 and G.4 jonna recorded average acre yields of 574, 779 and 400 lb. respectively. G.1. korra recorded an acre yield of 662½ lb.

31. *Tobacco H.S. 9.*—Maintenance of H.S. 9 tobacco was continued. Flowers were selfed after roguing the plots for off-types. A total quantity of 29 lb. of selfed seed was obtained from 668 plants selfed. Eighteen lb. of selfed seed was supplied to the Superintendent, Agricultural College, Bapatla, for raising nurseries and distribution of seedlings in the tract.

32. *Miscellaneous crops—Trial of linseed varieties.*—Observation trial of linseed varieties N.P. 68 and K.2 obtained from the Oil Seeds Specialist, was sown on 31st December 1951 on the red soil area of the station over an area of half-a-cent each. In body build and germination, N.P. 68 was found to be better than K.2. The former possessed light blue flowers while the latter had white flowers. N.P. 68 was earlier than K.2 in flowering duration. The former was harvested on 31st March 1952 while the latter came to harvest by 14th April 1952. The acre yields recorded were low being 31 lb. 2 oz. for K.2 and 7 lb. 4 oz. for N.P. 68.

III. CROP AGRONOMY.

33. *Mixed cropping trials—Chilli cotton mixed trials.*—Observation trials of chilli-cotton mixtures in 14:1 proportion were raised on the station with 1,402 chilli and eight medium early cottons, viz., K.21, K.28, B. 32-48-DA, H.420, 2955, 2963, P216F and Lakshmi, with the object of isolating a suitable early cotton type that could complete its harvest along with chilli. The first four are desi varieties and the rest are American cottons. The planting of chilli and sowing of cotton was done on 21st September 1951. The cotton variety P216F was earliest to flower and ripen. H.420 cotton was next in earliness when compared with Lakshmi, 2955, 2963 that possessed lower sympodial but were late due to shedding. K.21, K.28 and B. 32-48-DA varieties were late. Heavy shedding of floral forms first flush at various stages was recorded due to adverse seasonal conditions. There was a second flush and cotton varieties like Lakshmi, 2955 and 2963 among American cottons and B. 32-48.D.A. among Desi types were found to be retentive and productive. P.216F cotton was susceptible to jassid attack. 1402 chilli came to harvest by 25th December and harvests were over by 12th February 1952 while picking of kapas in cotton varieties, was commenced only on 5th March 1952 and continued up to 17th March 1952. B.32-48DA among Desi types and Lakshmi and 2955 among American types gave higher yields than P216F and H.420. The acre yields recorded were 48 for 32-48.D.A., 72 for Lakshmi and 82 for 2955. P.216F and H.420 recorded poor yields of 16 and 29 lb. respectively. None of the cotton varieties satisfied the objective of completing the harvest along with chilli. As the season was very adverse, the trial has to be repeated next season. Two more cotton varieties, viz., H.105 and Acala obtained from Brazil and which are reported to be very short duration types will also be included in the trial.

The results of the trial are summarised below :—

Observation trial of chilli—Cotton mixtures.

Field No.—1 E.
Object—To isolate a suitable early cotton type that completes its harvest along with chilli.
Layout—
Observation plots.
Method 1.—Every row of cotton was followed by 14 rows of chilli (1:14 proportion).
Method 2.—Cotton was dibbled in every third row of chilli as to occupy every fifth hole in this row (1:14 proportion).
Chillies—spacing 22" x 22" between rows and plants.
Cotton—spacing 22" x 9" between rows and plants.

Sown on—
Chillies—transplanted 20th September 1951.
Cotton—sown 20th September 1951.
Harvested on—
Chillies—25th December 1951 to 10th March 1952.
Cotton—5th March and 17th March 1952.
Previous crop—Chillies.
Area of each plot—
Method 1.—
Gross—272 cents (82½ L x 33 L).
Nett—227 cents (82½ L x 27½ L).
Method 2.—
Gross—284 cents (68½ L x 41½ L).
Nett—102 cents (41½ L x 24½ L).

Summary of results.

Serial number.	Main treatment.	Yield of chillies ripe pods in pound per acre.		Yield of cotton in pound of kapas per acre.	
		Method 1.	Method 2.	Method 1.	Method 2.
(1)	(2)	(3)	(4)	(5)	(6)
1	1402 Chilli + K.21 cotton ..	1,535	1,316	35	10
2	Do. + K.28 cotton ..	1,612	1,269	48	44
3	Do. + B. 32-48 D.A. cotton.	1,394	1,410	74	21
4	Do. + H. 420 cotton ..	1,707	1,090	34	24
5	Do. + 2,955 cotton ..	1,974	1,447	64	100
6	Do. + 2963 cotton ..	2,258	1,681	37	98
7	Do. + P.216F cotton ..	1,624	1,237	20	8
8	Do. + Lakshmi cotton ..	1,560	1,197	28	115
9	1402 chilli pure ..	1,983	1,559	..	..

34. *Trial of dibbling H. 420 cotton in standing groundnut.*—As per the suggestions of the Cotton Extension Officer, Coimbatore, in order to find the possibility of raising an early maturing cotton a month after sowing groundnut, a trial by dibbling cotton in alternate row spaces was laid out. The trial was laid adopting the treatments of dibbling H. 420 cotton in standing groundnut a month, two months and three months after the sowing of groundnut. Owing to drought and untimely rains, the cotton dibbled two months and three months after groundnut sowing did not establish properly. The yield differences of groundnut between pure and mixed plots were not significant. The groundnut was harvested on 11th October 1951 and cotton harvested from 6th November 1951 to 27th March 1952. It is proposed to repeat the trial next season and adopting treatments of dibbling cotton one month and 45 days after groundnut sowing as the interval adopted last year for cotton dibbling was more. The results of the trial are summarised in Table VI below :—

TABLE VI.—Trial of dibbling cotton in standing groundnut, 1951-52.

Field No.—1 F.

Object—To study the possibility of raising an early maturing cotton a month after sowing groundnut.

Layout—Randomized blocks replicated 6 times.

Variants—Four as in table below.

Sown on—

Local groundnut—30th June 1951.

H. 420 cotton—28th July 1951.

1st September 1951.

4th October 1951.

Harvested—

Groundnut on—11 October 1951.

Cotton—6th November 1951 to 27th March 1952.

Previous crop—Chillies.

Size of each plot—

Gross—1.21 cents (110 L × 11 L).

Nett—0.55 cents (100 L × 55 L).

Summary of results.

Serial number.	Variant particulars.	Groundnut.		Cotton.
		Yield in pounds of pods per acre.	Percentage on control.	Yield in pounds of kapas per acre.
(1)	(2)	(3)	(4)	(5)
*1	Groundnut pure (local bunch) ..	455	100	..
2	Groundnut + H. 420 cotton, July ..	360	79	759
3	Groundnut + H. 420 cotton, August ..	410	90	..
4	Groundnut + H. 420 cotton, September.	427	94	..
	Significance P=0.05	No	..	..
	Standard error percentage	..	12.03	..

35. *Leguminous crops and their effect on yields of succeeding crop.*—The experiment was started in 1949-50 in order to study the effect of previous leguminous crops and jonna on succeeding cotton crop. In the first year the following treatments were adopted, (1) jonna pure, (2) jonna and redgram 5:1, (3) redgram and groundnut, (4) redgram alone and (5) groundnut alone with and without 30 lb. P205.

The layout adopted consisted of randomized plots replicated four times. The five crops sorghum, groundnut, redgram, sorghum and redgram and groundnut and redgram, were raised during the season in all the ten treatments. The details of the treatments adopted and the results obtained are furnished in the table below. At the time of harvest, each plot was divided into two halves and produce harvested, weighed and recorded separately for each of the sub-plot.

Trial of Leguminous crops in rotation with cotton.

Field No.—2 E.
Area of the experiment—1.87 acre.
Layout—Randomized blocks.
Number of replications—Four.
Size of plot—4'6" cents.
Size of sub-plot—
Gross—2.34 cents
Nett—1.00 cents.
Crop—
Groundnut—
Strain used—A.H. 45.
Date of sowing—29th June 1951.
Date of harvest—27th October 1951.

Sorghum—
Strain used—G. 4.
Date of sowing—29th June 1951.
Date of harvest—31st October to 2nd November 1951.
Redgram—
Strain used—Local.
Date of sowing—29th June 1951.
Date of harvest—12th January 1952.

Serial number and treatments.	Sub-plot A.		Sub-plot B.		Remarks.
	Yield of grain pods.	Yield of straw or husk.	Yield of grain pods.	Yield of straw or husk.	
(1)	(2)	(3)	(4)	(5)	(6)
1 Groundnut 0 lb. P2O5	372	..	408	..	
2 " 30 lb. "	389	..	292	..	
3 Sorghum 0 lb. "	..	4,230	..	4,275	
4 " 30 lb. "	..	4,600	..	4,605	
5 Redgram 0 lb. "	227	5,700	319	6,750	
6 " 30 lb. "	270	6,225	320	6,350	
7 Sorghum + Redgram 0 lb. P2O5 ..	..	4,395	..	4,515 (Yield of sorghum)	
8 " 30 lb. "	194	4,425	303	5,950 (" redgram)	
9 Groundnut + redgram 0 lb. P2O5 ..	161	4,440	..	4,980 (" sorghum)	
10 " 30 lb. "	186	3,850	170	3,950 (" redgram)	
	167	4,550	214	5,175 (" redgram)	
	252	6,825	242	.. (" ground-nut)	
			416	8,175 (" redgram)	

The residual effect if any, of this treatments will be studied on the succeeding Cocanadas I cotton during the next season. One of the sub-plot will receive nitrogen in the form of ammonium sulphate.

36. In order to study the residual effect of previous crops, Cocanadas I cotton was sown during this season. The yields recorded for cotton showed no significant differences between treatments revealing thereby absence of effect of previous leguminous crops or manures. The results of the trial are summarized below:—

Experiment to study the effects of previous crop and manures on cotton.

Field No.—1-J2.	3 (b) Groundnut + 0 lb. P2O5,
Lay out—Randomized blocks.	(b) " + 30 "
Replications—Four.	4 (a) " + redgram + 0 lb. P2O5.
Treatments—6 × 2 × 2.	(b) " + 30 "
Area of each sub-plot.—	5 (a) Redgram + 0 lb. P2O5.
Gross—2'34 cents.	(b) " + 30 "
Nett—1'00 cents.	
Main treatments—	Sub-treatments—
1 (a) Jonna + 0 lb. P2O5.	A. Nitrogen at 30 lb. per acre as Ammonium sulphate.
(b) " + 30 "	B. No nitrogen.
2 (a) " + redgram 0 lb. P2O5.	
(a) " + " 30 "	

Summary of results.

Yield of kapas in lb. per acre.

Previous crop.	Jonna.		Jonna + redgram.		Redgram.		Groundnut + redgram.		Groundnut.		Mean.
	P2O5.	No. P2O5.	P2O5.	No. P2O5.	P2O5.	No. P2O5.	P2O5.	No. P2O5.	P2O5.	No. P2O5.	
A. Nitrogen ..	(b) 592	(a) 498	(b) 505	(a) 501	(b) 458	(a) 533	(b) 493	(a) 482	(b) 515	(a) 453	..
	545		503		498		483		484		..
B. Number of	538	512	508	483	417	477	504	515	480	470	..
	525		498		447		510		455		..
Mean ..	535		501		472		499		475		496

NOTE.—Yield differences are not statistically significant.

37. *Trial of presoaking Coconadas I cotton seed in nutrient solutions.*—An experiment was started with the object of finding out whether presoaking of cotton seed in nutrient solutions will improve yield of cotton. Coconadas I cotton seed

was soaked in water, molar, $\frac{1}{2}$ molar and $\frac{1}{4}$ 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 $\frac{1}{2}$ molar solution of mono potassium phosphate and $\frac{1}{4}$ molar ammonium sulphate solution are as good as unsoaked seed. The yields were poor with other treatments. The results obtained are summarised below:—

Trial of presoaking Coconadas I cotton seed in Nutrient solution.

Field No.—1-F.
Object—To study effect of presoaking cotton seed in nutrient solutions.
Layout—Randomized block—Replicated four times.
Variants—Eight as in table below.
Seeds soaked on—3rd October 1951.
Sown on—4th October 1951.
Harvested on—19th March 1952 and 6th April 1952.
Previous crop—Chillies.
Size of each plot—
Gross—2'84 cents (67½ L × 12 L)
Nett—0'34 cent (50½ L × 6 L.)

Serial number and variant and particulars.	Yield in lb. of kapas per acre.		Hallow length in cm.	Ginning percentage.
	Adjusted yield.	Percentage on control.		
(1)	(2)	(3)	(4)	(5)
1 Dry seed	575	100	21	27
2 Soaked in water for 24 hours	408	71	20	26
3 Soaked in Molar Mono potassium phosphate for 24 hours.	537	93	21	26
4 Soaked $\frac{1}{2}$ molar mono potassium phosphate for 24 hours.	395	69	21	25
5 Soaked $\frac{1}{4}$ molar mono potassium phosphate for 24 hours.	554	96	20	25
6 Soaked molar ammonium sulphate for 24 hours.	327	57	21	26
7 Soaked $\frac{1}{2}$ molar ammonium sulphate for 24 hours.	358	62	20	25
8 Soaked $\frac{1}{4}$ molar ammonium sulphate for 24 hours.	502	87	20	26
Significant (P = 0.05)	Yes.			
Standard error percentage	..	9.60		
Critical difference	130	23		

Conclusion—

1, 5, 3, 8, 2, 4, 7, 6.

NOTE.—Stand differences were found to be significant. Covariance has been worked out.

38. *Night-soil compost.*—An experiment was started in 1950-51 in consultation with Government Agricultural Chemist with the object of assessing the relative effects of night-soil compost and farm-yard manure over no manure. The crops studied for the trial were chilli and variga. During the year residual effect of manures on chilli and variga was studied. A fresh trial for study of direct effect was also laid for a second time in succession. The yield differences were found to be not significant in variga. No yields could be gathered in chilli crop of both the trials as the season was very adverse for that crop. Tables VII and VIII.

TABLE VII.—Night-soil compost experiment—1951-52—With variga (Residual effect).

Field No.—2 B.
Object—To study the comparative residual effects on night-soil compost, farm-yard manure and no manure on variga.
Layout—Randomized blocks replicated six times.
Variants—Three as in table below.
Sown on—24th October 1951.
Harvested on—18 January 1952.
Previous crop—Chillies.
Size of each plot—
Gross 1.589 cent (57.8 L × 27.5 L).
Nett 0.8 cent (45.0 L × 18.0 L).

Summary of results.

Variant particulars.	Yield in lb of grain per acre.		Percentage on control.
	(1)	(2)	
Night soil compost	..	781	114
Farm yard manure	..	858	95
No manure	..	688	100
Significant P = 0.05	..	No.	..
Standard error per cent	..	..	18.83

TABLE VIII.—Nightsoil compost experiment with variga direct effect, 1951-52.

Field No.—2 B.
 Object—To compare the relative manurial values of night-soil-compost, farm yard manure over no manure.
 Layout—Randomized blocks replicated six times.
 Variants—Three as in table below.

Sown on—3rd November 1951.
 Harvested on—18th January 1952.
 Previous crop—Jonna.
 Size of each plot—Gross—1.589 cent (57.8' x 27.5')
 Nett—0.8 cent. (45.0' x 18.0').

Summary of results.

Serial number (1)	Variants and particulars. (2)	Yield in lb per acre. (3)	Percentage on control. (4)
1	Night-soil compost	353	86
2	Farm-yard manure	338	94
3	No manure	411	100
	Significance $P=0.05$	..	..
	S.E. per cent	..	8.52

39. *Rainfall and crop yield correlation experiment.*—This is a long-range experiment started in 1941-42 and it has to be continued for a period of 25 years. The principal crops A.H. 45 groundnut, G. 2 jonna, G. 1. chilli and type 20 tobacco were raised and yields recorded. The acre yields of the crops yearwar since the commencement of the trial up to date are furnished in Table IX.

TABLE IX.—Rainfall and crop yields, 1951-52.

Field No.—3b.
 Object—To study the relationship between crop yields and rainfall.
 Lay out—4 x 4 latin square.

Crops—As in table below.
 Area of each plot—
 Gross: 23.90 cents.
 Nett: 22.50 cents.

Summary of results.

1951-52 crop—
 Groundnut A.H. 45.
 Pyru jonna G-2.
 Chillies G-1.
 Tobacco type 20.

Sown—
 29th June 1951.
 26th October 1951.
 3rd and 4th October 1951.
 1st and 2nd November 1951.

Harvested—
 29th October 1951.
 11th February to 12th February 1952.
 30th January to 19th February 1952.
 8th March to 9th March 1952.

Year. (1)	Rainfall in inches. (2)	Yields in pounds of			
		Pod of groundnut A.H. 45 per acre. (3)	Grain of pyru jonna G2 per acre. (4)	Ripe pods of chilli G1 per acre. (5)	Green leaf of tobacco T 20 per acre. (6)
1941-42 ..	21.74	698	749	2,070	1,159
1942-43 ..	30.43	1,453	278	1,042	3,736
1943-44 ..	26.59	887	882	1,220	4,708
1944-45 ..	38.45	1,416	1,052	769	3,109
1945-46 ..	36.64	811	960	361	4,081
1946-47 ..	33.29	1,090	300	158	3,338
1947-48 ..	34.00	727	1,008	375	3,883
1948-49 ..	29.61	750	702	407	6,818
1949-50 ..	35.88	1,250	520	92	5,214
1950-51 ..	33.39	498	1,504	1,139	3,719
1951-52 ..	25.20	323	1,080	813	2,741

IV. ORCHARD.

40. 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 suvaranarekha was the best in point of yield during the year followed by Firangi Ludwa and Banganapalle. A total number of 4,085 fruits were harvested, sold

and a revenue of Rs. 305 was realised. Owing to complete breakdown of oil engine intended for the irrigation of fruit plants and trees and due to insufficient moisture in the soil, the bearing in citrus trees was very poor during the season.

41. In the miscellaneous block also the bearing of guavas was very poor.

42. Seedlings were raised for Vanamahotsava for distribution to public.

43. Twenty-four pounds of vegetable seed was obtained from the orchard during the year under report.

44. During the year 1951-52, the following material was distributed during Vanamahotsava celebrations.

Name of material.	Nos.
Guava layers—Allahabad	25
" seedless	9
Pomegranate rooted cuttings—Dholka	28
" Papershell	9
" Kabul	19
Pongam seedlings	1,100
Guinea grass slips	200
Tomato seedlings	150

V. SRINIVASAN,
Chilli Specialist.

GUNTUR.
 20th August 1953.

T. RANGABRAHMA RAO,
Deputy Director of Agriculture.

APPENDIX A.

As a whole financial statement of the Agricultural Research Station, Lam, for the fasli year 1360 (1951-52).

Expenditure.

	RS.	A.	P.
Pay of establishment	9,663	0	0
Dearness allowance	3,395	0	0
Travelling allowance	665	0	0

Contingencies—

C.A. 2. Office contingencies	3,183	0	0
C.A. 3. Other charges	13,239	0	0
Working expenses	23,851	0	0

Total .. 54,026 0 0

Receipts .. 2,112 14

Quantities of seed transferred for distribution in the district.

Serial number and name of seed. Quantity. Area expected to cover.

	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
6 1402 chilli seeds	19½	9
7 Pusa gogu	7½	0.5
8 H.S. 9, tobacco seed (selfed)	18	144
9 C.1 cotton seed (selfed)	45	4.5
10 C.1 cotton seed (non-selfed)	780	117
	390	59
11 C.2 cotton seed (non-selfed)	100	10
12 197-3 cotton seed	2	..
13 Snakegourd	3	0.5
14 Benda	6	0.5
15 Bittergourd	0-12 oz.	0.20
16 Ribbed gourd	1 lb.	0.20

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APPENDIX B.

STEPS TO RAISE INCOME FROM THE FARM AS A WHOLE.

1. In bulk area and in agromic experiments improved strains were grown to get increased yields.
2. Sale proceeds of farm produce and hire charges of farm carts were periodically revised taking into account market fluctuations to get increased income.
3. In the orchard, arrangements were made for grafting and layering of fruit plants for sale to cultivators and thereby to enhance the income of the farm.
4. In the orchard, all the available open spaces were utilized for the production of vegetable seeds for sale to cultivators.

STATEMENT SHOWING DETAILS OF COST OF CULTIVATION FOR THE MAJOR CROPS
(RAISED AS BULK ON THE STATION).

Crops.	Chilli.	Cotton C. 1.	G. 1. Jonna for grain.	G. 2. Jonna for grain.	G. 4. Jonna for fodder.
(1)	(2)	(3)	(4)	(5)	(6)
1 Yield per acre ..	523 lb. of dried chilli.	352 lb. of kapas.	591 lb. of grain. 3,925 lb. of straw.	658 lb. of grain. 5,325 lb. of straw.	8,500 lb. of green fodder. 805 lb. of dry fodder 107 lb. of grain.
2 Value of produce per acre.	RS. A. P. 174 0 0	RS. A. P. 88 2 0	RS. A. P. 270 4 0	RS. A. P. 348 4 0	RS. A. P. 308 6 0
3 Cost of cultivation per acre.	254 13 0	186 14 6	150 5 0	75 14 3	140 6 0
(a) Preparatory cultivation.	45 1 0	14 9 0	48 7 0	16 7 0	27 12 0
(b) Manures and manuring.	105 0 0	45 11 0	47 0 0	19 5 6	40 0 0
(c) Seeds and sowing.	181 7 0	8 0 0	7 12 0	7 12 0	17 12 0
(d) After cultiva- tion.	21 2 0	26 0 0	4 2 0	..	..
(e) Irrigation ..	..	..	..	..	..
(f) Harvesting threshing, etc.	22 3 0	92 4 6	43 0 0	32 5 3	54 14 0
4 Profit ..	..	..	119 15 0	272 5 9	168 0 0
Loss per acre ..	180 13 0	98 12 6	..	..	..

ANNUAL REPORT OF THE CENTRAL BANANA RESEARCH STATION,
ADUTHURAI, FOR THE FASLI YEAR 1361 (1951-52).

This forms the third annual report of the Central Banana Research Station, Aduthurai, Madras State.

2. *Season.*—The weekly rainfall distribution during the period 5th July 1951 to 4th July 1952 at the Agricultural Research Station, Aduthurai, situated within a distance of about a mile from the Central Banana Research Station is given in Appendix I.

The year's rainfall is below the average fall for the past ten years by 4.88 inches. The insufficient north-east monsoon and hot weather rains affected the perennial banana crop adversely and enhanced the irrigation charges in the wet and garden land banana area.

3. *Banana variety collection.*—The up-to-date number of banana varieties under trial at the station is 163. During the year 21 varieties listed below were added (Table I):—

TABLE I.—List of banana varieties added during the year.

Names of varieties.	Place from where obtained.
Bombay Green, Bhurkel, Lal Velchi, Kanyal, Safed Velchi, Soneli and Rajeli	Bombay State*
Bhinkol, Cheeni Champa, Jahaji, Kachkol, Kechu lepa, Manohar, Octaman and Wathre	Assam.
Hondura Wala, Marathamana and Suwandel	Ceylon.
Melbhog, Anupan and China	Bihar.

*The varieties from Bombay State were selected from disease-free clumps of known performance at the Banana Research Station, Ganeshkind, and were grown in a quarantine area prior to planting. The present collections at this station are quite free from 'Bunchy top' disease.

The list of banana varieties which have fruited with the number of plants harvested, the mean period from planting to harvest and the mean weight of bunch of the different varieties grown under the perennial system of cultivation practised at Aduthurai are given in Table II.

TABLE II.—Yield of banana varieties with mean period from planting to harvest.

Name of variety.	Number of plants harvested.	Mean period from planting to harvest in days.	Mean weight of bunch in lb.
(1)	(2)	(3)	(4)
Nana Nendran	3	280	11
Attu Nendran	3	287	10
Nendran	2	306	13
Ponthan	2	338	19
Chingan	4	339	8
Anaikomban	5	359	5
Nendra Padathi	6	368	17
Kullan	4	378	14
Pidi Monthan	4	379	15
Pacha Vazhai	3	383	16
Bainsa	3	394	27
Kunnan	2	395	6
Kali	4	398	12
Kommu Arati	3	399	5
Then Kunnan	3	402	9
Kuri Bontha	2	403	6
Kallu Monthan	2	411	14
Booditha Bontha Batheesa	4	412	27
Virupakshi	6	419	7

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Name of variety.	Number of plants harvested.	Mean period from planting to harvest in days.	Mean weight of bunch in lb.
(1)	(2)	(3)	(4)
Batheesa Ashy	1	420	12
Melbhog	3	427	16
Pacha Bontha Batheesa	4	436	25
Bathisa Green	1	440	6
Ayiranka Rasthali	2	446	9
Pacha Nadan	3	451	8
Sirumalai	4	452	5
Thattilla Kunnan	3	455	9
Mannan	5	457	15
Mons Marie	2	465	17
Vamanakeli	6	466	10
Ney Poovan	1	469	8
Thiruvananthapuram	2	483	4
Motta Poovan	1	488	20
Nattu Poovan	2	498	10
Kapur	5	498	12
Venneettu Kunnan	4	500	6
Then Kadali	4	516	10
Krishna Vazhai	7	517	16
Suganthi	3	522	15
Kanch Kela	4	548	28

From the above table it may be noted that only six varieties—Nana Nendran, Attu Nendran, Nendran, Ponthan, Chingan and Anaikomban—have yielded fruits within one year after planting. With regard to bunch weight, varieties Kanch Kela, Booditha Bontha Batheesa, Pacha Bontha Batheesa, Bainsa and Motta Poovan have recorded a mean bunch weight of 20 lb. or above. Of these except Motta Poovan the rest are cooking varieties.

Descriptions of the plants listed above have been made.

4. *Hybridization*.—In addition to the collection of wild species, *Musa acuminata*, *Musa balbisiana*, and *Musa coccinea*, available at the station, a new species from Philippines, *Musa chilocarpa*, a male fertile type with male and female phases alternating has been added to the species collection during the year.

Preliminary work during the year has given the following results:—

(1) Two hybrids of Monthan, the leading cooking variety of the State as female parent with *Musa coccinea*, a dwarf species as male have been obtained and the performance of the hybrids is under study. This item was undertaken as per technical programme of hybridization work towards the first step in the synthesis of a suitable male parent to produce a dwarf type of the variety Monthan by breeding.

(2) Seeds have been obtained from the following crosses and were sown in June 1952:—

- Poovan X *Musa balbisiana* (male).
- Manthan X *Musa balbisiana* (male).

5. *Mutants*.—Two mutants detailed below were located—

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

Of the six selections made last year, three had to be rejected as the progenies failed to show the parental characteristics.

These are—

- (1) Poovan plant with a second series of fruiting hands in the bunch after a short male flower phase.
- (2) Monthan plant with the above character.
- (3) Mutant of the Red banana having green colouration of the pseudostem and leaf sheaths.

The progeny test of the mutant, Monthan plant with very high grade of fruits is satisfactory.

6. *Propagation and plantation practices*.—A. *Propagation studies*.—(1) *Selection of suckers*.—Object.—To determine which type of suckers, whether sword or broad leaved, form the best planting material.

Material.—Sword and broad leaved suckers of Monthan and Poovan varieties aged 3 and 4 months.

Treatments.—Eight.

Lay out.—Randomised and replicated layout with nine plants per plot and four replications. A spacing of 8 feet was given between plants. A guard row of equal age was provided all round.

The plots were irrigated four times during the summer months and given frequent diggings to remove weeds. An application of 1½ lb. groundnut cake and 4 oz. ammonium sulphate was given 3 months after planting. Desuckering operations are being attended to once a month, restricting the suckers to only one per plant from the date of flowering.

The plantings were done on 21st November 1951. The height, girth and leaf counts of the plants recorded in June 1952 were analysed. The results are furnished below Table III:—

TABLE III.—Selection of suckers.

Treatments—	Treatments—
A. Three months old sword suckers of Poovan variety.	E. Three months old sword suckers of Monthan variety.
B. Four months old sword suckers of Poovan variety.	F. Four months old sword suckers of Monthan variety.
C. Three months old broad leaved suckers of Poovan variety.	G. Three months old broad leaved suckers of Monthan variety.
D. Four months old broad leaved suckers of Poovan variety.	H. Four months old broad leaved suckers of Monthan variety.

(a) Height measurements taken on 13th June 1952.

Particulars.	A.	B.	C.	D.	E.	F.	G.	H.
Mean height in cm.	135.5	126.3	111.5	102.0	167.0	146.8	134.0	136.3
Standard error—12.04.								
'Z' test—Significant.								
Critical difference—25.04 (P = 0.05).								
Conclusion—E F H A G B C D.								

(b) Girth measurements taken on 13th June 1952.

Particulars.	A.	B.	C.	D.	E.	F.	G.	H.
Mean girth in cm.	36.8	34.8	30.5	27.3	43.0	43.3	38.5	39.0
Standard error—3.2.								
'Z' test—Significant.								
Critical difference—6.6 (P = 0.05).								
Conclusion—F E H G A B C D.								

(c) Leaf counts taken on 13th June 1952.

Particulars	A.	B.	C.	D.	E.	F.	G.	H.
Mean number of leaves produced ..	18.0	17.3	17.5	16.3	21	21	20.5	20.5
Standard error—1.32.								
'Z' test—Significant.								
Critical difference—2.7 (P = 0.05).								
Conclusion—E F G H A C B D.								

The analysis of growth measurements as given above shows that with regard to height, girth and leaf counts the sword suckers of the Monthan variety aged three and four months at the time of planting lead the rest. The differences in the growth measurements of the three and four months old broad leaved suckers of the Monthan variety and three months old sword suckers of the Poovan variety are not significant. Three and four months old broad leaved suckers of the Poovan variety are inferior to the rest in height and leaf counts. With regard to girth measurements both the types of suckers of the Poovan variety have recorded significantly poorer measurements when compared to those of the Monthan variety.

The trial is in progress and will be continued till the yield data are complete.

(2) *Method of propagation—Object.*—To find out if corms and their bits can provide quantitatively more conveniently available planting material for raising new plantations.

Bits and corms from Poovan and Monthan plants of uniform performance were selected (i) from the parent plant soon after the bunch was harvested and (ii) from the first daughter sucker of the same clump soon after the harvest of the bunch of the parent plant. The selected bits and corms with uniform weight and with only one well developed bud for sprouting were planted in a nursery in February 1951. The sprouting was over by the end of June 1951. The percentage of sprouting ranged from 84.1 to cent per cent. The plantings were done on 6th July 1951 with eight treatments detailed below and four replications. A spacing of eight feet was given between plants. One guard row was provided all round.

Cultural and manurial treatments given are similar to those under the trial, 'selection of suckers'. The application of manures were given in two doses first three months after planting and the second five months after planting.

The analysis of height, girth and leaf counts recorded on 19th February 1952 are given Table IV below:—

TABLE IV.—Analysis of growth measurements propagation trial.

Treatments—	Treatments—cont.
A. Suckers from mother corm of Poovan variety.	G. Suckers from corm of Monthan daughter sucker.
B. Suckers from bits of Poovan mother plant.	H. Suckers from bits of Monthan daughter sucker.
C. Suckers from corm of Poovan daughter sucker.	System of layout—Randomised plots replicated four
D. Suckers from bits of Poovan daughter sucker.	times with nine plants per plot.
E. Suckers from mother corm of Monthan variety.	Date of planting—6th July 1952.
F. Suckers from bits of Monthan mother plant.	

(a) Height measurements taken on 19th February 1952.

Particulars.	A.	B.	C.	D.	E.	F.	G.	H.
Mean height in cm.	218	225	227	190	294	279	255	268
Standard error—11.04.								
'Z' test—Significant.								
Critical difference—22.96 (P=0.05).								
Conclusion—E F H G C B A D.								

(b) Girth measurements taken on 19th February 1952.

Particulars.	A.	B.	C.	D.	E.	F.	G.	H.
Mean girth in cm.	57.0	56.3	54.8	49.4	61.6	60.8	57.0	60.1
Standard error—1.12.								
'Z' test—Significant.								
Critical difference—2.33 (P=0.05).								
Conclusion—E F H G A B C D.								

(c) Leaf counts taken on 19th February 1952.

Particulars.	A.	B.	C.	D.	E.	F.	G.	H.
Mean number of leaves produced ..	26.3	26.5	26.2	23.7	30.6	29.3	26.2	28.6
Standard error—1.01.								
'Z' test—Significant.								
Critical difference—2.16 (P=0.05).								
Conclusion—E F H A B C G D.								

The above analysis shows (1) that with regard to height the suckers raised from the mother corm of the Monthan variety have recorded significantly better measurements than the rest except those raised from bits of corms of the Monthan parent plant. Suckers raised from bits of corms of Poovan daughter suckers are inferior to the rest.

(2) With regard to girth measurements the superiority of suckers raised from mother corm of the Monthan variety, bits of mother corm of the Monthan variety and bits of daughter corm of the Monthan variety to the rest are indicated. The suckers raised from bits of corms of daughter suckers of the Poovan variety have recorded the poorest girth measurements.

(3) With regard to leaf counts the suckers raised from the mother corm of Monthan variety have recorded significantly higher counts than the rest except those under the two treatments suckers raised from bits of Monthan mother plant and suckers raised from bits of Monthan daughter suckers. The poorest leaf

count is recorded by the suckers of the Poovan variety raised from bits of the daughter suckers though the differences between this treatment and two other treatments, viz, suckers raised from corm of Poovan daughter sucker and those from Monthan daughter sucker are not significant.

The results of growth measurements recorded on 19th May 1952 when analysed are detailed in Table V below:—

TABLE V.—Analysis of growth measurements—Propagation trial.

(a) Height measurements taken on 19th May 1952.

Particulars.	A.	B.	C.	D.	E.	F.	G.	H.
Mean height in cm.	251.7	250.5	247.5	237.6	318.3	317.4	303.3	313.7
Standard error—12.61.								
'Z' test—Satisfied.								
Critical difference—26.42 (P=0.05).								
Conclusion—E F H G A B C D.								

(b) Girth measurements taken on 19th May 1952.

Particulars.	A.	B.	C.	D.	E.	F.	G.	H.
Mean girth in cm.	58.8	58.1	56.9	55.8	65.0	64.0	63.6	63.9
Standard error—0.84.								
'Z' test—Satisfied.								
Critical difference—1.94 (P=0.05.)								
Conclusion—E F H G A B C D.								

(c) Leaf counts taken on 19th May 1952.

Particulars.	A.	B.	C.	E.	F.	G.	H.
Mean number of leaves produced ..	30.5	30.0	30.0	29.7	33.3	31.6	32.8
Standard error—1.84.							
'Z' test—Not satisfied.							

From the above table it is clear that for each of the two varieties, Monthan and Poovan, the differences in the growth measurements of height and girth between the treatments are not significant and in leaf counts the treatment differences even between the two varieties are not significant. This indicates that the initial growth differences of suckers raised under the different treatments detailed above levelled up within about ten months after planting.

The progress of flowering and harvest of the bunches up to the end of June 1952 are presented in Table VI below. The number of plants under each treatment is thirty-six.

TABLE VI.—Progress of flowering and harvest of plants raised from corms and bits.

Treatment.	Percentage flowered.	Percentage of plants harvested.	Average weight of bunch.	
			LB.	oz.
A. Suckers from mother corm of Poovan ..	80.6	44.4	20	12
B. Suckers from bits of Poovan mother plant ..	88.9	58.3	22	8
C. Suckers from corm of Poovan daughter sucker ..	86.1	69.4	22	2
D. Suckers from bits of Poovan daughter sucker ..	47.2	16.7	24	1
E. Suckers from mother corm of Monthan ..	100.0	66.7	25	12
F. Suckers from bits of Monthan mother plant ..	88.9	58.3	22	0
G. Suckers from corm of Monthan daughter sucker ..	72.2	44.4	22	8
H. Suckers from bits of Monthan daughter sucker ..	88.9	63.9	23	9

It may be noted from the above table that suckers from the mother corm of Monthan variety are the first to complete flowering and these have so far given the highest average weight of bunch of 25 lb. 12 oz. The flowering and fruiting of the plants are in progress. The trial will be continued till yield data are collected.

(3) *Season of planting—Object.*—To assess the relative merits of the various months of the year for planting purposes.

The progress of flowering and harvest of twenty-five suckers under each of the two varieties Poovan and Monthan planted from February 1951 onwards in wet land under irrigation are given in Table VII below. The plantings were done in raised beds containing four plants each with drainage channels all round. Earthing up and deepening of drainage channels were attended to twice. The area was irrigated during the summer months.

TABLE VII.—Progress of flowering and harvest of plants under monthly planting trial.

Month of planting.	Variety.	Percentage of flowering.	Percentage of plants harvested.	Average weight of bunch.	
				lb.	oz.
February 1951	Monthan	92	40	25	1
Do.	Poovan	52	..	..	..
March 1951	Monthan	64	20	26	14
Do.	Poovan	36	..	..	..
April 1951	Monthan	64	16	29	12
Do.	Poovan	44	8	21	0
May 1951	Monthan	56	20	23	0
Do.	Poovan	80	12	17	0
June 1951	Monthan	88	24	27	13
Do.	Poovan	16	..	..	..
July 1951	Monthan	68	4	21	18
Do.	Poovan	..	..	..	..
August 1951	Monthan	32	..	..	..
Do.	Poovan	..	..	..	..
September 1951	Monthan	12	..	..	..
Do.	Poovan	..	..	..	..

NOTE.—None of the suckers planted during October, November and December 1951 has flowered.

The mean growth measurements of the plants taken at an interval of four months from the date of planting are given in Table VIII. The total number under each variety planted every month for this observational trial is twenty-five.

TABLE VIII.—Mean growth measurements of plants under the monthly planting trial.

Month of planting.	Poovan.		Monthan.	
	Height in inches.	Girth in inches.	Height in inches.	Girth in inches.
February 1951	68.8	16.8	77.7	20.0
March 1951	57.8	15.7	65.4	18.3
April 1951	47.6	14.0	59.4	14.1
May 1951	97.7	23.8	109.0	23.4
June 1951	115.7	27.8	176.5	35.2
July 1951	100.4	25.9	184.2	37.0
August 1951	97.0	24.0	140.9	29.8
September 1951	114.2	27.4	166.8	34.3
October 1951	116.5	26.0	139.0	29.3
November 1951	107.0	20.8	112.1	23.4
December 1951	88.7	21.4	110.9	21.8

The mean measurements recorded above indicate that suckers of the Poovan variety planted during the months of June, September and October and of the Monthan variety planted during the months of June, July and September lead the rest in height and girth measurements.

The yield data are being collected. It is proposed to continue the trial for another year when space becomes available in wet land.

B. Plantation practices—(1) Ratooning trial in wet land.—The object of this trial is to assess the utility of taking one to three ratoon crops after a plant crop of bananas. The plantings for this with four months old sword suckers of Poovan and Monthan varieties were done during February 1951 giving a spacing of 8 feet between plants. The undermentioned three treatments were replicated four times :—

- One ratoon crop after a plant crop.
- Two ratoon crops after the plant crop.
- Three ratoon crops after the plant crop.

The area was irrigated during the summer months. Digging and earthing up was attended to as often as necessary. Two doses of manures at the rate of 1½ lb. ground nut cake and 4 oz. of ammonium sulphate per plant were applied. The harvests commenced on 31st January 1952 and were completed on 9th June 1952. The average weight of bunch obtained for the plant crop for the two varieties Poovan and Monthan is 28 lb. 13 oz. and 27 lb. 4 oz. respectively. In all cases desuckering was done up to the time of flowering and only one sucker was allowed to grow after flowering. The stand of the ratoon crop is quite good. The trial will be continued for three ratoon crops.

(2) *Mattocking trial*—**Object.**—To study the influence of the extent of mattocking on the growth and performance of the sucker that follows on.

Material.—Four months old suckers of Monthan and Poovan varieties.

Method.—After harvest of the bunches the pseudostems were given the following three treatments :—

- Control—Parent pseudostem left untouched.
- Parent pseudostem cut back to half the length after harvest.
- Parent pseudostem cut to ground level after harvest.

Layout.—Randomized and replicated lay out with nine plants per plot and four replications.

The plantings were done on 12th April 1950. Cultural and manurial operations given were similar to those under 'Ratooning trial' the treatments detailed above were given to the parent pseudostems immediately after harvest of the bunches. The progress of flowering and harvest of the bunches are furnished in Table IX below :—

TABLE IX.—Progress of flowering and harvest of bunches of plants—Mattocking trial.

Treatment.	Variety.	Percentage of plants flowered.	Percentage of plants harvested.	Average weight of bunch.	
				lb.	oz.
A.	Monthan	38.9	16.7	14	12
B.	Monthan	55.6	36.1	14	16
C.	Monthan	36.1	16.7	15	4
A.	Poovan	11.1	..	..	..
B.	Poovan	22.2	8.3	12	8
C.	Poovan	5.5	..	..	..

The trial is in progress. Yield data will be collected and the trial completed in the present site.

(3) *Manurial trial in wet lands.*—The object of this trial is to find out the value of the different manurial practices by the application of cattle manure, ground-nut cake and ammonium sulphate either singly or as a mixture of any two and to ascertain in general how far the addition of potash or potash and phosphoric acid would contribute to yield. Four months old sword suckers of the Poovan variety were planted during March 1951. A basal dressing of 25 lb. cattle manure was given to all the plants. Half the quantity of the different manurial doses were applied during June 1951 and the other half during September 1951.

The plants were irrigated during the summer months. The drainage channels were deepened and the plants earthed up twice. Only one follower is allowed from the time of flowering.

Up to seven months after planting the analysis of height and girth measurements and leaf counts has not shown significant differences between the treatments. The height measurements taken on 8th November 1951 have shown significant

differences as detailed below, though in the case of leaf counts and girth the differences are not significant (Table X):—

TABLE X.—Manurial trial in wet lands—analysis of height measurements.

Treatments—										Treatments—cont.	
A.	B.	C.	D.	E.	F.	G.	H.	Standard error.	Critical difference (P=0.05)		
Control (No manure).	Cattle manure to supply $\frac{1}{2}$ lb. nitrogen per plant.	Cattle manure to supply $\frac{1}{2}$ lb. nitrogen plus ammonium sulphate to supply $\frac{1}{2}$ lb. nitrogen.	Cattle manure to supply $\frac{1}{2}$ lb. nitrogen plus groundnut cake to supply $\frac{1}{2}$ lb. nitrogen.	Groundnut cake to supply $\frac{1}{2}$ lb. nitrogen plus ammonium sulphate to supply $\frac{1}{2}$ lb. nitrogen.	Cattle manure to supply $\frac{1}{2}$ lb. nitrogen plus superphosphate to give $\frac{1}{2}$ lb. phosphoric acid.	G. Cattle manure to supply $\frac{1}{2}$ lb. nitrogen plus potassium sulphate to give $\frac{1}{2}$ lb. potash.	H. Cattle manure to supply $\frac{1}{2}$ lb. nitrogen plus superphosphate to give $\frac{1}{2}$ lb. phosphoric acid plus potassium sulphate to give $\frac{1}{2}$ lb. potash.			System of layout.—Randomised layout replicated four times with sixteen plants per plot and a guard row all round. A spacing of eight feet between plants was given.	
										Date of planting—8th March 1951.	
										Height measurement.—8th November 1951.	
Particulars.	A.	B.	C.	D.	E.	F.	G.	H.	Standard error.	Critical difference (P=0.05)	
Mean height in c.m.	140.6	173.6	240.9	208.5	213.5	152.6	140.1	153.7	13.9	28.9	
'Z' test—Significant.											
Conclusion—C E D B H F A G											

The analysis of height measurements given above shows that the treatment in which cattle manure is applied to supply $\frac{1}{2}$ lb. nitrogen plus ammonium sulphate also to supply $\frac{1}{2}$ lb. nitrogen per plant is leading the rest except the treatment in which groundnut cake and ammonium sulphate are given to supply $\frac{1}{2}$ lb. nitrogen each per plant. The application of half the quantity of nitrogen either as ammonium sulphate or groundnut cake with the other half as cattle manure has resulted in recording better height measurements than when the whole of the nitrogen on half pound level is applied as cattle manure alone or cattle manure with the addition of superphosphate to supply $\frac{1}{2}$ lb. phosphoric acid or potassium sulphate to supply $\frac{1}{2}$ lb. potash or both.

Differences in leaf counts taken on 8th February 1952 were not significant as shown in Table XI.

TABLE XI.—Manurial trial in wet lands—analysis of leaf counts.

Particulars.	A.	B.	C.	D.	E.	F.	G.	H.	Standard error.	'Z' test.
Mean number of leaves produced.	30.8	33.7	33.2	33.1	33.5	31.1	30.5	31.3	0.58	not satisfied.

Due to the commencement of harvests from February 1952 onwards growth measurements were not comparable after this period.

The progress of flowering and harvest of bunches from the plants under the different treatments up to 30th June 1952 are given in Table XII below. The number of plants under each treatment is sixty-four.

TABLE XII.—Progress of flowering and harvest of plants under the manurial trial

Treatment.	Percentage of plants flowered.	Percentage of plants harvested.	Average weight of bunches.	
			LB.	OZ.
A	48.4	0.8	24	3
B	81.3	40.7	19	7
C	100.0	100.0	34	0
D	96.8	86.0	30	2
E	98.4	90.6	30	3
F	42.2	9.3	23	11
G	36.0	12.5	24	0
H	45.3	15.7	21	5

So far 231 bunches out of 512 are harvested. Though the trial is yet incomplete, the superiority of the treatment, ammonium sulphate to supply $\frac{1}{2}$ lb. nitrogen plus cattle manure to supply $\frac{1}{2}$ lb. nitrogen is clearly indicated with regard to earliness in flowering and fruiting and increased bunch weight.

The trial will be continued till yield data are complete.

(4) *Improvement of perennial area—(a) Desuckering trial.*—This trial was initiated in April 1950 over one acre of perennial banana area in which the four treatments detailed below were replicated six times. Since the area is a mixed plantation planted mainly to Poovan and Monthan varieties of varying ages only an observational trial was laid out making use of the plants existing in the area. The area was given a deep digging during January and five surface diggings. Cattle manure at the rate of 25 lb. per plant was applied during December.

Object.—To devise the optimum desuckering practice.

Treatment.—Four as detailed below:—

- All daughter suckers permitted to grow.
- Removal of all suckers except the first daughter sucker.
- Removal of all suckers except the first and third daughter sucker.
- Removal of all except the one that emerges after the parent plant has flowered.

The first year's yield data have shown that the two treatments restricting the follower to only one sucker per plant lead the other two treatments in total bunch weight. The total weight of bunches harvested from the plants under the different treatments for the first year and from the initiation of the trial up to 30th June 1952 are furnished in Table XIII.

TABLE XIII.—Desuckering trial—Details of harvest.

Treatment.	Harvests during 1950-51.			Harvests up to 30th June 1952.		
	Number of plants harvested.	Total weight of bunches.	Average weight of bunch.	Number of plants harvested.	Total weight of bunches.	Average weight of bunch.
A	49	869	17 12	103	1,721	16 11
B	50	1,012	20 4	94	1,863	19 13
C	50	955	19 16	96	1,764	18 6
D	50	1,233	24 16	87	2,008	23 1

It may be noted from the above table that both in total bunch weight as well as average bunch weight for a period covering two years from the inception of the above trial treatment D, viz., removal of all suckers except the one that emerges after the parent plant has flowered is leading the rest.

Desuckering operations are being systematically done once every fortnight and this observational trial is being continued to the third year.

(b) *Spacing trial.*—The object of this trial is to determine the optimum spacing in perennial plantations. This trial was initiated in April 1951 and is another observational trial with the four treatments, detailed below, replicated only twice. There are eight plots, each having an area of 17.4 cents. The number of plants under each treatment are given below:—

Treatments.	Number of plants.
A. Spacing of clumps to give a spacing of 9 feet ..	186
B. Do. do. 10 feet ..	150
C. Do. do. 11 feet ..	124
D. Do. do. 12 feet ..	104

The details of harvest of the plants under the four treatments, since the inception of the trial are given in Table XIV. The cultural and manurial operations given were similar to those under 'Desuckering trial'. Only one follower per plant was allowed to develop.

TABLE XIV.—Spacing trial—Details of harvest.

Treatment.	Variety.	Number of plants harvested.	Total weight of bunch.				Average weight of bunch.	
			LB.	OZ.	LB.	OZ.	LB.	OZ.
A.	Poovan..	23	336	6	916	6	14	10
	Monthan	40	580	0			14	8
B.	Poovan..	25	417	3	908	6	16	11
	Monthan	29	491	3			16	15
C.	Poovan..	17	243	5	622	1	14	5
	Monthan	26	378	12			14	9
D.	Poovan..	13	186	14	590	6	14	6
	Monthan	24	403	8			16	13

The harvests are in progress. Heavier yields from the closely planted area is indicated during the first year. Only 197 plants out of a total of 564 have been harvested so far. No influence of spacing on the plant characters has been discerned. This is a fresh trial in the perennial area which is proposed to be conducted for a number of years.

(c) *Manurial trial in perennial area.*—The object of this trial is to obtain indications of the value of different manurial practices in perennial plantations. This trial was initiated on 4th June 1951. After allowing for the guard rows, only 56 plots could be demarcated to get seven replications of the eight treatments detailed below. Half the dose of the first application of manures was applied in June-July 1951, and the other half during December-January 1952. The third half-yearly application of manures is in progress. The plants in the guard rows are also receiving the same manurial treatments as in the plots enclosed. The cultural operations were similar to those under the rest of the trials in the perennial area.

Treatments—

- A Cattle manure to supply $\frac{1}{2}$ lb. nitrogen per clump.
 B Do. Do. 1 lb. do.
 C Do. Do. $\frac{1}{2}$ lb. nitrogen per clump plus ammonium sulphate to supply $\frac{1}{2}$ lb. nitrogen.
 D Groundnut cake to supply $\frac{1}{2}$ lb. nitrogen plus ammonium sulphate to supply $\frac{1}{2}$ lb. nitrogen.
 E Cattle manure to give $\frac{1}{2}$ lb. nitrogen plus groundnut cake to give $\frac{1}{2}$ lb. nitrogen.
 F Cattle manure to give $\frac{1}{2}$ lb. nitrogen plus super-phosphate to give $\frac{1}{2}$ lb. phosphoric acid.
 G Cattle manure to give $\frac{1}{2}$ lb. nitrogen plus wood ash to give $\frac{1}{2}$ lb. potash.
 H Cattle manure to give $\frac{1}{2}$ lb. nitrogen plus wood wash to give $\frac{1}{2}$ lb. potash plus superphosphate to give $\frac{1}{2}$ lb. phosphoric acid.

Performance records for the Poovan variety alone are being maintained. In view of the mixed plantations of varying ages the results could not be interpreted statistically. The harvest data for the year ending 30th June 1952 are presented in the Table XV below :—

TABLE XV.—Manurial trial in perennial area—Details of harvest.

Treatment.		Number of plants (Poovan) under the treatment.	Number of plants harvested.	Average weight of bunches.	
				LB.	OZ.
(1)	(2)	(3)	(4)	(5)	
A	24	21	20	1	
B	25	24	16	7	
C	33	31	19	10	
D	27	26	22	3	
E	23	22	19	6	
F	20	19	18	0	
G	40	38	19	8	
H	33	29	21	0	

Being an observational trial it is considered necessary to have the yield data for a number of years before any reliable inference could be drawn.

(d) *Soil culture.*—The object of the trial is to determine the frequency of soil digging in perennial banana plantations. The trial was initiated in January 1951 with seven replications of the four treatments detailed below. A guard row was provided to all the plots. The digging operations as per programme are being given to the various plots on the scheduled dates. The cultural and manurial operations given were similar to those under the 'Desuckering trial'.

Treatments—

- A. Digging once every month.
 B. Digging once in two months.
 C. Digging once in three months.
 D. Digging once in four months.

The details of harvest of the plants under the different treatments are given in Table XVI below. The guard rows were given the same treatment as in enclosed.

TABLE XVI.—Soil culture—Details of harvest.

Treatment.		Number of plants under each treatment.	Number of plants harvested.	Average weight of bunches.	
				LB.	OZ.
(1)	(2)	(3)	(4)	(5)	
A	145	112	16	12	
B	130	75	10	4	
C	138	90	11	6	
D	137	96	14	0	

The trial is in progress. Though it is too early to draw inferences, the results obtained so far indicate that more number of bunches with the highest average bunch weight were obtained from the plots which received digging once every month.

7. *Other crops.*—An area of 2.1 acres were under double crop and 4.45 acres under single crop paddy. The acre yields of paddy obtained are given below :—

	LB.
Adt. 3	2,089
Adt. 20	1,523
Co. 25	3,010

A green manure crop of *Sesbania speciosa* was raised in 3.85 acres of wet land. An average weight of 8,000 lb. per acre of green manure was incorporated for the Samba crop.

An area of 3.5 acres were put under Punjab cotton 216-F. The sowings were done during February-March. So far only 295 lb. of Kapas per acre have been obtained.

8. *Statement of expenditure and receipts.*—The statement of charges and receipts for the year is detailed in Appendix II.

Account of action taken to step up the revenue of the station.—During the year irrigation facilities were provided for the cultivation of bananas in the wet land area by the installation of a 4-inch filter point pump-set inside a well which is capable of giving a continuous supply of 10,000 gallons of water per hour.

In addition, 3.5 acres of single crop paddy area was cropped with Punjab cotton. The revenue of the station has increased from Rs. 6,420-3-0 to Rs. 9,458-8-0 during the year.

CENTRAL BANANA RESEARCH STATION,
 ADUTHURAI,
 30th October 1952.

T. GOPALAN NAYAR,
 Banana Research Officer.

APPENDIX I.

STATEMENT OF RAINFALL FOR THE YEAR 1951-52.

Months.	Week.	1950-51.		1951-52.		Average of ten years.	
		in		in		in	
		Quantity inches.	Number of rainy days.	Quantity inches.	Number of rainy days.	Quantity inches.	Number of rainy days.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>South-west monsoon.</i>							
July	5-11 12-18 19-25	.. .. ..	.. .. ..	2.67	2	0.66 0.19 0.27	0.7 0.6 0.5
July-August	26-1 2-8 9-15 16-22 23-29	1.51 0.07 .. 4.23 0.52	2 3 2	0.65 .. 2.19 .. 1.79	1 .. 3 .. 3	0.67 0.67 0.54 1.31 1.13	1.1 0.6 1.0 1.4 1.5
August-September	30-5 6-12 13-19 20-26	0.35 1.32 0.06 1.52	2 1 .. 3	4.07 0.41 .. 0.23	2 2 .. 1	0.78 1.00 0.52 1.17	1.1 1.6 1.0 1.5
Total ..		9.58	13	12.01	14	8.91	12.6
<i>North-east monsoon.</i>							
September-October	27-3 4-10 11-17 18-24 25-31	2.86 0.80 3.97 1.90 ..	2 1 5 2 ..	1.34 1.61 0.87 0.10 0.63	3 2 2 .. 3	1.64 1.21 1.53 1.86 1.10	1.0 1.7 2.2 2.3 1.8
November	1-7 8-14 15-21 22-28	4.54 1.42 3.78 0.20	3 5 2 1	1.55 1.56 2.25 0.40	4 2 4 1	2.02 2.52 3.19 1.96	1.9 2.8 3.0 2.2
November-December	29-5 6-12 13-19 20-26	 2.16 0.07	 3 ..	2.43 0.15 0.47 ..	3 1 2 ..	2.45 0.76 1.13 0.30	2.2 1.5 1.5 0.8
December-January	27-3 4-10 11-17 18-24 25-31	0.07 0.36 0.06 0.15 ..	.. 2	0.17 0.11 2.93	1 1 2	0.38 0.57 0.21 0.31 0.13	0.8 1.2 0.4 0.4 0.4
Total		22.14	26	16.62	31	23.27	29.0
<i>Hot weather.</i>							
February	1-7 3-14 15-21 22-28	.. .. .. ..	.. .. .. ..	.. .. 1.10 1.04	 1 1	0.02 0.46 0.03 0.03	.. 0.1 0.5 0.1
March	1-7 8-14 15-21 22-28	.. .. .. ..	.. .. .. ..	.. .. .. ..	.. .. .. ..	0.22 0.03 0.04 0.15	0.4 0.1 0.2 0.4
March-April	29-4 5-11 12-18 19-25 26-2 3-9	0.14 0.11 0.19 0.72	1 1 1 2	0.14 0.11 0.17 0.72	1 1 1 2	0.40 0.20 0.27 0.43 .. 0.26	0.9 0.3 0.6 0.3 .. 0.4
April-May	10-16 17-23 24-30	0.16 0.35 1.93	1 1 4	.. 0.22 ..	.. 1 ..	0.96 1.11 0.59	0.8 1.0 0.8
May-June	31-6 7-13 14-20 21-27	0.06 0.09 .. ..	.. .. .. ..	.. .. .. 0.80	 2	0.30 0.06 0.13 0.17	0.5 0.2 0.2 0.5
June-July	28-4	1.60	1	..	..	0.40	0.8
Total ..		5.35	12	4.90	10	6.23	8.8
Grand total ..		37.07	51	33.53	55	38.41	50.4

APPENDIX II.

STATEMENT OF CHARGES AND RECEIPTS OF THE CENTRAL BANANA RESEARCH STATION,
ADUTHURAI, FROM 1ST JULY 1950 TO 30TH JUNE 1951.

[Budget Head—40-G. Agriculture—Agricultural Experiments and Research excluding Post-war Reconstruction—Scheme for the establishment of Central Banana Research Station, Aduthurai.]

Particulars.	Expenditure met by Provincial Government.			Expenditure met by Indian Council of Agricultural Research.			Total.		
	RS.	A.	P.	RS.	A.	P.	RS.	A.	P.
<i>I. Expenditure.</i>									
1 (a) Pay of officers and establishment	5,799	6	1	5,799	6	1	11,598	12	2
(b) Deputation charges	836	14	6	806	14	6	1,613	13	0
2 Dearness allowance	1,798	15	0	1,798	15	0	3,597	14	0
3 Travelling allowance	351	9	6	655	5	6	1,006	15	0
4 Dearness allowance to menials	1,182	4	8	1,182	4	8	2,364	9	4
5 Other Charges—									
(a) Working and plantation expenses	5,978	2	6	5,996	2	6	11,974	5	0
(b) Other contingencies	964	9	5	324	1	4	1,288	10	9
(c) Petty construction and repairs	25	0	0	..			25	0	0
(d) Dead stock	319	12	0	..			319	12	0
Total	17,226	9	8	16,563	1	7	33,789	11	3

II. Receipts.

XXIX. Agriculture—Agricultural Receipts—Miscellaneous.

Total ..	4,729	3 10	4,729	3 10	9,458	7 8
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APPENDIX III.

STATEMENT OF COST OF CULTIVATION OF BANANAS (1951-52).

(Wet land area 86 cents.)

<i>Expenditure.</i>							<i>RS. A. P.</i>
Digging pits, planting and watering	..	..	..	..	..	..	72 6 0
After cultivation forming drains, earthing up, digging with mammutty, applying manures and irrigating	..	..	..	..	..	..	277 10 6
Cost of manures applied	..	..	..	..	..	..	188 12 0
Total ..							538 12 6
<i>Receipts.</i>							
By sale of 598 banana bunches (16,773 lb.) at Re. 0-15-9 per bunch ..							588 10 6
By sale of 500 banana leaves at Re. 0-10-0 per 100	..	..	..	..	..	..	3 2 0
Total ..							591 12 6

**ANNUAL REPORT OF THE CENTRAL BANANA RESEARCH
STATION, ADUTHURAI**

Profit and Loss Account.

	RS.	A.	P.
Total value of produce	591	12	6
Less expenditure	538	12	6
Total ..	53	0	0
Profit per acre *	61	3	0

* The poor profit per acre is due to contract rate which is the rate for all bunches from perennial area and fallen bunches.

NOTE.—Irrigation facilities have been provided during the year for the cultivation of bananas in wet land area. The entire banana area in the station is under various trials. During the year appreciable increase in the total revenue has been achieved, viz., from Rs. 6,420-3-0 during 1950-51 to Rs. 9,458-8-0 during the current year. Deducting the lease value, the expenditure under 'Working Expenses' for the corresponding periods are Rs. 11,674-1-0 and Rs. 9,494-5-0 respectively.

APPENDIX IV.

**A BRIEF HISTORY AND OBJECTS OF THE CENTRAL BANANA RESEARCH STATION,
ADUTHURAI.**

In response to a scheme submitted by the Madras Government, the Indian Council of Agricultural Research sanctioned a five-year scheme for research on bananas. It was decided that the Central Station for banana research should be in Madras State, which leads with an estimated area of 168,700 acres under this crop. The opening of two sub-stations, one in Bombay State and the other in West Bengal was also sanctioned by the Council. In G.O. Ms. No. 6241, Development, dated 16th February 1948, an expenditure of Rs. 1,75,256 spread over a period of five years to be incurred on a 50 per cent basis by the Provincial Government and the Indian Council of Agricultural Research was sanctioned by the Government in addition to the provision of Rs. 13,400 exclusively by the Provincial Government towards buildings, fencing, etc.

2. The site for the Central Station was selected at Aduthurai in Tanjore district, in a representative banana area noted for perennial banana culture. The area comprising a single block of 27.92 acres is situated within half a mile of the town, on the northern side of the Kumbakonam-Mayavaram main road touching it. It is a fairly fertile strip between the Cauvery and Veeracholan rivers, giving facilities for the cultivation of bananas under three distinct soil types, viz., perennial banana area on paduga lands, wet land area and a small block of high lying area which could be successfully cropped with banana under irrigated conditions. This land belonging to the Thiruvaduthurai mutt was taken possession of on 29th June 1949.

3. The object with which the station is started is to effect improvement of the banana crop by undertaking research on the varietal, propagational, cultural and manurial aspects of the crop. Work in connexion with the classification and varietal studies are also programmed. A Systematic Botanist to deal specially with this subject has also been appointed in June 1950.

4. The soil of the station is fairly representative of the delta region with sharp variations in certain parts. While the small block of high-lying area is rather sandy, the adjoining wet land blocks have shallow loamy surface soil with heavy clay at depths varying from 2 to 10 feet or more. The soil in the perennial area is mostly clay loam, very sticky when wet. The cultural operations practised in the perennial plantations are restricted to about eight to ten diggings a year. At the time of digging, desuckering is done allowing only one follower per parent plant. A system of mattocking is also practised, the mother plant after harvest is cut at the top just below the leaf bases and allowed to remain in the clump till the next digging, when it is cut and incorporated in the soil. The prunings and mattocked pseudo-stems are buried simultaneously at the time of digging. Manuring is not generally adopted. All the manure available is applied to the paddy crop. Very few apply cattle manure at the time of digging just prior to the commencement of the north-east monsoon. Poovan and Monthan are the two main varieties cultivated. In perennial plantations, the main seasons of harvest is during November-January when about 60 per cent of the bunches are cut. There is good trade for Poovan bunches during this season and a net income of Rs. 400 per acre of perennial banana is about the average for the past few years.

**ANNUAL REPORT OF THE AGRICULTURAL RESEARCH STATION,
AMBALAVAYAL, WYNAAD COLONIZATION SCHEME, FOR THE
YEAR 1951-52.**

Season and Rainfall.—The rainfall recorded during the year was 77.56 inches distributed over 155 days, as against a rainfall of 88.66 inches recorded on 161 days in the previous year.

The south-west monsoon was far below normal in 1951. The north-east monsoon was slightly above normal and the rain was fairly well distributed and continued till the end of November. The hot-weather rains were far below normal and there was a long period of drought from December 1951 to April 1952, except for a rainfall of 1.92 inches in the last week of February 1952. Due to the poor rainfall during the hot weather and in the month of June 1952, there was scarcity for water in the tank for preparing the land for paddy nursery and paddy transplanting. The poor rainfall in June 1952 resulted in poor flush and spike production of pepper. The rainfall in February 1952 and in April and May 1952 was conducive for the development of a good crop of coffee.

The weekly rainfall during 1950-51 and 1951-52 and the average weekly rainfall for the past five years are given in Table I.

TABLE I.—Monthly rainfall data for the year 1950-51 and 1951-52.
Agricultural Research Station, Ambalavayal.

Month.	Week.	1950-51.		1951-52.		Average for past five years.
		Rainfall.	Days.	Rainfall.	Days.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
South-west monsoon.						
June	7-13	0.63	5	6.37	7	2.67
	14-20	1.05	7	1.98	5	3.18
	21-27	2.68	5	1.16	6	4.31
June-July	28-4	1.11	4	0.53	5	3.48
	5-11	5.27	6	0.48	4	4.79
	12-18	5.27	7	3.98	7	7.48
July-August	19-26	12.44	7	12.21	7	6.10
	26-1	10.75	6	5.75	5	4.23
	2-8	3.62	7	2.63	7	5.30
August-September	9-15	4.11	7	1.10	4	4.07
	16-22	2.82	5	1.17	3	3.76
	23-29	0.46	6	1.74	6	3.61
Total	30-5	1.97	7	0.46	2	1.97
	6-12	3.52	7	0.35	4	1.89
	13-19	1.23	5	2.75	3	1.23
	20-26	0.86	3	4.44	6	1.48
		57.79	94	46.79	83	59.55
North-east monsoon.						
September-October	27-3	2.36	5	5.94	7	1.47
	4-10	1.31	6	2.94	4	1.54
	11-17	1.41	5	3.94	5	2.58
November	18-24	0.53	1	1.34	3	1.78
	25-31	..	..	0.20	3	0.93
	1-7	2.67	4	4.23	3	1.85
November-December	8-14	4.45	4	0.24	2	1.96
	15-21	0.04	2	0.59	3	0.61
	22-28	..	..	1.95	2	0.28
Total	29-5	..	..	0.28	1	0.41
	6-12	..	..	..	..	0.16
	13-19	0.15	3	..	..	0.18
	20-26	0.11	1	..	..	0.13

Month.	Work.	1950-51.		1950-52.		Average for past five years	
		Rainfall.	Days.	Rainfall.	Days.		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	
North-east monsoon—cont.							
December-January	..	27- 3	..	..	..	..	
		4-10	..	..	..	0.02	
		11-17	0.09	1	..	0.01	
		18-24	..	..	0.09	1	0.24
		25-31	..	..	..	..	0.16
February ..	..	1- 7	..	..	..	0.06	
	..	8-14	0.17	1	0.06	1	0.04
	..	15-21	..	..	..	0.07	
		Total ..	13.29	33	21.80	35	14.56
Hot-weather monsoon.							
February-March	..	22-28	..	..	1.92	4	0.31
March-April	..	1-7	..	..	..	..	0.16
	..	8-14	..	..	..	..	0.23
	..	15-21	..	..	..	..	0.52
	..	22-28	0.01	1	..	..	0.21
April-May	..	29-4	2.87	3	0.38	1	1.39
	..	5-11	0.56	2	0.42	4	1.00
	..	12-18	2.83	5	0.42	2	2.06
	..	19-25	0.36	2	0.15	3	1.25
	..	26-2	1.63	3	2.01	5	1.56
May-June	..	3-9	0.43	3	1.36	5	1.50
	..	10-16	2.89	3	2.56	5	1.67
	..	17-23	0.53	3	0.28	5	1.23
	..	24-30	2.65	4	..	..	1.36
	..	1-7	3.82	5	1.16	1	3.62
		Total ..	18.58	34	10.66	33	18.47
Grand total		..	89.66	161	79.25	151	92.58

2. Crops—I. Paddy—(a) Monthly planting trial.—To determine the optimum season for transplanting paddy and the strains and varieties suitable for transplanting in the different months, ten strains and varieties, 2801, MTU. 3, MTU. 19, SLO. 17, GEB. 24, Palthondi, Marathondi, Velumpala, Kothandan and Chettuvaliyan were transplanted in the months of June, July, August, September and October 1951. The transplanting was done on the 15th of every month and each strain or variety was transplanted in strips 40 square yards in area, in each month. The sowing of the nurseries was so adjusted that the seedlings transplanted in each month were of the same age. The duration from sowing to flowering and maturing of grain, yield, etc., in respect of each of the above ten strains and varieties transplanted in each of the five months from June 1951 to October 1951 were recorded. The data regarding duration and yield recorded are given in Table II.

TABLE II.													
Serial number and strain or variety.				June.		July.		August.		September.		October.	
				D	Y	D	Y	D	Y	D	Y	D	Y
1	2801	..	..	142	2,299	143	2,239	133	789	129	424	159	121
2	MTU. 3	..	..	147	2,178	153	1,936	155	787	152	303	..	..
3	MTU. 19	..	..	223	4,598	200	3,932	183	2,269	172	908	174	182
4	SLO. 17	..	..	223	5,682	199	4,114	184	2,360	174	605	178	303
5	GEB. 24	..	..	211	3,509	195	4,023	180	2,722	172	726	175	242
6	Palthondi	..	..	167	1,674	155	3,146	150	1,876	148	545	165	62
7	Marathondi	..	..	202	3,025	184	3,751	165	3,388	171	1,089	164	726
8	Velumpala	..	..	218	2,118	202	3,267	185	2,541	178	726	176	363
9	Kothandan	..	..	220	4,180	205	3,811	188	3,146	171	1,331	161	1,210
10	Chettuvaliyan	..	..	232	5,203	205	4,533	189	3,388	176	1,089	168	1,089

NOTE.—'D' = Duration in days. 'Y' = Yield per acre.

The crop of MTU. 3 transplanted in October completely failed to make any growth due to heavy incidence of *Piricularia* and *Helminthosporium*.

From the data it is found that almost all the strains and varieties have recorded the best yields in June and July transplanting and very much lower yields in August. However, in the trials in the previous year, the yields recorded in the August transplanting were higher than in June and July transplanting in the case of some of the varieties.

From the data in respect of duration, it is found that the duration of all the long duration types decreases when those are planted later in the season. In the case of short duration type, 2801, it is found that, while the duration is less in the transplantings in August and September compared to that in the earlier transplantings, it is more in the October transplanting than in all the earlier transplantings. In the case of MTU. 3, the duration is found to increase in the later transplanting compared to the June transplanting. In respect of *Palthondi* (a local short duration variety), it is found that the duration in the October transplanting is about the same as in June transplanting, while that in July, August and September transplantings is less in the later than in the earlier transplantings.

The yield is very low in the September and October transplantings in the case of all the strains and varieties.

From the data recorded from the trial during the year and in the previous year, the following inferences have been drawn:—

(i) That September and October transplantings will result in comparatively very low yields and that most of the strains and varieties are almost completely unsuited for transplanting in these months.

(ii) That the most suitable varieties for transplanting later in the season, in the months of August, September and October are the local varieties *Marathondi*, *Kothandan* and *Chettuvaliyan*.

(iii) That the duration of all the longer duration types decreases, if the transplanting is done later in the season.

The above trial is being carried out in the next year also for confirming the inferences already drawn.

(b) Trial of different varieties; strains and types.—Nine strains, types and varieties of paddy were put under trial each in 5 cent plots to compare the performance of these and to select those that can be popularised in Wynaad, after further trials. The details of the different strains, varieties and types put under trial and the data in respect of duration and yield recorded are given in Table III.

TABLE III.

Date of sowing—7th May 1951.
Date of planting—11th June 1951.
Area—0.05 acre each.

Serial number and strain, type or variety.						Duration in days.	Acre yield in lb.
1 2801 ..	..	..	..	..	..	142	1,500
2 MTU. 3 ..	..	..	..	..	..	145	1,620
3 T. 2201 ..	..	..	..	..	..	168	1,860
4 T. 2203 ..	..	..	..	..	..	156	1,620
5 T. 2191 ..	..	..	..	..	..	243	2,100
6 SR. 26. B. ..	..	..	..	..	..	175	2,560
7 Mankora ..	..	..	..	..	..	205	2,300
8 Jeerakasala ..	..	..	..	..	..	200	1,740
9 Kotakuvaliyan ..	..	..	..	..	..	213	2,460

The trial indicates that the strain SR. 26. B, which recorded the highest yield, is suited for popularisation in Wynaad. The Kenya variety *Mankora* was found to be suited for cultivation in Wynaad, as it recorded very much higher yield than the local fine variety, *Jeerakasala*. The Siamese type 2201 was found to give an acre-yield of 380 lb. within three months of the first harvest, if the stubbles are allowed to ratoon. There was indication that the Siamese type 2191 may prove

suitable for late planting in the tract, on account of its very long duration habit. The Siamese types T.2191, T.2201 and T.2203, the strain SR. 26.B and the variety *Mankora* were found to be non-lodging types.

Further trials with SR. 26.B, Siamese types 2201, 2203 and 2191, *Mankora* and *Jeerakasala* along with GEB. 24 and 'Puncha' (a recently introduced short duration type) are proposed to be carried out during the ensuing year.

(c) *Bulk trial of selected cultures of local paddy varieties.*—The selected cultures of the six local varieties and the strains SLO. 17 and MTU. 19 were grown in a total area of 14.78 acres for multiplying the seed for distribution. In addition the bulk seed of *Palthondi*, *Marathondi* and *Velumpala* were grown in an area of 7.42 acres and *Kothandan* culture No. 517 was grown broadcast in an area of 0.82 acre. The details of the cultures, strains, etc., grown and the yield and other data recorded are given in Table IV.

TABLE IV.

Culture or strain.	Date of planting.	Area in acres.	Duration in days.	Acre yield in lb.	Remarks.
<i>Palthondi</i> 9114	29th May 1951.	1.36	179	2,470	..
<i>Marathondi</i> 8948	20th June 1951.	0.71	190	2,745	..
<i>Velumpala</i> 8393	10th July 1951.	0.83	196	2,753	..
<i>Kothandan</i> 517	25th July 1951.	3.11	200	1,810	Marshy land.
<i>Maranellu</i> 881	6th Aug. 1951.	2.32	189	1,562	Do.
<i>Chettuvaliyan</i> 8939	14th Aug. 1951.	2.16	193	1,390	Do.
SLO. 17	23rd June 1951.	2.26	210	2,924	..
MTU. 19	28th June 1951.	2.03	208	2,643	..
<i>Palthondi</i> (bulk)	21st May 1951.	1.35	162	1,787	..
<i>Marathondi</i> (bulk)	7th June 1951.	3.49	196	2,203	..
<i>Velumpala</i> (bulk)	16th July 1951.	2.58	201	2,445	..
<i>Kothandan</i> 517 } (Broadcast) }	9th Aug. 1951.	0.82	157	1,655	Marshy land.

The best yield during the year was recorded by SLO. 17. The selected cultures of *Palthondi*, *Marathondi* and *Velumpala* have recorded very much higher yield than the bulk seed of these varieties. The selected cultures of the varieties *Kothandan*, *Chettuvaliyan* and *Maranellu* have recorded only comparatively low yields, as these were transplanted only very late in the season due to limited availability of labour for transplanting, and as the area where these were transplanted was marshy and of low fertility.

The selected cultures of the six local varieties were put under district trial in the taluks of Wynaad and Gudalur and these have recorded 10 per cent to 30 per cent increased yield over the local bulk seed.

(d) *Evolving a high yielding and superior strain of local Jeerakasala by selection.*—With a view to evolve a high yielding, superior strain of the local *Jeerakasala*, 6,000 single seedlings, of this variety were transplanted giving a spacing of 1 foot between seedlings both ways. From these 145 promising seedlings were selected and the seeds of these selected seedlings were collected separately for further trials and selection during the ensuing years.

The seedlings of each of these 145 selections made during the year were transplanted in single lines by the end of the year under report.

(e) *Second crop.*—An area of 2,965 acres which could be easily irrigated from the tank was grown to a second crop of paddy. The strains and varieties

put under trial were *Palthondi*, local *Navara*, MTU-3, Co-13 and a recently introduced variety known as *Mangalore Puncha*. The details of the strains and varieties grown and the data on duration, yield, etc. of these are given in Table V.

TABLE V.

Variety or strain.	Area in acres.	Date of planting.	Duration in days.	Acre-yield in lb.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)
<i>Palthondi</i>	1.51	23rd November 1951.	164	993	Transplanted.
<i>Palthondi</i>	0.325	23rd January 1952.	156	951	Do.
<i>Navara</i>	0.30	31st October 1951.	136	370	Broadcast.
MTU-3	0.07	4th December 1951.	184	329	Transplanted.
MTU-3	0.18	14th January 1952.	133	961	Broadcast.
Co-13	0.13	14th January 1952.	124	662	Do.
<i>Vella puncha</i>	0.10	14th January 1952.	125	1,280	Do.
Co-13	0.35	10th December 1951.	152	629	Transplanted.

From the trial, it is found that the recently introduced variety *Vella Puncha* is suited for cultivation in the second crop season in January, as this variety has recorded high yield than all the other strains and varieties put under trial. It is also found, that broadcasting MTU-3 and Co-13 in January is better than transplanting these in December as the broadcast crops of these, sown in January have recorded higher yields than the December-transplanted crops.

It is therefore proposed to put this variety 'Vella Puncha' under comparative trial with *Palthondi*, MTU-3, Co-13 and PTB. 10 during the second crop season in 1952-53, and to multiply the seed of this variety for distribution in the tract for second crop.

II. *Dry paddy.*—Five *Punnam* paddy varieties, namely, *Thuthukayama*, *Palian*, *Chemmalu*, *Kozhivalan* and *Vellarian* were put under trial in two-cent plots, each, during the year. These failed completely due to severe *Piricularia* and *Helminthosporium* attack. Among these five varieties, the variety 'Palian' was found to be comparatively less affected by the fungus diseases than the other four varieties.

Four dry-paddy varieties from Araku Valley, namely, *Battadam*, *Kabiri*, *Kudisari* and *Moumachi* were put under trial. The seeds were sown rather late in the season, viz., on 14th June 1952. The germination and the growth of all the four varieties were very poor. The variety *Moumachi* failed completely, while the variety *Battadam* indicated comparatively better suitability for the tract than the others.

III. *Fruits.*—(a) *Mandarin orange.*—(1) *Cultural trial on mandarin orange seedlings.*—The one hundred and forty-four seedlings of a single scion tree planted in June 1951, established without any casualty. These seedlings were given each of the following six treatments, as detailed below. Two rows with twelve plants in each row, were selected for each treatment.

Details of treatment—

(i) *Control.*—No soil disturbance round the plants was given, but the weed growth round the plants to a diameter of 6 feet was cut back in November 1951 and June 1952.

(ii) *Digging.*—The ground round the plants to a diameter of 6 feet was dug to a depth of 4 inches in November 1951 and in June 1952.

(iii) *Cover crop.*—A cover crop of *Calapogonium* was grown round the plants to a diameter of 6 feet in April 1952.

(iv) *Mulching*.—The ground round the plants to a diameter of 6 feet was given a mulch of leaves about 4 inches in thickness throughout the year.

(v) *Manuring and digging*.—The plants were manured with 50 lb. cattle manure, 1 lb. ammonium sulphate, $\frac{1}{2}$ lb. superphosphate and 2 lb. wood-ash per plant in November 1951 and again in June 1952 and given a light digging to incorporate the manures.

(vi) *Manuring, digging and mulching*.—The plants were manured with 50 lb. cattle manure, 1 lb. ammonium sulphate, $\frac{1}{2}$ lb. superphosphate and 2 lb. wood-ash per plant in November 1951 and again in June 1952 and given a light digging to incorporate the manures, while a mulch of leaves round the plants to a diameter of 6 feet and about 4 inches in thickness was maintained throughout the year.

The growth measurements of all the plants in all the six treatments were recorded on 21st March 1952. The mean girth and height measurements of the plants in the six treatments are given in Tables VI-A and VI-B respectively.

TABLE VI-A.

Treatments.	Number of plants.	Mean girth at planting (cm.).	Mean girth on 21st March 1952 (cm.).	Mean increased girth (cm.).
(1)	(2)	(3)	(4)	(5)
1 Control	24	2.33	3.07	0.74
2 Digging only	24	2.20	3.62	1.42
3 Cover crop	24	2.35	2.97	0.62
4 Mulching	24	2.30	3.51	1.21
5 Manuring and mulching	24	2.55	3.46	0.91
6 Manuring, mulching and digging	24	2.38	3.99	1.61

TABLE VI-B.

Treatment.	Number of plants.	Mean height at planting (cm.).	Mean height on 21st March 1952 (cm.).	Mean increase in height (cm.).
(1)	(2)	(3)	(4)	(5)
1 Control	24	51.70	60.35	8.65
2 Digging	24	45.20	67.30	22.10
3 Cover crop	24	55.30	59.80	4.50
4 Mulching	24	52.10	62.00	9.90
5 Manuring and digging	24	60.30	73.70	13.40
6 Manuring, digging and mulching	24	57.50	72.80	15.30

NOTE.—The planting was done on 21st June 1951.

From the data and observations recorded during the year; it is found that the plants in the manuring and digging and in the manuring, digging and mulching treatments have made very much better growth than the plants in all the other four treatments. The plants in the control (no soil disturbance) and in the cover crop treatment have made the least growth compared to the plants in the other four treatments.

It was observed during the year that plants in the treatments (i) and (iii), above, wilted very badly during the dry months, from December to April, while the plants in the other treatments withstood the drought very well and did not at all wilt.

From the data in respect of the height of the plants in the lower half of the rows and that of the plants in the upper half of the rows in all the six treatments, it is found that the plants in the lower half of the rows of all the six treatments have made very much better growth than the plants in the upper half of the rows of the respective treatments. The height data of the plants in the lower half of the rows and in the upper half of the rows of all the six treatments are given in Table VII.

TABLE VII.

Treatment.	Number of plants.	Mean height of the plants in the lower half in Cm.	Mean height of the plants in the upper half in Cm.
(1)	(2)	(3)	(4)
1 Control	12	64.00	56.70
2 Digging	12	71.00	63.50
3 Cover crop	12	61.60	58.00
4 Mulching	12	61.00	60.00
5 Manuring and digging	12	80.70	66.70
6 Manuring, digging and mulching	12	80.00	65.30

NOTE.—The rows run along the slope of hillock and the planting is done on contour. Each treatment consists of two rows along the slope.

From the above data, there is indication that the lower portions of hillocks is to be preferred for planting mandarin orange seedlings than the higher portions.

(2) *Trial to compare the orchard performance of mandarin budded plants and seedlings*.—The seedlings and budded plants of mandarin orange on rough lemon rootstock of a single scion tree raised in January 1951 were planted out on 26th June 1952 for this trial. Thirty-two each of budded plants and seedlings were planted in the A B A method of layout, with four plants in each treatment and eight replications of each, and the necessary guard-rows for the trial was also provided.

It is found that the budlings, budded on the same date on which the seeds of the scion tree were sown for raising seedlings, have made better growth than the seedlings in the nursery beds.

(3) *Rootstock trial of mandarin orange*.—The rootstock trial of mandarin orange was planted out on 30th June 1952. Six budded plants of mandarin orange on each of rough lemon, sweet orange, marmalade orange, kitchili and Wynaad country orange and six seedlings of the same scion tree of the budded plants were planted out in six rows, with one budling on each of the five rootstocks and one seedling in each row.

From the growth of the plants in the nursery, it is found that the budlings on rough lemon rootstock have made better growth than the budlings on the other rootstocks and the seedlings. The budded plants on the other four rootstocks also have made better growth than the seedlings, in the nursery beds.

The growth measurements of all the plants in the trial have been recorded immediately after planting.

(4) *Budding trial of mandarin orange on different grades of rough lemon rootstock*.—With a view to determine the optimum size of rough lemon rootstock for budding mandarin orange a budding trial with five grades of rough lemon rootstock, with bud-wood selected from a single scion tree, was carried out in February and March 1952. The five different grades of rootstock were as under:—

Grade I with a diameter ranging from 0.75 cm. to 1.00 cm.	
Grade II	1.01 cm. to 1.25 cm.
Grade III	1.26 cm. to 1.50 cm.
Grade IV	1.51 cm. to 1.75 cm.
Grade V	1.76 cm. to 2.00 cm.

The 'take' data in respect of the trial are given in Table VIII.

TABLE VIII.

Particulars of grade of rootstock.	Number budded.	Percentage of 'take'.
I (0.75 cm. to 1.00 cm.)	90	53.3
II (1.01 cm. to 1.25 cm.)	90	47.7
III (1.26 cm. to 1.50 cm.)	66	39.5
IV (1.51 cm. to 1.75 cm.)	50	36.0
V (1.76 cm. to 2.00 cm.)	50	25.0

From the 'take' data recorded above, it is evident that rough lemon rootstock with a diameter range of 0.75 cm. to 1.25 cm. is to be preferred for budding mandarin orange for increased 'take', instead of rootstocks with a greater diameter.

(5) *Budding trial with different kinds of rootstocks.*—During the months of December 1951, January 1952, March 1952 and April 1952, budding trials of mandarin orange on four kinds of rootstocks, namely rough lemon, sweet orange, sour orange and kitchili were carried out with bud-wood selected from a single scion tree. The data in respect of the trial are given in Table IX.

TABLE IX.

Rootstock.	Months of budding.							
	December 51.		January 52.		March 1952.		April 1952.	
	Number budded.	'Take.'	Number budded.	'Take.'	Number budded.	'Take.'	Number budded.	'Take.'
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Rough lemon ..	24	16.6	10	60	30	56.6	30	50
Sweet orange ..	24	16.6	10	10	55	54.5	30	50
Sour orange ..	24	..	10	..	55	63.6	30	26.6
Kitchili ..	24	..	10	..	30	50.0	30	6.6

From the data it is evident that the 'take' is better on rough lemon, and sweet orange than on sour orange and kitchili.

(b) *Bulk plantations.*—The individual tree yields of the 146 mandarin orange trees in the old garden (about thirteen years of age) were recorded. The total yield during the year was 29,707 fruits weighing 7,653 lb. as against an yield of 46,588 fruits weighing 11,610 lb. in the previous year. The yield all over Wynaad during the year was only about 50 per cent of that of the previous year. The yield of the 146 trees in the old garden from 1949 to 1951 is given below:—

Year.	Number of fruits.	Weight of fruits. Lb.
1949	24,891	6,433
1950	46,588	11,610
1951	29,707	7,653

The entire crop on the trees was auctioned for Rs. 750 during the year as against Rs. 500 obtained in the previous year.

The progress of the trees in the 1947 plantation is satisfactory and 180 seedlings have flowered in March 1952. The 507 seedlings and forty-six budded plants, planted along contour, in an area of 13.00 acres, in 1950 are making satisfactory growth. These plants, the basins of which were mulched with leaves in November-December, were found to withstand the drought from December to April very satisfactorily.

(c) *Pineapple*—(1) *Trial on the effect of phytohormones in extending the bearing season of pineapples.*—(a) *Object.*—To find out if application of phytohormones like planofix to pineapple plants will result in extending the bearing season of pineapple.

(b) *Method.*—Four hundred slips of 'kew' variety were planted in May 1951. The application of alphanaphthalene acetic acid had to be commenced fourteen months after planting. The slips planted for the trial were severely affected by mealybug and most of the plants died by May 1952. Consequently, four hundred and twenty suckers of 'kew' of uniform age and size were planted in June 1952 and the application of alphanaphthalene acetic acid will be commenced in June 1953.

(2) *Mulching trial.*—The trial which was initiated in May 1951, to determine, if pineapple can be grown economically by providing a mulch of leaves and grass to control weed growth instead of periodical weeding to control

the weed growth, indicated that growing pineapple with a mulch of leaves and grass is less economical than growing pineapple giving periodical weeding. On account of white ant attack of the mulch, it was necessary to renew the mulch very often. It was, however, found that the plants in the mulched plot are more vigorous than those in the unmulched plot and that the mean size of the fruits in the mulched plot is about 0.25 lb. more than that of the fruits in the unmulched plot.

(3) *Trial on the effect of removal of suckers and slips till the plant crop is harvested on the fruit size.*—In August 1951, the above trial was initiated. One hundred and ninety-two suckers of fairly uniform age and size were planted adopting the A B B A method of lay out, with twelve plants in each treatment, and each treatment was replicated eight times. The suckers have made satisfactory growth till the end of the period under report. But none of the plants have developed fruit or suckers so far. As and when the suckers and slips develop on the plants, in the plots for the 'desuckering' treatments, these would be removed till the fruits on these plants mature, whereas the suckers and slips on the plants in the other plots would be allowed to develop even before the fruits mature, and the weight of the individual fruits from the two different treatments recorded for comparison.

(4) *Cultural and manurial trial of pineapple to determine the optimum cultural and manurial practice.*—A complex cultural and manurial trial on pineapple was laid out and planted in April 1952. The treatments in the trial consist of the combination of four cultural and five manurial treatments, as detailed below.—

Cultural treatment—

- (i) One weeding and earthing up.
- (ii) Two weedings and earthing up.
- (iii) Three weedings and earthing up.
- (iv) Four weedings and earthing up.

Manurial treatment—

- (i) Basal dressing of 2.5 lb. of cattle manure per plant.
- (ii) Basal dressing of cattle manure and 0.25 lb. superphosphate per plant six weeks after planting.
- (iii) Basal dressing of cattle manure and 0.50 lb. of wood-ash per plant six weeks after planting.
- (iv) Basal dressing of cattle manure and 0.25 lb. ammonium sulphate per plant six months after planting.
- (v) Basal dressing and 0.25 lb. each of ammonium sulphate and superphosphate per plant six weeks after planting, and 0.50 lb. of wood-ash per plant eight weeks after planting.

Each treatment consists of twelve plants and the necessary guard-rows have also been provided between each treatment. The crop is on the ground.

(5) *Comparative trial of different kinds of planting material of pineapple.*—With a view to compare the performance of suckers, slips, from the fruit stalk and slips from the base of the fruits, an observational trial with one hundred each of the three kinds of planting material was started in May 1952.

(6) *Bulk planting.*—To extend the area under pineapple for multiplying plants for distribution, an area of 0.50 acre was planted to 1,440 suckers of 'kew' and 740 suckers of 'Mauritius' in May 1952.

From the plantation of pineapple planted as an intercrop with other fruit and spice plants, in 1948 and 1950 in an area of 4 acres, 1,633 fruits of 'kew' and 270 fruits of 'Mauritius', weighing 4,112 lb. and 291 lb., respectively, were harvested.

(d) *Trial of different kinds and varieties of fruits*—(1) *Sathgudi orange.*—The ninety-two budded plants of Sathgudi orange, planted in 1947 have recorded an average height of about 200 cm. During the year, twenty-one trees developed a crop of 267 fruits weighing 71 lb. The fruits, though juicy and of good colour and flavour, were rather acidic. In March 1952, fifty-nine trees flowered and thirty-three of these have developed a moderate crop of fruits.

(2) *Acid lime*.—Out of the twenty-eight budded plants of acid lime on rough lemon rootstock planted in 1947, only thirteen plants have made satisfactory growth, and the rest are stunted in growth and sickly. During the year, 378 fruits became available for harvest from eleven plants. All the twenty-eight plants have flowered in March 1952 and developed a moderate crop of fruits.

The two hundred seedlings, planted in June 1950, have made satisfactory growth, and eight of these came into flower for the first time, about thirty-one months from raising the seedlings, and these have developed a few fruits.

(3) *Malta lemon*.—The eighteen rooted cuttings of Malta lemon planted in 1946 gave an yield of 2,635 fruits during the year, bringing the total number of fruits harvested from 1948, from these plants to 8,950. The maximum number of fruits harvested from a single plant so far is 990.

From the eighteen rooted cuttings planted in 1947 and 1948, in a less favourable site than the above plants; one thousand three hundred and seventy-six fruits have been harvested till the end of the year under report.

The 200 rooted cuttings planted in June 1950 in a compact block have made satisfactory growth; and five of these plants came into flower and fruit in January 1952.

(4) *Other lemon varieties*.—The eleven rooted cuttings of Seville lemon planted in August 1949 have made good growth. Twenty-four fruits became available for harvest from four plants during the year. All the plants have developed a moderate crop of young fruits by the end of the year. The fruit of this variety is found to be longer and of better quality than Malta lemon. To extend the area under this fruit, thirty rooted cuttings were planted in August 1951, and these have made very satisfactory growth.

In August 1951, twenty rooted cuttings of Nepali Oblong, six of Villa Franca, four of Lisbon, five of Sicily and three of Nepali Round were planted. Of these, only eighteen of Nepali Oblong, two of Villa Franca, three of Lisbon, two of Sicily and two of Nepali Round have survived. The plants of Nepali Oblong and Lisbon have made better growth than those of other varieties.

(5) *Mangosteen*.—The four mangosteen seedlings planted in 1947 have grown to a height of about 2.5 feet and developed lateral shoots. Out of the forty seedlings planted in 1950 only sixteen have survived and the growth of these is satisfactory. In July 1951, fifty seedlings obtained from Taliparamba were planted and twenty-four of these have survived the first summer after planting.

From observations, it is found that, if proper shade is provided for the plants and the plants are periodically watered and the basins kept mulched during the dry season, it would be possible to grow this plant successfully in Wynaad.

(6) *Avocado pear*.—The six seedlings planted in 1947, the seven planted in 1949 and eight planted in 1950 have made very good growth. Three seedlings were planted in July 1951 and these are also making satisfactory growth. From observations, it is found that this fruit can be grown in Wynaad successfully even without any irrigation or watering during the dry season.

(7) *Durian*.—Eight, out of the twenty-five seedlings planted in 1950 are surviving at the end of the year under report, and these have made satisfactory growth. Twenty-five seedlings were planted in July 1951 and seven of these have survived the first summer after planting. The growth of these plants also is satisfactory.

(8) *Litchi*.—The six litchi seedlings planted in 1947 have made very good growth, and from the growth and vigour of the plants, there is indication that this fruit may prove suitable for this tract.

(9) *Langsat*.—The seven seedlings planted in 1950 are making satisfactory growth. In July 1951, twelve seedlings were planted, and eleven of these have survived.

(10) *Annonas*.—The five seedlings of cherimoyer planted in July 1950 have made very good growth. The ten bull's heart seedlings planted in July 1950 have grown well. In July 1951, six seedlings of bull's heart were planted. The six seedlings of custard apple planted in July 1950 are making satisfactory growth

and one of these came into flower in June 1952. In July 1951, six more seedlings were planted.

(11) *Singapore jack*.—The five seedlings of Singapore jack planted in 1948 have made only poor growth, the average height of the plants being 2 feet.

(12) *Queen'sland nut*.—Five seedlings planted in 1950 have made good growth, while one is stunted in growth.

(13) *Passion fruit*.—The passion fruit vines planted in 1947-48 have become unproductive, and only very few fruits were harvested from these vines during the year. The vines planted in 1950 and 1951 have made very good growth, and from seventy-eight vines planted in 1950, during the year, 960 fruits weighing sixty-nine lb. were harvested. From observations on this fruit, it is found that it should be trained on pandals or trellis for satisfactory growth and production of fruits and that allowing the vines to trail on the ground results in very poor production of fruits. It is also found, that the production of fruits is poor when the vines are over four years old.

(14) *Rose apple*.—The five roseapple, planted in 1947 have made very good growth and these have started producing fruits. The Eight Malayan roseapple planted in 1947 have grown well, but the growth is less than that of rose-apple and these plants have not started flowering.

(15) *Bread fruit*.—Seven plants of seedless bread fruit were planted in July 1951, and these have made satisfactory growth during the year.

(16) *Banana*.—One hundred suckers of banana '*Virupakshi*' and 85 of banana '*Sirumalai*' were planted in July 1951 to assess the suitability of these for popularizing in Wynad. The former has made better growth than the latter. But none of the suckers of both the varieties has thrown bunches even eleven months after planting.

From the size of the bunches of the different varieties recorded during the year, it is confirmed that the varieties '*Gros Micheal*', '*Mauritius*', '*Pedda Pacha Aratti*', '*Pacha Nadan*', '*Suganthi*', '*Chenkadali*', '*Mannan*', '*Mysore poovan*' and '*Nendran*' are the most suited for popularization in Wynad. To extend the area under these varieties for making available suckers for distribution, the undermentioned suckers were planted during the year:—

	NOS.
1 Gros Micheal	78
2 Pedda Pacha Aratti	20
3 Mauritius	48
4 Pacha Nadan	15
5 Suganthi	15
6 Chenkadali	75
7 Nendran	154
8 Kothabontha	15
9 Peyladan	15

(e) *Nursery work*.—During the year, the undermentioned fruit and other plants were raised for distribution:—

	NOS.
Mandarin orange budded plants	980
Mandarin orange seedlings	9,059
Acid lime seedlings	3,100
Malta lemon rooted cuttings	2,000
Rough lemon seedlings	20,000
Sour orange seedlings	2,200
Kitchili seedlings	800
Seville lemon rooted cuttings	90
Pineapple suckers	3,750
Passion fruit plants	2,500
Papaya seedlings	1,000

	NOS.
Jack seedlings	5,000
Arecanut seedlings	1,800
Banana suckers	1,000
Drumstick seedlings	550
Coffee seedlings	14,050
Indian gooseberry seedlings	12,000
Silveroak seedlings	10,000
Eucalyptus citriodora seedlings	460
Artocarpus hirsuta seedlings	280

IV. *Tree spices*—(a) *Clove*.—Out of the fifty clove seedlings planted in July 1950, in an open site, only six are surviving at the end of the period under report, and these have made only very poor growth. In July 1951, 84 seedlings of clove were planted, as detailed below:—

Nature of site.	Number planted.	Number surviving.
1 Under shade, between coffee plants in fertile soil	31	15
2 In between banana plants in slightly sandy soil.	20	1
3 In open site with comparatively poor soil	33	..

The growth of the seedlings planted under shade in coffee plantation is satisfactory, while the growth of the only one surviving plant in the other sites is poor. From the trial of growing this spice during the past two years, there is indication, that, if fairly well-grown seedlings established in pots are planted in a shady site of good soil fertility and the plants are watered during the dry season, it would be possible to successfully grow this spice in Wynad.

(b) *Nutmeg*.—Only one seedling out of the 25 planted in July 1950 is surviving at the end of the period under report. Thirty-six seedlings were planted in a coffee plantation, under shade, in July 1951, and 25 of these have established and made very satisfactory growth. From the progress of the seedlings planted in an open site in 1950 and in a shady site in 1951, it is evident that nutmeg require a shady site with good soil for its proper growth. From the trial of this spice for the past two years, there is indication, that it would be possible to grow this spice successfully in Wynad, if fairly well-grown seedlings established in pots are planted in a shady site and periodically watered during the dry season.

(c) *Cinnamon*.—The 24 seedlings planted in July 1950 and surviving at the beginning of the year under report have made very vigorous growth. In July 1951, twenty seedlings were planted and 19 of these have established. The seedlings planted in 1950 and 1951 have made very good growth and from the trial of this spice, there is indication, that it would be possible to grow this spice successfully in Wynad. This spice is found to withstand drought better than clove and nutmeg and to grow satisfactorily even without any shade.

(d) *Allspice*.—Two allspice seedlings were planted in July 1950 and these have grown very well, indicating its suitability for the tract.

V. *Seasonal spices*—(a) *Ginger*.—An observational trial with two different sizes of planting material namely seed material weighing 3 lb. per 100 pieces and seed material weighing 2 lb. per 100 pieces was carried out during the year. The data recorded from the trial are given in Table X.

TABLE X.

Size of seed material.	Number of beds planted.	Size of each bed.	Mean yield per bed in lb.	Acro yield in lb.
(1)	(2)	(3)	(4)	(5)
100 pieces weighing two lb. ..	13	10' × 3'	19.90	8,955
100 pieces weighing three lb. ..	13	10' × 3'	27.77	12,496

From the data it is evident that seed rate of 1,350 lb. per acre. (100 pieces weighing three lb. per bed with 450 beds per acre) would give a net increased

yield of about 3,000 lb. per acre over the yield by adopting the seed rate of 900 lb. per acre (100 pieces weighing two lb. per bed with 450 beds per acre).

Another observational trial to confirm this finding has been initiated at the end of the year under report.

An observational trial with seed material preserved in the field itself without digging till the planting season and with the seed material dug out in January and preserved in pits till the planting season in May after treating with 0.1 per cent mercuric chloride solution was carried out. The data recorded from the trial are given in Table XI.

TABLE XI.—Observational trials with differently preserved seed material in ginger.

Kind of seed material.	Size of seed material.	Number of beds.	Size of beds.	Mean yield per acre in lb.	Acro yield in lb.
(1)	(2)	(3)	(4)	(5)	(6)
Preserved in field ..	2 lb. per 100 pieces	28	10' × 3'	20.00	9,000
Preserved in pit ..	2 lb. per 100 pieces	28	10' × 3'	18.18	8,163

From the data, it is evident that it is more advantageous to preserve the seed ginger in the field itself, with a thick mulch of grass over the beds, without digging up till the planting season, than digging out the seed material and preserving in pits, after treating with 0.1 per cent mercuric chloride solution, till the planting season. The seed material preserved by the former method has not only recorded a higher yield than the seed material preserved in pit, but it has been found that the loss in weight of the seed material in the process of preservation is greatly reduced by the former method of preserving the seed material. However, in case there is incident of 'soft-rot' in the beds, the former method of preserving cannot be adopted, as there is the risk of the seed material getting infected by the fungus.

During the year, ginger was grown in a total area of 0.30 acre. The crop recorded an acre yield of 8,666 lb. of fresh rhizomes.

(b) *Chilli*.—Five types of chilli namely, local, 398, 1,402, 2,150, Kendrapur. Dubara and Balasore were grown in an area of 0.50 acre. There was severe damage of the plants by cut-worms during different stages of the growth of the plants and consequently, the performance of all the types was very poor. The total yield recorded was 150 lb. of dry chilli per acre.

(c) *Turmeric*.—The crop was grown only in three beds each 20' × 3', as the demand for the local turmeric is very little in the locality. The crop recorded an acre yield of 19,700 lb. of fresh rhizomes.

VI. *Pulse crops*—(a) *Horsegram*.—An area of 10 cents was grown to horsegram, S. 35 and an adjoining plot of 10 cents was grown to local horsegram for comparison. The crop was sown on 20th August 1951 and harvested in January 1952. The type, S. 35 recorded an acre yield of 410 lb., while the local recorded only an yield of 300 lb. per acre. In an area of 2.7 acres, previously grown to tapioca, local horsegram was grown from the first week of September 1951 to January 1952. The crop recorded only an acre-yield of 127 lb. on account of very heavy weed growth.

(b) *Redgram*.—The Attapadi redgram was grown in an area of 0.78 acre as an intercrop in mandarin orange plantation. The plants made very good growth. But due to the incident of pod-borer attack, the yield was only 165 lb. seed per acre. This variety is found to be a perennial type, as the stumps after the harvest in February 1952 have again sprouted and started growing after the receipt of rains in April 1952.

(c) *Cowpea*.—During the south-west monsoon season, cowpea 'New Era' was grown in an area of 0.20 acre. The crop made very good growth in the early stages, but with the advent of heavy rains in August, the crop was damaged due to incidence of *Gleosporium* and the crop gave only an acre yield of 105 lb. of seed. From the trial, it is found that sowing the crop in June results in severe incidence of *Gleosporium*.

During the summer season, the crop was grown in an area of twenty-five cents of high-lying wetland which is neither too dry nor too wet. The crop was sown on 10th January 1952, and by the end of May recorded an yield of 128 lb. of seed per acre. From the trial, it is found that cowpea 'New Era' can be grown successfully without irrigation in high-lying wet land which is neither too dry nor too moist, from January to May.

VII. Root crops—(a) Tapioca.—The tapioca crop planted in 1950-51 in an area of 4.5 acres was harvested during the year. The crop recorded only an acre-yield of 5,200 lb., due to the damage of the crop by wild boar, in addition to the early damage of the roots by cut-worms.

From the harvest of tapioca, eight months, nine months, and ten months after planting, it was found that harvesting the crop ten months after planting, recorded higher yield than harvesting the crop earlier. The yield data recorded from the harvest eight months, nine months and ten months after planting are given below :—

Months after planting.	Number of plants harvested.	Mean yield per plant.
		LB.
Eight months	20	2.35
Nine months	20	3.75
Ten months	20	4.20

From the yield of tapioca from sets planted 2 feet and 3 feet in the row, on ridges 3 feet apart, it is found that planting the sets 2 feet apart in the row is conducive to a higher yield per acre than planting the sets 3 feet apart. The yield data recorded from the sets planted 2 feet and 3 feet apart in row, on ridges 3 feet apart are given below :—

Spacing in the row.	Number of plants harvested.	Mean yield per plant in lb.	Acre yield in lb.
Two feet	40	3.3	21,780
Three feet	40	3.3	15,400

Fifty-three sets of the reputed type of tapioca Travancore Hybrid 105 introduced in the previous year and planted for multiplying the planting material made very good growth and 800 sets that become available during the year were planted in April 1952 for further multiplication of the sets for distribution.

In April 1952, an observational trial on different methods of planting tapioca, namely, on ridges and individual mounds and in pits has been initiated, to determine the optimum method of planting.

A monthly planting trial to determine the optimum month for planting tapioca to obtain high yield has also been initiated in March 1952.

(b) *Elephant yam.*—Elephant yam was grown in an area of 0.10 acre and the crop recorded an acre yield of 18,160 lb.

From the yield data of corms that developed from seed material of different weight groups, it is found that planting seed material weighing over 2.5 lb. each would result in considerably higher yield than planting smaller sized seed material. The yield data recorded in respect of seed material of different weight groups are given below.

Size of seed material.	Number planted.	Weight of seed material in lb.	Total quantity of corms harvested.	Mean weight of corms.
(1)	(2)	(3)	(4)	(5)
Less than one lb.	18	15.0	74.5	4.16
Between 1 and 1.5 lb.	38	48.5	313.0	8.24
Between 1.5 and 2 lb.	25	46.25	205.0	8.20
Between 2.0 and 2.5 lb.	24	56.25	227.5	9.50
Over 2.5 lb.	5	14.25	88.0	17.60

An observational trial with seed corms, weighing 1 lb., 2 lb. and 3 lb. has been initiated in March 1952, to determine the optimum size of seed material for planting.

(c) *Colocassia.*—Four types of colocassia locally known as *Palchembu*, *Kari-mchembu*, *Pillaihatti*, and *Malaraman* were grown in an area of 10 cents for multiplying the seed material for initiating certain trials and extending the area. Among these four types, it was found that the variety *Palchembu* is a heavier yielder than the other varieties.

The four varieties of colocassia were planted in an area of 30 cents in April 1952. An observational trial with different kinds of planting material, namely, tops of corms weighing 4 ounce and 6 ounce, bits of corms weighing 4 ounce and 6 ounce from the lower portion of the mother corms and 'fingers' weighing $\frac{1}{2}$ ounce to 3 ounce of all the above four varieties, was initiated to gather data on the performance of the different kinds of planting material of the four varieties.

VIII. Vegetables.—Four types of brinjal selected locally, namely, 'Wynad Giant White,' 'Wynad Giant Purple Streak,' 'Dark Purple Streak' and 'Purple Round Thornless' were grown in an area of 20 cents during the south-west monsoon season for multiplication of seed for distribution.

The types, 'Wynad Giant White,' 'Wynad Giant Purple Streak' were found to be completely free from 'wilt' and 'small leaf' diseases, while the variety 'Round Purple Thornless' was found to be susceptible to both the above diseases. The yield data of the four types recorded are given below :—

Type.	Number of plants.	Total number of fruits.	Harvested weight of fruits.	Mean number of fruits per plant.	Mean weight of fruits per plant.
(1)	(2)	(3)	(4)	(5)	(6)
			LB.		LB.
Wynad Giant White ..	517	2,999	2,098	5.8	4.1
Wynad Giant Purple Streak.	411	2,799	1,407	6.8	3.4
Wynad Dark Purple Streak.	144	711	406	5.0	2.8
Purple Round Thornless ..	29	82	65	2.8	2.2

Ninety-four lb. of seed of the above four types of brinjal was collected during the year for distribution.

An outstanding type of bitter gourd with fruits about 15 inches in length and white in colour was selected and grown in an area of 2 cents from December 1951 to May 1952 for multiplying the seed for distribution. The crop recorded an yield of 191 lb. from 2 cents and $3\frac{1}{4}$ lb. seed was collected for distribution.

Cucumber was grown in an area of 2.5 cents from December 1951 to May 1952 and the crop recorded an acre-yield of 11,680 lb. The yield would have been higher but for the severe incidence of *Aulocophora* beetle which caused considerable damage to the young seedlings.

IX. Plantation crops—(a) Pepper.—The pepper crop during the year was poor due to unfavourable seasonal conditions, during June-July 1951. From 311 vines, a total quantity of 233 lb. of dry pepper was obtained during the year, as against 235.25 lb. in the previous year.

(b) *Coffee.*—From the area of 5.9 acres of the old mixed plantation of orange, pepper and coffee, 716 lb. of ripe coffee berries was obtained during the year, as against an yield of 919 lb. in the previous year. The yield of coffee in the mixed plantation of orange, coffee and pepper was 121 lb. per acre.

(c) *Cardamom.*—An area of one acre in the old mixed plantation, which is very shady was planted to 600 seedlings of cardamom raised in the station in 1950-51.

X. Groundnut.—Groundnut TMV. 2 was sown in an area of 0.20 acre of the high-lying wet land in January 1952 to find out if a short-term crop of groundnut can be grown after the harvest of paddy. The land was given four ploughings after the harvest of paddy and seeds were dibbled behind the country plough. No manuring was done. The crop came to harvest in May 1952. Due to severe earwig attack of the pods the crop recorded only an acre yield of 275 lb. of dry pods.

XI. Cover and green manure crops.—*Calapogonium* was grown as a cover crop in mandarin orange, Malta lemon and acid lime plantations in an area of about ten acres. This plant is found to be an excellent cover crop for fruit plantations as it makes luxuriant growth and effectively covers the ground and smothers the weed growth. Further, this plant sets seed and dries up with the advent of the dry season leaving a thick mulch of leaves. Soon after the pre-monsoon showers, the self-sown seeds germinate and with the beginning of the monsoon the plants give effective cover over the ground.

During the year 200 lb. of *Calapogonium* seed was collected and 72 lb. seed was distributed to various research stations for trial in those stations.

Peuraria Javanica and *Centrosema pubescens* were also grown in a very small area and these also were found to grow very vigorously. It was found that these do not dry up during the summer months and that they do not seed so profusely as *Calapogonium*.

Crotalaria anagyroides, a perennial shrub which withstands lopping periodically was found suited for growing in orange and coffee plantations and on field bunds in the wet lands. *Crotalaria striata* var. *acutifolia* and *Indigofera hirsuta* were found to be suitable green manure crops for Wynaad.

XII. Fodder crops.—Guinea grass, thin Napier grass and elephant grass planted in the station in 1947-48 continued to make excellent growth and it is established that these grasses are suited for growing in Wynaad.

XIII. Miscellaneous crops.—The seedlings of *Ocimum Kilimanjericum* planted in the previous year made very vigorous growth during the year. Scented geranium plants continued to grow very vigorously, and from the growth, it is evident that this plant is suited for cultivation in Wynaad. The five camphor (*Cinnamomum-Camphora*) seedlings planted in the previous year have made satisfactory growth.

The *Eucalyptus citriodora* seedlings planted in 1948 and 1950 are growing very vigorously and the seedlings planted in 1948 have grown to a height of about 20 feet. The seedlings of *Eucalyptus robusta* and *Eucalyptus rostrata* planted in 1948 and 1950 are found to be less vigorous than *Eucalyptus citriodora* while the growth of *Eucalyptus globulus* seedlings planted in 1948 is found to be very poor, and the plants do not look healthy.

The coconut seedlings were given two hoeings during the year once in June and again in November. They were manured with 3 lb. groundnut cake, 2 lb. ammonium sulphate, 1 lb. super phosphate and 5 lb. wood ash per plant in June. The seedlings planted on the tank bund have made fairly satisfactory growth while those on the drier sites have made only very poor growth.

The arecanut seedlings planted on the field bunds in the wet land have made very poor growth.

An observational trial on manuring of Vettiver (t) was initiated in July 1951. From the growth of the plants in the different treatments, it was found that the plants in the plots which were manured with cattle manure made better growth than the plants in the plots which did not receive cattle manure.

3. Pests and diseases.—The paddy crop was affected by *Piricularia* and *Helminthosporium*. The incidence was more severe on the strains SLO. 17, MTU. 19, GEB. 24, MTU. 3 and Co. 13 than on the local varieties.

Thrips and Jassid attack was fairly severe on all paddy strains and varieties. There was very slight attack of case-worm on the paddy crop. The incidence was more on the crops planted later in the season than the crops planted earlier in the season.

Very severe damage was caused to chilli seedlings and tapioca setts by cut-worms and white-ants. The damage of groundnut pods, by 'ear-wigs' was very severe.

There was severe incidence of root-aphis on Vettiver (t).

The pineapple plants were severely affected by mealy-bugs and consequently suffered from 'Mealy-bug-wilt'.

The young mandarin orange trees were affected by scales and aphids. The stem-borer attack on mandarin orange has been almost completely controlled by removal of the wilted twigs before the grubs gain entry into the main branch.

4. Livestock.—Six cows were in milk and a total of 10,025 lb. of milk was obtained. Five cows calved during the year. One bull-calf was given in exchange for a work animal for stud purpose, at the instance of the Veterinary department and one bull-calf was transferred to the Agricultural Research Station, Pattambi, for stud purpose. One bull-calf was castrated and put for work in the station.

One of the bullocks died during the year. Excluding this animal, nine pairs of bullocks and one pair of he-buffaloes were maintained in the station.

The breeding bull carried out twenty services during the year. At the close of the year, there are six cows, twelve calves, nine pairs of bullocks, one pair of he-buffaloes and one breeding bull in the station.

At the beginning of the year there were three Rhode Island Red hens and one Rhode Island Red cock. During the year thirty-seven pullets and cockerels of Rhode Island Red and White Leghorn and six country hens were obtained. Twenty-three birds were sold and ten birds died during the year due to various causes. At the end of the year, there are one Rhode Island Red hen, four Rhode Island Red chicks, one White Leghorn hen, one White Leghorn cock, one White Leghorn pullet and six country hens.

Two hundred and thirty eggs were distributed during the year.

5. Statement of seeds, plants, etc., distributed.—

Paddy seed	..	..	..	56,639	lb.
Cowpea seed	..	..	..	30	"
Horsegram seed	..	..	..	331	"
Thin Napier Grass seed	..	..	..	29	"
Cover crop seed	..	..	..	73	"
Mandarin orange seedlings	..	..	..	2,380	nos.
Acid lime seedlings	..	..	..	198	"
Passion fruit plants	..	..	..	1,702	"
Malta lemon plants	..	..	..	161	"
Jack seedlings	..	..	..	78	"
Roughlemon seedlings	..	..	..	2,250	"
Coffee seedlings	..	..	..	1,900	"
Pepper vine cuttings	..	..	..	100	"
Tapioca stem	..	..	..	1,150	"
Redgram seed	..	..	..	116	"
Ragi seed	..	..	..	172	"
Vegetable seed	..	..	..	110	"
Seed ginger	..	..	..	640	"
Seed turmeric	..	..	..	9	"
Orange budded plants	..	..	..	718	"
Pineapple suckers	..	..	..	1,512	"
Papaya seedlings	..	..	..	339	"
Banana suckers	..	..	..	251	"
Mango seedlings	..	..	..	80	"
Silveroak seedlings	..	..	..	5,884	"
Arecanut seedlings	..	..	..	122	"
Vegetable seedlings	..	..	..	20,915	"
Miscellaneous plants	..	..	..	12	"

AMBALAVAYAL,
30th August 1952.

P. G. KURUP,
Superintendent, Wynaad Colonization Scheme.
S. S. KATCHAPESWARAN,
Deputy Director of Agriculture, Eighth Division.

APPENDIX I.

STATEMENT SHOWING THE COST OF CULTIVATION FOR THE MAJOR CROPS GROWN IN BULK AT THE AGRICULTURAL RESEARCH STATION, AMBALAVAYAL.

Serial number and crop. (1)	Area. (2)	Preparatory cultivation. (3)			Manure and manuring. (4)			Seeds and sowing. (5)			Irrigation. (6)			After cultivation. (7)		
		RS.	A.	P.	RS.	A.	P.	RS.	A.	P.	RS.	A.	P.	RS.	A.	P.
1 Paddy	25.88	1,679	11	6	488	12	0	1,503	1	0	302	2	0	702	1	6
2 Tapioca	2.35	255	12	0	..	..	..	58	15	0	..	..	..	201	9	6
3 Sugarcane Ratoon (dry)	0.40	..	..	..	..	..	..	..	..	..	..	..	..	18	6	0
4 Redgram Attapadi ..	0.25	..	..	..	..	..	..	5	12	0	..	..	..	..	..	..
5 Ginger	0.20	37	2	0	61	8	6	27	4	0	..	..	..	67	10	0
6 Chillies	0.52	41	6	0	24	12	0	59	3	0	..	..	..	50	3	0
7 Horsegram	2.90	99	11	0	..	..	..	51	11	0	..	..	..	1	0	0
8 Pineapple	3.70	53	3	0	76	15	6	50	14	0	..	..	..	789	13	0
9 Yam	0.10	10	9	0	0	11	0	25	2	0	..	..	..	24	6	0
10 Colocassia	0.10	12	13	0	11	2	0	18	7	0	..	..	..	23	6	0

	Harvesting.			Total cost per plot.			Total cost per acre.			Value of produce.			Profit and loss.					
													Per plot.			Per acre.		
	(8)			(9)			(10)			(11)			(12)			(13)		
	RS.	A.	P.	RS.	A.	P.	RS.	A.	P.	RS.	A.	P.	RS.	A.	P.	RS.	A.	P.
1 Paddy	1,567	7	6	6,243	3	6	241	4	0	8,921	9	0	2,678	5	6	103	8	0
2 Tapioca	88	3	9	604	8	3	257	2	0	342	15	6	*261	8	9	111	2	9
3 Sugarcane Ratoon (dry)	97	3	0	115	9	0	288	14	6	6,316	0	0	200	7	0	501	1	6
4 Redgram Attapadi ..	14	9	6	20	5	6	81	6	0	26	4	0	5	14	6	23	10	0
5 Ginger	24	3	0	217	11	6	1,188	9	6	691	14	0	474	2	6	2,270	12	6
6 Chillies	7	8	6	183	0	6	354	4	9	41	14	6	*141	2	0	271	12	9
7 Horsegram	38	4	0	191	2	0	63	12	0	81	0	0	*110	2	0	35	10	0
8 Pineapple	..	..	..	970	13	6	262	6	0	1,818	1	0	847	3	6	229	0	0
9 Yam	6	0	0	66	12	0	667	8	0	85	2	0	18	6	0	183	12	0
10 Colocassia	12	9	6	78	5	6	783	7	0	98	1	0	19	16	6	196	9	0

* (2) (6) and (7) are losses

Remarks.—(2) Due to attack of wild boar and damage by cut-worms in the early stages.
(6) Due to damage of seedlings by cut-worms.
(7) Due to heavy weed growth,

APPENDIX II.

Statement of receipts and charges.—The receipts during the year are as under:—

	RS.	A.	P.
By sale of farm produce	15,606	14	0
By miscellaneous recoveries	110	0	0
By sales tax	138	1	0
By stationery and printing	0	2	0
By value of free transfer of farm produce	4,950	12	6
Total receipts	20,806	4	6
Deduct refunds	3	9	0
Net receipts	20,802	11	0

The expenditure during the year are detailed below:—

	Recurring. RS. A. P.			Non-recurring. RS. A. P.		
Pay of officers	4,634	6	0	..	..	..
Pay of establishment	19,418	3	0	..	..	..
Dearness allowance	6,532	14	0	..	..	..
Travelling allowance	2,193	1	0	..	..	..
Other compensatory allowance	1,163	4	0	..	..	..
Other charges	49,540	3	0	12,947	4	0
Total charge	83,481	15	0	12,947	4	0

The profit and loss account of the Agricultural Research station, Ambalavayal, for the year 1951-52 are as under.—

Serial number and block.	Area in acres.	Crops grown.	Expenditure.			Receipts.		
			RS.	A.	P.	RS.	A.	P.
1 Orchard	55.9	Mandarin orange, acid lime, lemon, mangosteen and nursery.	10,450	0	0	4,383	5	3
2 Dry land	22.8	Coffee, pepper, ginger, tapioca and seasonal crops.	3,740	0	0	1,934	0	0
3 Wet land	24.5	Paddy and sugarcane ..	7,925	0	0	8,776	12	6
4 Livestock .. ..	..	....	5,398	0	0	3,198	2	9
Total	..	..	27,513	0	0	18,292	4	6

REMARKS.

The orchard was started only in 1947 and the area was considerably extended in 1950 and 1951. The plantations have not yet started bearing, except for some mandarin orange trees in the old garden. The orchard is expected to give proper return only after a period of about five years. However the receipts during the year from fruits and nursery is appreciably more than in the previous year due to increased production and sale of plants.

The seasonal crops of chilli and tapioca failed to give a satisfactory return on account of the insect and wild boar damage of the crop. In addition, the prices of tapioca during the year was very low being only 25 per cent of the normal prices. Further, the pepper crop harvested in the year was not sold during the year, as the market price was low. The ginger obtained during the year was mostly retained for seed purpose for extending the area under this crop and only a small portion of the produce was sold during the year. On account of these features the return from the seasonal and plantation crops in the dry land was less than in the previous year. The return from the dry land is expected to be much higher in the next year as an area of about two acres has been put under ginger and yam and the stock of pepper would be sold during the next year when the price is expected to rise.

The yield of paddy in general was good and the sale price also was slightly higher than in the previous year. Therefore the return from the wet land was satisfactory and appreciably in excess of that of the previous year. The receipts should have been better, but for the fact that the sugarcane crop was badly damaged by jackals and the price of jaggery during the year was very low.

Considering that the major area of the station is grown to perennial crops which have not started yielding, the receipts from the station is satisfactory and have been increasing year by year, and the station is expected to be almost self supporting after another five years when most of the perennial crops would start bearing sizeable crops.

Steps taken to increase the revenue of the station and to make the station self-supporting.—With a view to reduce the weeding charges in the fruit plantation, a cover crop of Calapogonium is being established and where the cover crop is properly established, the maintenance charges of the fruit plantation would be considerably reduced.

2. The area under pineapple and heavy yielding type of banana has been increased and these two crops would greatly increase the revenue during the next two years. Further, the system of growing pineapple with a thick mulch of leaves is being taken up to reduce the cost of weeding.

3. The nursery has been enlarged and a large number of various fruit and other economic plants have been raised for sale.

4. The area under coffee has been increased considerably and in addition a very large number of silver oak seedlings to serve as standards for pepper has been planted. Rooted pepper cuttings will be planted to these standards during the next year.

5. The area under un-remunerative seasonal crops like dry paddy, ragi, etc., has been greatly reduced and the area under remunerative crops like ginger, yam, colocassia and cowpea has been greatly increased.

6. The area of the wet land has been reduced to 19 acres from 25 acres, so that the lesser area can be more efficiently cultivated, and that acre yield of paddy increased. The experimental area has been limited to the minimum and high yielding cultures and strains are being grown for increased yield. The plots of low soil fertility have been greatly improved in fertility by application of cattle manure and green leaf and this is expected to increase the yield of paddy considerably.

7. Very large quantities of compost have been prepared and the cattle manure production has been greatly augmented by putting litter in the cattle shed, for increased application of the bulky organic manure to various crops for increased yield from the various crops.

ANNUAL REPORT OF THE ARAKU VALLEY SCHEME FOR THE YEAR 1951-52 (FASLI 1361).

I. (i) *Season.*—There was a total rainfall of 64.23 inches during the year distributed over 92 rainy days as against 56.24 inches received during the previous year, and a triennial average of 50.46 inches. This total rainfall was distributed in the three seasons as follows:—

Rainfall data, 1951-52.

1 South-west monsoon period	40.34 inches on	48 rainy days.
2 North-east monsoon period	12.39 "	15 "
3 Hot weather period	11.50 "	26 "

(ii) *South-west monsoon period.*—The south-west monsoon started with enough rainfall during June 1951 to take up the preparatory cultivation of land, and sowings of early crops like samai and dry paddy. But during July 1951 there was an unusually heavy rainfall of 16.74 inches, on account of which sowings of some of the dry crops like ragi could not be done in time. This heavy rainfall which developed into cyclonic weather with strong gales, continued even during the first fortnight of August, keeping the soil wet and unfit for sowing of ragi and washing off the tender seedlings of crops sown during the previous month. The rainfall during the rest of the period was adequate for the growth of the crops, and well distributed to take up after cultivation operations like weeding, hoeing, etc.

The rainfall on the whole during this period was unusually heavy, accounting for nearly two-thirds of the total rainfall for the year.

(iii) *North-east monsoon period.*—The north-east monsoon period started with a heavy rainfall during the first week of October 1951, but during the subsequent period it was well distributed and was beneficial to the standing crops. The clear weather during the second fortnight of October was helpful in taking up harvests of early crops like samai and dry paddy. Towards the end of November there was again a heavy rainfall of nearly 3.50 inches accompanied by cyclonic weather. This unexpected heavy rainfall was more harmful than beneficial as the harvested sheaves of ragi and wet paddy left in the fields were caught in the rains and sugarcane on the farm also lodged. There was no rainfall during the rest of the period.

(iv) *Hot weather period.*—The rainfall during this period, which was above normal, was mostly received during the months of April and May, and was very beneficial to take up preparatory cultivation of land and also early sowings of crops like samai, dry paddy and ragi. The rains during April were, as usual, accompanied by gales and hail storms.

(v) *Temperature.*—The maximum and minimum temperatures recorded during the year were 98° F and 39° F. Cold weather set in early in November and continued up to February when it started warming up. There was frost during January. The temperature gradually rose in April, May, but as there were intermittant rains during this period, the intensity of heat was not much felt.

(The details of rainfall are given in Appendix I.)

II. *Paddy bulks.*—(i) *Wet paddy.*—Four varieties of paddy were grown on a bulk scale in total area of 7.27 acres. Planting was taken up in July, but due to heavy and continuous rains there is great labour scarcity and hence planting dragged on to the first fortnight of August also. During the months of July-August there was severe attack of paddy blast in the nurseries of

AKP. 1, BAM. 1 and MTU. 3 and in the transplanted crops of MTU. 3. The nurseries and planted crops of Ninnidhan (a local variety) and S.R. 26 B were completely free from the attack. The season during the rest of the period was in general satisfactory. The crops were harvested during November-December and the following were the yields obtained:—

Yield of paddy varieties, 1951-52.

Variety.	Area grown in acre.	Yield per acre in lb.
S.R. 26 B.	2.84	2,704
Ninnidhan	2.43	2,120
AKP. 2	1.50	1,904
MTU. 3	0.50	1,144

The yields of AKP. 2 and MTU. 3 were low as the crops were affected by blast, the worst affected being MTU. 3. This variety, MTU. 3 has however given the highest yield of 3,610 lb. per acre during the previous year. The yields of S.R. 26 B. and Ninnidhan were above average and steady. These two varieties were also free from paddy blast. The local variety Ninnidhan has small and fine grain and mass—selected seed in this crop is finding favour with the hillmen.

(ii) (a)—*Trials of new varieties Culture No. 10,034.*—This is a cross between MTU. 1 and S.R. 26-B. and was tried for the first time during the year in an area of 0.09 acre. As the seed was received late, it was sown broadcast in August. The growth of the crop was satisfactory. It flowered in October-November and was harvested in January. The yield of 666 lb. per acre was however poor.

(b) *Deep water paddy—Cultures Nos. 1311 and 1315.*—The seeds of these cultures were also sown broadcast in August in the beds of ponds in a total area of 0.30 acre. The vegetative growth of the crop was satisfactory, but the crop was longer in duration and flowered during the winter months, January and February. On account of the heavy dewfall and frost during the flowering period the seed setting was badly affected and the grains turned chaffy. No yield was obtained from these varieties.

(iii) *Varietal trials.*—The six varieties, i.e., AKP. 1, AKP. 2, MTU. 3, S.R. 26-B, Ninnidhan and BAM. 1 under varietal trials could not be planted during this year as two of the varieties AKP. 1 and BAM. 1 were completely spoiled in the nursery due to severe attack of blast.

(iv) *Mass-selection in the main crop variety—Ninnidhan.*—The local variety Ninnidhan which is high yielding, free from blast attack and has fine small grain, is promising and mass-selection is being done in this crop year after year. The seeds of the mass-selected crop are being distributed to the local hillmen.

(v) *Wet paddy—Second crop.*—Four varieties of second crop paddy, i.e., SLO. 12, MTU. 15, X 60 and Sattikalu (local) were grown in a total area of 0.62 acre. The nurseries were raised in January and transplanting was done in March. The growth of all the varieties was satisfactory. X 60 (a cross between SLO. 16 and Nallari) and Sattikalu (local) were harvested in June, and SLO. 12 and MTU. 15 in July. The yields of these are recorded below:—

Yield of second crop paddy varieties, 1951-52.

Variety.	Area grown in acre.	Yield per acre in lb.
SLO. 12	0.28	2,486
MTU. 15	0.20	2,125
Sattikalu (local)	0.12	1,366
X 60	0.02	950

X 60, a new introduction, is a crop of 98 days' duration. Though it is early, the grains have the shedding quality and its yield is also not encouraging.

(vi) *Dry paddy—(a) Bulk crop.*—Mass-selection is being done year after year in the local variety Battadhan, which was found to be superior to other varieties (local and departmental strains) tried so far. This mass-selected crop in Battadhan was grown in a total area of 3.50 acres. The growth of the crop was slow during July-August when there were heavy and continuous rains. The crop pulled up thereafter. One weeding was given and the crop was harvested in November-December. Though the average yield from this whole area worked out to 1,290 lb. per acre, the maximum yield of 1,647 lb. per acre was obtained from a plot of 1.05 acres.

(b) *Demonstration plots.*—Mass-selected Battadhan was grown side by side with local Battadhan for demonstration purposes.

The following were the yields obtained:—

Dry paddy—Yield of demonstration plots, 1951-52.

Variety.	Area grown in acres.	Yield per acre in lb.
Battadhan (local)	0.10	910
Battadhan (mass-selected)	0.10	1,020

(c) *Observation trials.*—The trial of six varieties of dry paddy for comparison of yield was conducted for the second year. The varieties were grown in duplicate plots of 0.10 acre each. The sowing was done on 29th June 1952. The growth and tillering of Battadhan mass-selected and Vedurusannam were comparatively better than the rest. Karani (local variety) was longer in duration than the rest. The following were the yields obtained:—

Dry paddy—Yield of observation plots, 1951-52.

Variety.	Yield per acre in lb.
1 Vedurusannam	1,000
2 Battadhan (mass-selected)	980
3 Sattikalu (local)	790
4 MTU. 18	750
5 MTU. 17	670
6 Karani (local)	100

As in the previous year Vedurusannam and Battadhan have given high yields.

(vii) *Ragi—(a) Bulke.*—The bulk crop of ragi from an area of 9.50 acres was almost a failure during this year, as sowings could not be done in time (July) due to abnormally heavy rains in July-August. The crop was however sown during the second fortnight of August. The growth of the crop was stunted, and yields were very poor.

Ragi—Yield of bulk crops, 1951-52.

Variety.	Area grown in acre.	Yield per acre in lb.
Jagaralamandya (Kothavalasa farm)	1.90	242
Jagaralamandya (Kantabamsaguda farm)	4.00	84
Mudaimuskal	2.00	73
AKP. 7	1.60	112

The average yield of the bulk crop worked out to 128 lb. per acre.

(b) *Ragi*—*Demonstration plots*.—Mass selections in the local varieties of ragi, Jagaralamandya and Mudaimuskal were compared with the locals in demonstration plots of 0.10 acre each. As the area was small the seed could be sown in time in July. The growth of the crop was good. The following were the yields obtained:—

Ragi—Yield of demonstration plots, 1951-52.

Variety.	Yield per acre in lb.
Jagaralamandya (mass selected)	2,360
Jagaralamandya (local)	1,949
Mudaimuskal (mass selected)	2,500
Mudaimuskal (local)	1,500

The mass-selected crops have given better yield than their local.

(c) *Ragi*—*Observation trials*.—Six varieties of ragi were grown under observation trials to study and to compare their yields. The varieties were sown in duplicate plots of 0.10 acre each. But, as in the case of the bulk crop, the sowing was done in August. The growth of all the varieties was poor and stunted, and the following poor yields were obtained:—

Ragi—Yield of observation trials, 1951-52.

Variety.	Yield per acre in lb.
AKP. 3	390
AKP. 6	360
AKP. 7	350
Jagaralamandya (mass selected)	240
Mudiamuskal (mass selected)	155
Jagaralamandya (local)	160

(viii) *Jonna*.—Mass selection in the local variety Kakijonna was sown broadcast in June in an area of 0.20 acre. The seed rate used was 10 lb. per acre and the seed was covered by ploughing and passing brush harrow. The plot received cattle manure at 10 cart-loads per acre. The growth of the crop was satisfactory, and it was harvested in December. An acre yield of 255 lb. of grain was obtained.

(ix) *Samai*—(a) Mass-selected seed from the local Pedda samai was sown as bulk in an area of 0.30 acre in July. The seed was sown broadcast using a seed rate of 10 lb. per acre, and covered by ploughing and passing brush harrow. Cattle manure at 10 cart-loads per acre was given to the plot. The growth of the crop was satisfactory; it was harvested in November; it gave an acre yield of 490 lb.

(b) *Demonstration plots*.—Mass-selected samai was grown with the local each in plots 10 cents for demonstration purposes. The following were the yields obtained:—

Samai—Yield of demonstration plots, 1951-52.

Variety.	Yield per acre in lb.
Samai (mass selected)	820
Samai (local)	650

(x) *Wheat*.—Wheat was grown on the farm during the year in an area of 1.10 acres. The following are the varieties tried with areas:—

	ACRE.
'Geba' wheat (from Coonoor)	0.50
Glumed wheat (from Siruguppa)	0.50
Local wheat	0.20

The crop was sown broadcast using a seed rate of 50 lb. per acre in the first fortnight of November. The germination and stand of glumed wheat and 'Geba' wheat were satisfactory while the local variety showed poor germination and failed. The following are the yields obtained:—

'Geba' 200 lb. per acre.

Glumed wheat (Siruguppa) 340 lb. per acre.

(xi) *Oil-seeds*—(a) *Groundnut*—(Variety TMV. 3).—The spreading variety of groundnut was sown in 0.40 acre in June. The sowing was done by dibbling seed behind the country plough; and the seed rate was 100 lb. of unshelled pods.

The plot received cattle manure at 10 cart-loads per acre. The vegetative growth of the crop was luxuriant; but on harvest in November, it has given a poor yield of 240 lb. of pods per acre. This was probably due to the heavy rainfall during the year.

(b) *Niger*.—(1) Mass-selected crop of niger was grown as bulk in a total area of 4.60 acres of which 2.80 acres were sown after the monsoon potato, and this area has not received any manure whereas in the rest of the area received cattle manure at 10 cart-loads per acre. The seed was sown broadcast and covered by ploughing and passing brush harrow. The seed-rate used was 10 lb. per acre. The growth of the crop was satisfactory; it was harvested in December-January and the following yields were obtained.

Niger—Yield of bulk crops, 1951-52.

Crop.	Date of sowing.	Area sown in acre.	Yield per acre in lb.
Niger bulk— (Kantabhmsaguda Farm)	28th August 1951.	0.40	395
Niger bulk *— (Kothavalasa Farm) .. .. .	.. .. .	1.40	98
Niger after potato	6th to 16th October 1951.	2.80	225

* As the season for sowing ragi had advanced due to continuous heavy rains, niger was sown in the plots intended for ragi.

(2) *Demonstration plots*.—Mass-selected niger was sown side by side with the local, each in an area of 0.10 acre. The growth of the crop was satisfactory, and the following were the yields obtained:—

Niger—Yield of demonstration plots, 1951-52.

Variety.	Yield per acre in lb.
Niger (mass-selected)	370
Niger (local)	250

(xii) *Fibre crops*—(a) *Cotton*.—One hundred seeds in each of the varieties Madras Uganda and K-2 were received from the Cotton Specialist, Coimbatore for trial on this station. The seeds were sown on 10th July 1952, each variety in 5 rows. K-2 has completely failed to germinate, whereas in Madras Uganda 25 seeds germinated. But the growth of the seedlings was very slow and stunted. Even after a year, the seedlings have not grown more than one foot. This variety also can be considered as a failure.

(b) *Kasi gogu*.—Kasi gogu was tried for the second year in an area of 0.20 acre. No manure was applied to the plot. The seeds were sown broadcast and covered by ploughing and passing brush harrow. The progress and growth of

the crop were good. It received one weeding and hoeing and at the time of harvest in December it reached a height of nearly 9 feet. Fibre was extracted from 0.18 acre; leaving 0.02 acre for seed production. One thousand seven hundred and twenty-two pounds of fibre per acre and 6 lb. of seed from 0.02 acre were obtained.

(xiii) *Fodder crops*.—An area of 2.68 acres was acquired adjoining Padmapuram orchard to grow fodder crops for meeting the fodder requirements of the livestock maintained on this station. A live-fence with agave and *Jatropha* stumps was put up and the area tractor ploughed in 1951. The following are the fodders grown in this block:—

(i) *Water grass*.—Slips of water grass were planted in June 1951 in an area of 0.40 acre. Gaps were filled up with 500 more slips in September. The crop made slow growth in the beginning and its performance at Araku is satisfactory. During February, 300 slips were cut and supplied to Srikakulam district. In June 1952, 1,340 lb. of green fodder was cut from an area of 20 cents for feeding the milch cattle. The crop is coming up well.

(ii) *Guinea grass*.—Guinea grass was planted in an area of 5 cents and its growth was not satisfactory during the year.

(iii) *Napier grass*.—Slips were planted in an area of about 60 cents, the growth of the crop in the beginning was slow. During summer, with the receipt of summer showers, the crop put in some growth. It was observed to be vigorous from April. Harvest of green fodder was commenced towards the close of the year. So far, 3,450 lb. of green fodder was cut from an area of 50 cents.

(iv) *Lucerne*.—An area of 25 cents was brought under this crop in June 1952. The crop did not establish well during the year. The crop was again sown during May 1952 and the growth of the crop is so far satisfactory.

(v) *Pillipesara*.—An area of 40 cents was sown with *Pillipesara* in April. Though growth in the beginning was slow, the crop pulled up in growth after six weeks of planting. The performance of the crop is satisfactory.

(vi) *Fodder jonna*.—This was sown in an area of 0.05 acre in May 1952 and the performance of the crop so far is satisfactory.

(xiv) *Green manure crops*.—Sunn hemp was sown for green manure in 6.00 acres of wet land and 20.00 acres of dry land and it was ploughed in. It gave an acre yield of 5,000 lb. and 4,000 lb. of green leaf from wet and dry lands respectively.

Seedlings of *Sesbania* and *Glyricidia* were also planted on field bunds, along the boundaries of farms and on the tank bunds and 12 lb. of *Sesbania* seed was collected during the year. Sunn hemp was also sown on field bunds for seed purposes.

(xv) *Root crops*.—(a) *Sweet potato*.—(i) *Bulk crop*.—Of the six Almora varieties under trial, the promising ones like Triumph and Ranger were grown on a bulk scale in a total area of 0.20 acre. The plot received cattle manure at 20 cart-loads per acre. A seed rate of 2,000 lb. of vines was adopted. Planting of setts was done on ridges 2 feet apart and a spacing of 9 inches was given between the sets. One weeding and hoeing and turning of vines were done. The crop received a top dressing of ammonium sulphate at 100 lb. per acre. Harvest of tubers was done in December-January. The tubers were of fairly big size and were much relished by hillmen. A total yield of 8,095 lb. per acre was obtained.

(ii) *Sweet potato—Varietal observations*.—The observation trial of the six sweet potato varieties received from Almora, was continued during this year also. The varieties were planted in duplicate plots of 0.05 acre during the first fortnight

of July. The vegetative growth of the vines in all the varieties was satisfactory. Harvest of tubers was done in March-April. The following were the yields obtained.

Sweet potato yields, 1951-52.

Variety.	Yield per acre. LB.
1 Triumph	12,250
2 Ranger	11,000
3 B 4004	10,250
4 B 5941	10,040
5 B 196	9,810
6 B 4306	8,750

As in the previous year triumph has given the highest yield closely followed by ranger. The size of tubers in these two varieties is also fairly big.

(b) *Potato*.—(1) *Monsoon crop*.—The monsoon crop potato was planted in May-June in a total area of 3.00 acres. Of this 1.00 acre was planted with the seed material raised and preserved here, and the rest with seed material got from Hosur. This seed material was mostly spoiled as it was detained in transit for nearly 17 days and the crop was very gappy. It was harvested in September, and the average yield per acre worked out to 2,503 lb. per acre.

(2) *Winter potato*.—The trial of four manure mixtures on potato (mixtures A, B, C and D as detailed below) as suggested by the Government Agricultural Chemist, Coimbatore, was continued for the fifth year in succession. The results as in the previous years, were not statistically significant.

Government Agricultural Chemist's manurial experiments on potato, 1951-52.

Name of the trial—Trial of different manure mixtures on potato.	Mixture C—	LB. PER ACRE.
Object—To find out a suitable manure mixture to potato under Araku conditions.	Groundnut cake	500
System of layout—4 x 5 randomized blocks.	Ordinary super	1,500
Treatments—	Ammonium sulphate	200
	Potassium sulphate	200
	* Mixture D—	
Mixture A—	Groundnut cake	500
Groundnut cake	Concentrated super.	336
Ammonium	Bonemeal	350
Concentrated super	Ammonium sulphate	200
Bonemeal	Potassium sulphate	224
Potassium sulphate	Size of plot—5 cents nett.	
Mixture B—	Date of planting—23rd November 1951.	
Groundnut cake	Date of harvest—20th March 1952.	
Ammonium	Spacing—2 feet between lines and 9 inches between plants.	
Ordinary super	Seed rate—2,000 lb. per acre.	
Potassium sulphate	Variety—Mysore ricketa.	

* This is Nanjanad mixture and is taken as control.

Summary of results, 1951-52.

Manure mixture.	A.	B.	C.	D.	General mean.	Standard error of treatment mean.	Significant or not.
Yield per acre in lb.	2,572	2,432	2,300	2,472	2,444	154	No.
Percentage on control	101.04	98.4	93.0	100	98.9	6.2	..

The results were not statistically significant. During all the five years of trial the results were not statistically significant. So it was proposed to adopt here also Nanjanad mixture for potato crop. The relative costs of the above manure mixtures on acre basis are as follows. Mixture 'A', Rs. 340-10-0; mixture 'B', Rs. 350-6-0; mixture 'C', Rs. 372-12-0 and mixture 'D', Rs. 332-6-0.

(c) *Summer potato*.—The summer crop of potato was raised in an area of 0.75 acre from seed material preserved on the farm. The tubers were planted by the middle of February 1952. The sprouting of tubers and the progress of the

crop were satisfactory. One weeding was given to the crop. Towards the end the crop was somewhat over grown with weeds and it gave an yield of 1,600 lb. of tubers per acre.

(d) *Storage trials on potato*.—The trials conducted during the previous years has revealed that potato can be preserved during the summer months by spreading the tubers on racks and dusting them with gammexane or derris dust. Hence during this year, nearly one ton of good tubers from the winter crop were selected and preserved on improvised racks dusted with gammexane and derris dust. The percentage of rottage of tubers was negligent. Towards the end of May the tubers sprouted nicely, and they were planted on 28th May 1952 in an area of one acre.

Potatoes no doubt can be preserved here for seed material. But the main difficulty is in finding a proper shed. All the sheds here are temporary and thatched and subject to collapse with the strong gales in summer. Hence the trial was conducted in the Nissen shed. Due to the radiation of heat in the summer months, some of the tubers have become soft.

(xvi) *Vegetables*.—Periodic planting of exotic and indigenous vegetables was done on the farm to supply vegetables to the people in the colony.

The following are the different varieties of vegetables grown on the farm with their yields:—

Yield of vegetables, 1951-52.

Variety.	Month.	Area of plot in acres.	Yield per acre in lb.
(1)	(2)	(3)	(4)
(a) Indigenous vegetables—			
Brinjal	February 1951	0.04	8,000
	September	0.20	1,897
	September-October	0.15	11,000
	January 1952	0.20	7,625
Ladies fingers	April 1951	0.04	2,112½
	May 1951	0.10	1,250
Gourds—			
Snake gourd	April	0.10	5,010
Ribbed gourd		0.05	1,050
Bitter gourd		0.05	2,350
Banana .. ..	.....	0.25	4,200
Maize	June	0.02	2,500
Greens	May 1952	0.02	2,825
Gogu	April 1952	0.03	2,865
Bellary Onions	November	0.10	4,560
(b) Exotic vegetables—			
Carrot	September	0.025	10,480
Radish	September	0.035	1,714
Cabbage	November	0.15	14,266
	December-January	0.20	17,180
Califlower	November	0.08	3,925
	November-December	0.05	3,200
Tomato	November	0.05	1,000
	November-December	0.06	9,164
Knol khol	November	0.10	4,500
French beans	May	0.10	3,230
	June	0.05	1,740

(c) *Vegetable seed production*.—The following varieties of vegetable seeds were produced on the farm during the year for supply to other districts:—

Snake gourd	12 lb. 5 oz.
French beans	12 lb. ½ lb.
Brinjal	2 lb. 38 tolas.
Tomato	1 lb. 3 oz.
Ribbed gourd	4 oz.
Cucumber	2 lb. 12 tolas.
Dill	5 tolas.

Vegetables seed production (in orchard).—Nineteen ounces of tomato seed of Marglobe and Ponderosa were collected from the crop raised in an area of 40 cents. Eleven and quarter lb. of French been seed of Dwarf Canadian Red was also collected from a crop raised in an area of 30 cents. Half an ounce of cauliflower seed of Snow Ball was also collected. Attempts made to produce cabbage seed planting the crop in December-January, proved a failure as the stray flower stalks put forth by a few cabbage plants were badly hit by hail stones during April. Ten ounces of cape gooseberry seed have so far been collected from the crop raised over an area of 12 cents.

(xvii) *Chillies (local and mass selected) (0.34 acre)*.—The mass selected crop was planted in an area of 0.34 acre. The stand of the crop was poor and the crop failed due to heavy rainfall in July-August. An acre yield of 60 lb. of dry chillies was obtained.

(xviii) *Banana*.—From the area 1.15 acres planted with Bontha, Amruthapani and Sirumalai in June-July 1950, bunches from Bontha variety were harvested from 0.25 acre and it gave an acre yield of 4,200 lb. under dry conditions. The Sirumalai crop has just started throwing bunches and Amruthapani is not yet throwing bunches. The crop was raised under rainfed conditions and the stand of the crop was poor and the bunches thrown are small. In June 1952 a fresh area of 0.25 acre was planted to Sirumalai. Pits were dug and cattle manure was applied and good sword suckers were planted 12 feet apart as ordered by the Director of Agriculture, Madras.

(xix) *Sugarcane (0.05 acre)*.—A crop of Co. 419 from the previous year was left for ratoon during the year. The crop received manuring to supply 100 lb. of nitrogen and earthing up was done to the crop. The stand and growth of the crop was very satisfactory. The crop was harvested during November-December. Part of canes were sold for chewing and the rest were converted into jaggery and disposed of. The crop recorded an acre yield of 48 tons and 1,760 lb. of cane.

An area of 0.045 acre was planted on 3rd March 1952 to B 208 (a chewing variety) brought from Anakapalle as per Headquarters Deputy Director of Agriculture's instructions. The crop of B. 208 is progressing satisfactorily.

(xx) *Pineapple*.—Hoeing, weeding and manuring with compost was done round the pineapple plants. But their growth and progress were slow.

(xxi) *Cinchona*.—Periodical clearance of weeds and bushes in the cinchona plots at Ananthagiri and Sukarametta were done. The plants at Sukarametta are having satisfactory growth and they also flowered. The progress of the plants at Ananthagiri is satisfactory. Many of the plants died and some of the silver oak plants were also cut away by the telegraph line people.

(xxii) *Avenue plants*.—The progress of the avenue plants, silver oak, eucalyptus, camphor, pungam and kapok is satisfactory. They are being cared for regularly.

(xxiii) *New introductions*—(1) *Aeroplane wood tree*.—Twelve seedlings got from Anakapalle were planted in all the farms. The growth was satisfactory for about two months, but with the coming of winter the plants shed their leaves and died gradually.

(2) *Kasigoju*.—The crop which was grown for the second year in an area of 0.20 acre has grown well and has attained a height of 9 feet. The fibre yield obtained was 1,722 lb. per acre.

(3) *Paddy*—(Culture. 10034—Cross between MTU. 1 and SR.—26-B).—This seed was sown broadcast in an area of 0.08 acre as the seed was received late in the season. The stand of the crop was satisfactory. The crop gave an acre yield of 666 lb.

(4) *Deep water paddy*—(Cultures 1311 and 1315).—These cultures were sown in the tank area. The stand of the crop was satisfactory, but the flowering was late in severe winter and frost conditions and the earheads turned out chaffy.

(5) *Chicago water melon and cucumbers*.—Four seeds of water melon and 32 seeds of cucumber received from the Director of Agriculture, Madras, were sown on 17th June 1952 of which 2 seeds of water melon and 3 seeds of cucumber have germinated. The growth of the creepers was stunted. The melon vines have flowered but no fruit setting was observed while the cucumber has given a few fruits from which 1 oz. of seed was collected for further trial.

(6) *Soya bean*—Tata 5.—This variety said to be useful as a vegetable was tried in 0.02 acre. The growth of the plants was slow and stunted and pod formation was poor as it was not inoculated. Four ounces of seed was collected from this crop and it will be tried next year.

(7) *Chicago cucumbers*—(a) "Improved long green".—Out of 130 seeds sown 29 germinated and developed vines. The growth of the vines was satisfactory and on the average six fruits were harvested from each vine. The quality of the fruit was good. The fruits were good for culinary and table purposes. They were 10 inches to 14 inches long with a circumference of 8 inches to 10 inches in the middle. The variety was found promising. A quantity of 2 lb. 10 tolas of seed was collected from the fruits and the Director of Agriculture was addressed for its disposal.

(b) "Arlington".—From 80 seeds sown fifteen vines have come up. Some of the fruits borne rotted due to fruit-fly attack. The Plant Protection Officer (Entomology) who visited the station was consulted but he could not suggest control measures as it happened to be a cucurbit. From four good fruits harvested from these vines 2 tolas of seeds were collected. The fruit was 8 inches to 10 inches long and 6 inches to 8 inches in circumference at the middle.

(c) "Mandarin".—Out of the 10 seeds received and sown only one vine has come up and has set one crumpled fruit from which no seed could be collected.

(d) "Straight light".—Of the four seeds sown, none have germinated.

(e) "Local".—Two of the six seeds sown have germinated but the vines wilted and died before they came to bearing.

(8) *Dill*.—Of the 100 seeds sown only six plants have come up. The plants have attained a height of 3 to 4 feet. From these plants 5 tolas of seed was obtained for further trials.

(9) *Indigofera teysmanii*.—One hundred eighty-one seeds of *Indigofera teysmanii* received from the Government Lecturing and Systematic Botanists Coimbatore, were sown in seed-beds during December and the germination was observed to be very poor. Only 13 seedlings which attained a length of 6 inches, during April and May were transplanted four feet apart on a bund on the side of

a road in the orchard. Growth of seedlings was observed to be very slow. A second batch of 185 seeds were sown in May and so far only 28 seeds have germinated. They will be transplanted after they attain a height of six inches.

(10) *Subterranean clover*.—Three types, Acc. 330, 334 and 383 were introduced for trial obtaining seed from the Oil Seed Specialist, Coimbatore. Seeds were sown on 20th February 1952 at four seeds per square foot in well-prepared plots in loamy soils. Though germination commenced 15 days after sowing the percentage was very poor. The growth of the few plants that have germinated was also very unsatisfactory. The performance of all the three types was very unsatisfactory.

(11) *Pueraria javanica*, *Centrosema pubescens* and *Calapogonium mucronoides*.—These were sent by the Government Lecturing and Systematic Botanist, Coimbatore, and they were sown in lines in an area of 10 cents; germination in all the three was satisfactory. Plants of *Calapogonium mucronoides* were observed to be coming up more vigorously than the rest closely followed by the plants of *Centrosema pubescens*. The two types were also sown as intercrops in the coffee block and their germination was satisfactory. Observations are in progress.

(12) *Coffee*.—Two hundred sixty-one plants of the three types, S. 288, S. 645 and S. 785 were planted in October in the main block in an area of 0.30 acre under shade of mango trees. One deep-cover digging was given to these plants in December when forest covers were also provided for all these plants. In December and January all the plants were manured with ammonium sulphate and steamed bonemeal at two ounces of each for each plant. This manuring was beneficial for all the three types which pulled up growth and were observed to be moderately vigorous. During February seeds of *Erythrina lithosperma* were sown in the main block amidst coffee plants to augment shade for coffee plants in future. Seeds of S. 288 and S. 333 were obtained from the Director of Coffee Research, Balehonnur, and sown in February. The seedlings of both the types were coming up well. In the main block, *Centrosema pubescens* and *Pueraria javanica* were sown as cover crops in May and they have germinated well, and are progressing satisfactorily. Of the three types planted in the main block, plants of S. 288 were observed to be coming up more vigorously than the rest. Observation are in progress.

(13) *Local legumes in observation plots*.—Soft wood cuttings of four local legumes, *Indigofera endecaphylla*, *Alysicarpus scaberrimus*, *Desmodium triflorum* and *Desmodium diffusum* were planted in small beds, each of 10 feet × 10 feet size to assess their performance and suitability in solving the fodder problems of this region. Cuttings of *Indigofera endecaphylla* only have established well. Observations are in progress.

III. *Orchard*.—The following is the report of work done regarding the orchard for 1951-52.

(a) *Performance of hill and plains fruits and other horticultural crops and their progress*.—(i) *Plains fruits*.—Malta Ruby, Sathgudi, Teneriffe and Washington Navel which are in the fifth year of their orchard life and second year of bearing continued to perform well in Citrus variety collections. The sweet oranges are in season from August to November for the main crop and from June to September for the off-season crop, thus establishing so far two cropping seasons. The off-season crop accounted for about one-third of the gross harvests during the year. Among the four-year old mandarin trees two budded trees of Nagpur santra and one of Kallar type as well as a seedling tree of Kallar type were in the first year of bearing. Harvests of fruits in the budded and seedling trees of Kallar type were in season during October and of Nagpur santra from November-December. Among these, fruits of Nagpur type were larger in size and their quality excellent. Fruit size as well as quality were poor in the seedling tree of Kallar type. Budded plants of Nagpur santra and Kallar type were again in blossom during February and the fruits (for the second year of bearing) are developing well. Three about four-year old acid lime trees budded on jamberi were in the first year of bearing and the season of maximum harvest was limited to September-December. Acid

(b) *Fruit, spice and beverage crops which were finding conditions uncongenial.*—Mangosteen, durian, cashew, cacao, clove and rambutan have proved a failure after repeated introductions to assess their performance in this tract. The nutmeg plants set out during the year, in the Orchard, and the three and one-year old grafted trees of sapota were observed to be finding conditions apparently uncongenial. The performance of pepper and vanilla vines was unsatisfactory during the year.

(c) *Research*.—The following are the items of the research undertaken during the year :—

(i) *Inarching in jack*.—From as many as seventy-five grafts made from one promising jack tree spotted in the Orchard, only three grafts could be successfully separated. These were set out in a row in the variety collection plot in the Orchard and a further batch of grafts is being raised.

(ii) *Rooting of lemon cuttings.*—From as many as 1,400 lemon cuttings planted periodically in the nursery area during the year for rooting, only 18 lemon cuttings planted during September struck root. Their progress was satisfactory.

(iii) *Layering in guava*.—Layering was successfully done in Lucknow No. 49 in July, September, December and January. The layers could be successfully separated four months after layering.

(iv) *Layering in lemon*.—Tongue layers were raised successfully when shoots were operated during July, September, October, December and January. It took about 3½ months for separating the layers from the parent tree.

(d) *Fruit plants released for planting in the valley villages.*—Please see under paragraph V (iii).

IV. *Subsidiary industries*—(a) *Dairy*.—Twenty-four she-buffaloes were maintained during the year till November 1951 when one buffalo died due to acute *Peritonitis*. Five uneconomical buffaloes were auctioned off in December 1951 as ordered by the Director of Agriculture, Madras. From January 1952, 18 she-buffaloes were maintained on this station. On an average, 10 animals were in milk during the year, yielding 26,598½ lb. of milk valued Rs. 6,629-7-0. The average total milk per day was 73·8 lb. and the average per animal per day worked out to 7·4 lb. There were seven calvings during the year and six deaths of buffalo calves. Four weaned male calves were auctioned off. The condition of the dairy animals was on the whole satisfactory.

(b) *Poultry*.—Three white leg horn cocks and 9 hens were maintained up to 1st September 1951 and afterwards the following chicks were obtained from Sugarcane Research Station, Anakapalle. In October; 28 numbers; in November 7 numbers and in December 22 numbers. In January 1952, 40 chicks died due to after effect of Ranikhet inoculations and subsequently 11 chicks died of cramps, thus bringing the stock to three white leg horn cocks, 10 hens, three cockrels and two pullets. It is proposed to increase the stock by getting fresh stock in September 1952 from Anakapalle. During the year, 1,381 white leg horn eggs were obtained of which 791 eggs were given for exchange with desi ones to the hillmen of the valley for hatching purposes, but from April 1952 this practice of giving eggs on exchange was stopped as ordered by the Director of Agriculture, Madras, and hereafter only cockrels will be supplied to hillmen. Stock position of poultry unit on 30th June 1952—Ten white leg-horn hens, three cocks, six pullets and cockrels.

(c) *Sheep*.—The condition of the sheep of Mandya breed was satisfactory. Thirteen lambs were dropped during the year of which there were three deaths.

<i>Stock position.</i>										
<i>Original stock obtained in 1949.</i>										
1. Rams	..	..	..	..	..	..	..	..	..	2
2. Ewes	..	..	..	..	..	..	..	..	..	10
<i>Born on the station.</i>										
1. Males	..	..	..	..	..	..	..	..	..	28
2. Females	..	..	..	..	..	..	..	..	..	28
Total ..										77

Died on the station.

1. Males	12
2. Females	15
Total	27

Disposals from the station.

1. Died	27
2. Rams which are not true to type were castrated and auctioned off as per Sheep and Goat Development Officer's suggestion ..	9
3. Distributed to hillmen (2 rams plus 8 ewes)	10
Total	46

Stock position on 30th June 1952—77—46=31 consisting of 2 rams, 18 ewes, 5 male lambs and 6 female lambs.

One shearing was done during the year and 23 lb. of wool were obtained.

(d) *Pisciculture.*—The fingerlings of mirror carp introduced during the previous year and earlier years are thriving well. Two fishes of this variety which have attained sizable growth of about 12 inches length and 5 lb. weight (each) were netted and sold. Further nettings were stopped to intensify their breeding in large numbers, as suggested by the Fisheries department.

V. *Demonstration and propaganda.*—There were two Farm Managers in charge of district work till the end of December 1951 but one post was retrenched as per G.O. Ms. No. 5716, Development, dated 16th November 1951. There is only one Farm Manager now in charge of district work; he toured all the twenty villages in the jurisdiction and attended to the following items of work:—

(i) Distribution of improved seeds during 1951-52—

Serial number and variety.	Quantity.	Area covered.
	LB.	ACS.
1 Paddy AKP. 2	1,459	33.60
2 „ SR. 26-B	1,888	43.60
3 „ Ninnidhan	1,680	42.20
4 „ MTU. 3	512	17.00
5 „ Battadhan	560	18.00
6 Ragi-Mudaimuskal (mass selected).	180	18.00
7 Ragi—Jagaralamandya (mass selected).	244	24.00
8 Niger (mass selected)	200	20.00
9 Samai	200	20.00
10 Sunnhemp seed	200	10.00

Mass-selected seed in ryots' holdings and distributed amongst them.

11 Dry paddy	400	20.00
12 Ragi—Jagaralamandya	750	75.00
13 Pedda sama	710	71.00
14 Niger	835	83.50
15 Sunnhemp seed collected and distributed.	460	23.00

(ii) Introduction of new crops during 1951-52—

Serial number and variety.	Quantity.	Area covered.
	LB.	ACS.
1 Groundnut—TMV. 2	24	0.40
2 Kasigogu	34	3.65
3 Chillies (mass selected)	43	4.50

(iii) Introduction of fruit plants—

Serial number and variety.	Number of plants distributed.
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 Pineapple suckers	400
8 Banana suckers	946
9 Mango grafts	70
10 Drumstick cuttings	200
11 Collection of economic seeds:—	
1 Mango stones	3,000 No.
2 Tamarind seeds	188 „

(iv) *Compost work.*—During the year a special drive was given for compost making. Five hundred pits were arranged to be dug in all the valley villages from which 500 tons of compost was prepared and applied to crops. It is very pleasing to note that the hillmen have taken to it in earnestness and batteries of compost pits are a sight in every village.

(v) *Cattle manure preservation work.*—One thousand five hundred and eighty-one cattle sheds were tackled during this year in which litter was regularly arranged to be spread.

(vi) *Sale of artificial manures.*—Nil.

(vii) *Green manure work.*—The following items of work were done regarding green manure:—

(a) Sale of sunnhemp for green manure	200 lb.
(b) Green leaf manuring arranged for wet land	16.50 acres
(c) Sunnhemp applied as green leaf manure	78.30 „
(d) Sunnhemp sown as mixture with ragi for seed purposes	178.75 „
(e) Sowing of pure crops of sunnhemp for seed	2.00 „

(viii) *Vegetable work.*—The cultivation of exotic vegetables was encouraged in places where there were irrigation facilities, and the following areas were actually arranged under their cultivation:—

	ACS.
(a) Exotic vegetables	1.56
(b) Indigenous	5.00

(c) The following quantities of vegetable seeds were distributed free to the villagers in the valley:—

1 Cluster beans	1 lb.
2 Brinjal	1 „
3 Cucumber (fruiting)	1 oz.
4 Cucumber (culinary)	1 tola.
5 Bitter gourd	4 oz.
6 Serpent gourd	1 „
7 Peas	1 lb.
8 Pumpkin	1 „
9 Ash gourd	1 „
10 Radish	1 „
11 Tomato	1 „
12 French beans	1 „
13 Capsicum	1 oz.
14 Ridge gourd	1 „

(d) The following vegetable seeds were distributed free to the schools:—

	OZ.
1. Carrot	4
2 French beans	8
3 Cauliflower	2½
4 Brinjal	6
5 Snake gourd	2

(ix) *Control of pests and diseases.*—There was incidence of paddy case worm during the year and 5.00 acres of the crop were treated for this pest. Twenty-one lb. of zinc phosphide was sold to ryots during the year for rat control. The use of gammaxane on pests on food crops and vegetables was demonstrated and 5 lb. of gammaxane was sold to the ryots for pest control.

(x) *Exchange of white leg horn eggs.*—During the year exchange of white leg horn eggs was taken up, and 781 eggs were supplied to hillmen on exchange for hatching purposes.

(xi) *Hiring of tractor.*—The tractor has ploughed 155.99 acres of hillmen's land during the year. It was unfortunate that it could not be repaired by the Assistant Agricultural Engineer, Anakapalle, though there is a great demand for it from hillmen and though the Government have ordered collection of Rs. 2-8-0 per acre from hillmen and the rest of Rs. 3-8-0 from the District Collector.

(xii) *Tree-planting work.*—The following were the seedlings, etc., planted during July 1951:—

Serial number and name.	Number sown or planted.	Serial number and name.	Number sown or planted.
1 Mango grafts	50	1 Banyan stumps	190
2 Mango stones	9,805	2 Pungam seeds	52,960
3 Jack seeds	6,345	3 Silver oak seedlings	3,800
4 Pomegranate (rooted cuttings)	121	4 Tamarind seeds	14,200
5 Lemon layers	200	5 Delonix regia	280
6 Guava layers	27	6 Sandalwood seedlings	180
7 Grape vine cuttings	100	7 Nallamaddi	6,080
8 Papaya seedlings	208	8 Teak	5,200
9 Passion fruit seedlings	92	9 Sago palm	50
10 Rose apple seedlings	75	10 Leucanaglauca	57 lb.
11 Country pear cuttings	50	11 Camphor	70
12 Pineapple suckers	360	12 Thevetia	150
13 Plantain suckers	896	13 Thurakavapa seed	1,450
14 Jambolan	280	14 Mulberry cuttings	500
		15 Glyricidia seed	450
		16 Jatropah stumps	3,000
		17 Addasaram cuttings	6,660

ARAKU VALLEY,
12th August 1952.

K. BHUSHANAM,
Special District Agricultural Officer.

APPENDIX I.

STATEMENT OF RAINFALL DURING 1951-52.

Month.	Week.	7th June 1951 to 6th June 1952.		Average of the past six years.	
		Quantity in inches.	Number of rainy days.	Rainfall in inches.	Number of rainy days.
(1)	(2)	(3)	(4)	(5)	(6)
(i) South-west monsoon.					
June	7-13	0.90	2	1.86	3
	14-20	0.30	1	7.60	2
	21-27	4.24	6	1.94	4
June-July	28-4	0.09	..	1.53	3
	5-11	2.94	3	2.87	3
July	12-18	1.63	3	2.45	4
	19-25	7.62	6	2.15	4
	26-1	4.60	4	2.24	3
July-August	2-8	5.28	3	2.83	4
	9-15	3.59	3	2.56	3
August	16-22	2.47	4	1.22	3
	23-29	0.20	1	2.24	3
	30-5	1.10	4	1.05	3
August-September	6-12	1.95	3	1.04	2
	13-19	2.51	3	1.55	3
September	20-26	0.92	2	3.07	4
	Total	40.34	48	98.25	51

(ii) North-east monsoon.					
September-October	27-3	5.11	6	2.48	3
	4-10	1.53	3	0.98	2
	11-17	1.24	4	2.25	3
October	18-24	0.05	..	1.04	2
	25-31	0.31	1	2.16	1
	1-7	0.20	1	0.87	2
November	8-14	0.34	1	0.48	1
	15-21	..	..	0.17	1
	22-28	3.57	2	0.66	1
November-December	29-5	..	..	0.16	..
	6-12	..	..	0.01	..
	13-19	0.04	..	0.92	1
December	20-26	..	..	0.19	1
	27-3	..	..	..	..
	4-10	..	..	0.01	..
December-January	11-17	..	..	..	..
	18-24	..	..	0.01	..
	25-31	..	..	0.14	1
Total		12.39	18	12.53	19

(iii) Hot weather period.					
February	1-7	..	..	0.05	1
	8-14	..	..	1.01	..
	15-21	..	..	0.08	1
March	22-28	..	..	0.05	..
	1-7	0.25	1	0.06	..
	8-14	0.13	1	0.02	..
March-April	15-21	0.84	1	0.17	..
	22-28	..	..	0.28	1
	29-4	0.58	1	0.82	1
April	5-11	1.69	3	0.62	2
	12-18	1.23	2	0.76	2
	19-25	2.07	4	0.85	..

APPENDIX IV.

The following is a summary of the action taken and steps proposed to be taken to step up the revenues of the station :—

1. Nearly 1 ton of potato seed material was preserved on this station. If this quantity had to be got from Hosur it would have costed nearly Rs. 800 whereas the value of this material produced and preserved on this farm comes to nearly Rs. 400. Thus there is a saving of nearly half the amount per ton. If proper facilities like a pucca storage shed with racks are provided, all the seed material (nearly 4 to 5 tons) required for planting monsoon and winter crops can be preserved on this station.

2. Instead of leaving the vacant the area in which monsoon potato was raised, niger crop was taken which has given an additional income of nearly Rs. 100 per acre.

3. In the orchard more number of layers, grafts, etc. were taken from the promising fruit plants, and the cost of these comes to nearly Rs. 645.

4. In the wet land and dry land sunhemp was raised and ploughed in as green manure and this has increased the fertility of the soil. In the orchard also cover crops like *Calapogonium* were raised to enrich the soil. Sunhemp and *Sesbania* were also raised on field bunds for collection of seed.

5. When the paddy crop in about an acre was severely attacked by blast, it was pulled out, and the local variety *Sathikalu* was sown broadcast, though late in the season, and this has given an acre yield of 600 lb.

6. The areas under money crops like *Kasigogu* and sweet potato were slightly increased.

7. Considerable quantities of seeds of vegetables like brinjals, gourds, French beans and tomato were also produced on the farms.

8. Fruit plants like guavas, papayas and lemons were planted in odd corners and sides of foot-paths on the farms, thus utilizing vacant places.

9. The live-fences round the farms were strengthened to prevent trespass of cattle.

All the above practices and actions will be continued during the next year also.

10. The statement exhibiting the "expenditure and receipts" of the bulk crops is appended to the annual report as Appendix V.

APPENDIX II.

25. GENERAL ADMINISTRATION—DISTRICT ADMINISTRATION—MISCELLANEOUS ESTABLISHMENT—U.H. POST-WAR RECONSTRUCTION—II. PARTIALLY EXCLUDED AREAS—ARAKU VALLEY COLONIZATION SCHEME—

Expenditure.						RS. A. P.	
Pay of officers	..	..	..	..	..	5,595	8 0
Pay of establishment	..	..	..	..	..	25,395	3 0
Allowances	..	..	..	..	..	17,332	3 0
Other charges	..	..	..	..	..	37,313	12 9
XLVI. Miscellaneous—Miscellaneous Receipts—Agricultural Receipts—Araku Valley						19,531	2 1

APPENDIX III.

A NOTE ON THE ORIGIN OF THE ARAKU VALLEY SCHEME.

The Araku Valley Scheme was started in October 1944 with following main objects:—

- (i) Eradication of malaria from the Agency tracts;
- (ii) importation of people from plains for colonizing the surplus area in the Agency;
- (iii) protection of rights of hillmen; and
- (iv) control of the scheme of Agency development by the Agent to the Government, Visakhapatnam.

In G.O. No. 3373, Development, dated 3rd August 1944, a revised scheme was sanctioned for growing potatoes and vegetables for the army at Visakhapatnam, and work was actually started in October 1944. Potato was grown in an area of 20 acres and vegetables over 5 acres.

During the year 1945-46 with increased staff, an area of 230 acres was grown under potato and 55 acres under exotic vegetables; and 114 tons of potatoes and 30.5 tons of exotic vegetables were produced and supplied to the army at Visakhapatnam. During the same period a scheme for the uplift of hillmen was sanctioned to study their economic condition and effect improvement.

With the cessation of hostilities, the programme of work for 1946-47 took a different shape. Only bulk cultivation with food crops was taken up in an area of 633 acres. Besides, the hillmen uplift work was intensified during this period.

Based on the experience of the previous two years, a definite programme of work was chalked out during 1947-48 in Director of Agriculture's No. E. 1800/47, dated 31st May 1947, and approved in Government Memorandum No. 1945 P. & D., T. 47-7, Public (P. & D.), dated 4th August 1947. This report covers the fourth year of work of the above programme.

During the year under report, a total area of 98.59 acres under departmental cultivation was distributed over three different blocks, called "Kothavalasa block" consisting of 8.38 acres of wet land and 28.85 acres of garden and dry land, "Kantabamsaguda block" consisting of 10.00 acres of dry land under cultivation, 4.00 acres under pine apple cultivation and 26.50 acres under pastures, and "Padmapuram block" consisting of 18.24 acres of orchard and 2.58 acres of fodder block acquired last year for growing permanent fodder crops.

APPENDIX V.

STATEMENT SHOWING BALANCE SHEET OF BULK CROPS ON THE FARMS (KANTABHAMSAGUDA AND KOTHAVALASA FARMS).

Crop.	(1)	Area cultivated in acres.	(2)	Preparatory cultivation.	(3)	Manures and manuring.	(4)	Seeds and sowing.	(5)	After cultivation.	(6)	Irrigation.	(7)	Harvesting thrashing and cleaning, etc.	(8)	Total cost of production per acre.	(9)
First crop wet paddy ..	..	780	0.59	27 3 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Second crop wet paddy ..	..	0.62	0.14	48 7 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Dry paddy ..	..	430	0.11	20 13 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Ragi ..	..	980	0.13	38 11 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Potato ..	..	494	0.03	33 5 4	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
II. Vegetables—																	
Brinjals ..	..	..	0.59	35 8 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Lady fingers ..	..	..	0.14	22 8 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Gourds ..	..	..	0.20	115 10 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Tomato ..	..	..	0.11	115 10 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Radish ..	..	..	0.045	78 9 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Cabbage ..	..	..	0.35	88 12 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Caulliflower ..	..	..	0.13	128 2 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Knol-khol ..	..	..	0.30	76 7 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Carrot ..	..	..	0.075	68 2 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
French beans ..	..	..	0.10	42 8 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Onion and garlic ..	..	..	0.12	58 5 4	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Greens ..	..	..	0.03	33 5 4	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Other miscellaneous crops—																	
Samal ..	..	..	0.50	20 13 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Yam ..	..	..	0.20	17 13 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Wheat ..	..	..	1.20	23 6 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Sugarcane ..	..	..	0.05	218 12 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Niger ..	..	..	0.40	15 2 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Groundnut ..	..	..	0.40	25 10 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Street potato ..	..	..	0.30	47 15 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Banana ..	..	..	0.25	45 0 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Kasigogu ..	..	..	0.20	22 8 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.

Crop.	(1)	Produce yield in lb. per acre.	(10)	Total value of produce per acre.	(11)	Profit per acre.	(12)	Loss per acre.	(13)	total profit or loss accruing to the station.	(14)	Remarks.	(15)
First crop wet paddy ..	..	..	..	321 11 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Second crop wet paddy ..	..	..	..	295 0 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Dry paddy ..	..	..	..	205 12 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Ragi ..	..	..	..	403 7 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Potato ..	..	..	..	..	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
II. Vegetables—													
Brinjals ..	..	..	..	619 12 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Lady fingers ..	..	..	..	210 2 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Gourds ..	..	..	..	407 9 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Tomato ..	..	..	..	136 11 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Radish ..	..	..	..	2,707	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Cabbage ..	..	..	..	15,723	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Caulliflower ..	..	..	..	3,583	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Knol-khol ..	..	..	..	890 12 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Carrot ..	..	..	..	533 8 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
French beans ..	..	..	..	731 13 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Onion and garlic ..	..	..	..	201 14 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Greens ..	..	..	..	275 0 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Other miscellaneous crops—													
Samal ..	..	..	..	179 2 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Jonna ..	..	..	..	45 0 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Wheat ..	..	..	..	21 14 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Sugarcane ..	..	..	..	248	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Niger ..	..	..	..	1,432 12 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Groundnut ..	..	..	..	240	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Sweet potato ..	..	..	..	9,223	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Banana ..	..	..	..	4,200	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.
Kasigogu ..	..	..	..	270 0 0	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.	ES. A. P.

Total profit Rs. 2,868-4-0 (minus) loss Rs. 3,239-12-0.

Net loss

Add one-third miscellaneous cultivation expenses.

565 0 0

If one-third of the supervision charges also are to be deducted, which comes to Rs. 4,150-15-0, the total loss comes to Rs. 4,718-5-0.

NOTE.—(+) Profit.

(-) Loss.

**ANNUAL REPORT OF THE DEEP WATER RICE STATION, PULLA
(WEST GODAVARI DISTRICT), FOR THE FASLI 1361 (1st JULY 1951
TO 30TH JUNE 1952).**

This is the second annual report of the Deep water Rice Station started on the 20th December 1950.

2. *Season.*—There was a total rainfall of 35.30 inches during the period under report (Table I). The seasonal conditions in the West Godavari district in general were normal for both the first and second crops of paddy. As far as the Collair tract was concerned the lake was in full from 26th July onwards and water level reached 3½ feet (vide Table II) and it took about 75 days for the water to recede to normal depths. The usual period of commencement of floods in the Collair zone is from the third week of August, which continues for some time and then recedes after a pause of 15 days at the most. This year, however, was an abnormal year with floods even from the very start of the paddy crop, which therefore offered the unique opportunity for studying the resistance of the varieties raised under extreme adverse conditions. As regards the second crop, the season was generally very favourable in and around Collair. But in the Eastern delta and parts of Western delta, it failed for want of sufficient supply of water, the losses rising up to 50 per cent on this account.

TABLE I.— *Statement of rainfall deep water rice station, Pulla.*

Month.	1951-52.			Normal average of ten years.
	Week.	Quantity in inches.	Number of rainy days.	
(1)	(2)	(3)	(4)	(5)
<i>South-west monsoon.</i>				
June	7-13	0.89	1	1.10
	14-20	..	..	0.36
	21-27	1.36	3	1.68
June-July	28-4	0.17	1	0.94
	5-11	0.16	1	1.88
	12-18	2.23	2	1.75
July-August	19-25	2.79	4	2.56
	26-1	3.06	3	1.57
	2-8	1.69	5	1.21
	9-15	0.72	3	1.59
	16-22	2.46	1	1.59
	23-29	0.42	1	2.90
August-September	30-5	1.29	4	1.96
	6-12	0.79	3	2.33
	13-19	0.20	1	1.70
	20-26	2.19	2	2.09
		20.42	35	27.21
<i>North-east monsoon.</i>				
September-October	27-3	3.11	7	1.87
	4-10	2.57	2	0.88
	11-17	3.48	4	2.72
	18-24	2.22	1	1.03
	25-31	0.35	1	0.90
November	1-7	0.42	2	1.03
	8-14	0.38	2	0.74
	15-21	Nil.	Nil.	0.30
November-December	22-28	Nil.	Nil.	0.02
	29-5	Nil.	Nil.	0.07
	6-12	Nil.	Nil.	Nil.
	13-19	0.42	1	0.09
	20-26	0.58	2	0.05

1951-52.					Normal average of ten years.
Month.	Week.	Quantity in inches.	Number of rainy days.		
(1)	(2)	(3)	(4)	(5)	
North-east monsoon—cont.					
December-January ..	27-3	Nil.	Nil.	Nil.	
	4-10	Nil.	Nil.	0.028	
	11-17	Nil.	Nil.	Nil.	
	18-24	Nil.	Nil.	Nil.	
	25-31	Nil.	Nil.	0.091	
		13.53	22	9.319	
Hot weather period.					
February 1952	1-7	Nil.	Nil.	Nil.	
	8-14	Nil.	Nil.	0.10	
	15-21	Nil.	Nil.	0.18	
	22-28	Nil.	Nil.	Nil.	
February-March	29-6	Nil.	Nil.	Nil.	
	7-13	Nil.	Nil.	Nil.	
	14-20	Nil.	Nil.	Nil.	
March-April	21-27	Nil.	Nil.	0.28	
	28-3	Nil.	Nil.	0.62	
	4-10	Nil.	Nil.	0.43	
	11-17	Nil.	Nil.	0.12	
April-May	18-24	Nil.	Nil.	0.07	
	25-1	Nil.	Nil.	0.10	
	2-8	Nil.	Nil.	0.01	
	9-15	Nil.	Nil.	0.20	
	16-22	0.62	1	0.09	
May-June	23-29	Nil.	Nil.	0.61	
	30-6	0.73	1	1.00	
		1.35	2	3.81	
Abstract—					
South-west monsoon		20.42	35	27.21	
North-west monsoon		13.52	22	9.319	
Hot Weather period		1.35	2	3.81	
		35.30	59	40.339	

TABLE II.—Depths of under in the fields from July 1951 to October at Deep Water Rice Station, Pulla.

Date.	Depths of water.	
	FEET. INCHES.	
26th July 1951	1	9
31st July 1951	2	9
8th August 1951	3	2
15th August 1951	2	8
23rd August 1951	2	4
31st August 1951	2	0
8th September 1951	1	10
15th September 1951	1	6½
23rd September 1951	0	10
30th September 1951	0	10
8th October 1951	1	2
15th October 1951	1	4
23rd October 1951	1	0

Date of transplanting of cultures—2nd July 1951.

3. *Cultivation routine.*—For the first crop, the farm fields were puddled thrice with country plough and then bunds trimmed and fields levelled. As regards the second crop, the fields were ploughed four times, levelled and weeds completely removed. The fields were manured with 150 lb. of superphosphate at the time of final ploughing and 100 lb. of ammonium sulphate at first weeding.

Ninety-eight varieties, types and cultures were sown in first crop and 11 varieties, 171 single plant selections and 49 cross progenies in second crop. Nurseries for the second crop were sown in two stages, the first sowing on the 26th December 1951 and the second on the 6th January 1952.

Seed beds of the first crop were sown on 9th and 10th May 1952 in 27 plots for bulk and 88 plots for study material. The seedlings were quite healthy except 0614 AR-I which were infected with leaf spot and appeared stunted in growth.

4. *New introductions.*—The problem during the first crop season in the Collair (the deep water area extending over a lakh of acres) is to find out a variety which can withstand temporary submersion under water which rises up to 3 or 4 feet in the monsoon season commencing from the end of August. There is a depression with sweet water accumulation which is connected to the sea by a small drain emptying into it. The usual floating rices of Assam are not useful in this place. The levels of the floods do not remain constant nor increase as in Assam. The floating types of rices, therefore, come down when the water level recedes and may even perish. With a view to study and find out promising and useful types for this condition, a large amount of material was studied. The varietal collections under study in the station included five strains from Assam, five from Siam, four from Burma and three from Madras State which are reputed to stand submersion of different depths. It was proposed to test their capacity to withstand floods and their ability to rejuvenate after floods recede. Of all the varietal collections, T. 2205 of Assam proved to be very promising. It gave the yield of 1,140 lb. per acre, while the crop on the ryots' fields either completely perished or gave but negligible yields. MTU. 19 and *Burma Akkullu* withstood the flood next in order. But both of them were severely affected by stem borer in common with the area where MTU. 19 is grown this year, resulting in low yields of 400 to 600 lb. per acre. It is therefore obvious that the seasonal factors were responsible for the low yield due to stem borer and the resistance to submerged conditions is inherited in the varieties. AR. 1, AR. 108-1, AR. 123, AKP. 11 and AKP. 12 during the time of flood appeared to do well and always stood above floods with 5 to 8 tillers. But when the floods receded, the vegetation decayed and only very poor yields were realized from the few surviving productive tillers.

As a result of the very early receipt of floods, a very large number of varieties succumbed as they did not make any growth. If floods had commenced in August, as in the normal season, there may be a different experience. Even under these exceptionally severe conditions six of the types did very well (vide Table III). The rest gave very poor yields not worth recording. The studies are being continued in June 1952. All these varieties and twenty more have been added to the collection and planted.

TABLE III.—Showing performance of deep-water types and strains.

	Yield per acre.	Percentage of stem-borer.
T. 2,205	1,222	48
AR. 108-1	550	70
AR. 123	610	70
Burma Akkullu	410	57
MTU. 19	625	53
MTU. 16	300	63

Yield trials in second crop.—The second crop area in the Collair, called permanent *dahwa* zone, is fed by a high level channel from the Godavari and when the water level is low in the channel, the high level fields usually suffer from water shortage during the last stages of the crop. To see if any of the short duration strains already issued would be useful in this tract, nine strains from other stations were tried for the first time. In a bulk plots trials PLR. 2 (Chitrakali) was promising and gave an yield of 3,400 lb. grain per acre and TKM. 3 (Swarnavari) gave 2,907 lb. It appeared as though these may be useful. The results of comparative yield trials are set out in Table IV. PLR. 2, 15 days shorter than MTU. 15 and Nallarlur, was promising.

TABLE IV.—Results of trials of short duration strains.

Second crop 1951-52.							
Size of plot—35' x 6'. Layout—11 x 4 Randomized blocks.		Sowing—1st January 1952. Planting—6th February 1952. Harvesting—1st to 10th May.					
Particulars.	MTU. 15.	SLO. 12.	Nallarlur (local.)	MTU. 9.	TKM. 4.	N x 60.	SLO. 16
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Grain—							
Acre yield in lb.	3,623	2,867	3,339	3,269	2,124	3,339	3,068
Percentage on general mean.	125.1	99.0	115.3	112.9	73.4	115.3	106.0
Straw—							
Acre yield in lb.	3,682	4,154	4,012	4,154	3,068	2,502	3,245
Percentage on general mean.	109.0	122.9	118.7	122.9	90.8	74.0	96.0
	Co. 13.	TKM. 3.	PLR. 2.	Palabenda.	General mean.	Standard error.	P. value attached to each (P=0.05)
	(9)	(10)	(11)	(12)	(13)	(14)	Critical difference (P=0.05)
Grain—							
Acre yield in lb.	2,077	1,947	3,292	2,903	2,896	Yes.	19.7
Percentage on general mean.	71.7	67.2	113.7	100.2	100.0	..	
Straw—							
Acre yield in lb.	2,502	2,207	3,587	4,059	3,380	Yes.	20.90
Percentage on general mean.	74.0	65.3	106.2	120.1	100.0	..	
Conclusion—							
Grain—MTU. 15, Nallarlur (local), N x 60, PLR. 2, MTU. 9, SLO. 16, Palabenda, SLO. 12,							
TKM. 4, Co. 13, TKM. 3.							
Straw—SLO. 12, MTU. 9, Palabenda, Nallarlur (local), MTU. 15, PLR. 2, SLO. 16,							
TKM. 4, N x 60, Co. 13, TKM. 3.							

5. Pure line selection.—Nallarlur is the important variety grown in this area. One hundred and sixty-eight cultures of this variety selected in the last second crop season were sown and transplanted. Their performances are shown in Table V. Eighty-two cultures gave yields higher than the standard and forty-five promising cultures were carried forward for further study.

TABLE V.—Performance of Nallarlur single plingle-pl ut selections

Increases over Nallarlur bulk as Standard expressed as percentage.		Frequency.
Below Nallarlur and on par with it		86
1-5		6
6-10		13
11-15		12
16-20		14
21-25		17
26-30		10
31-35		8
36-40		2

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6. Hybridization (First crop).—Forty-two cross progenies between deep water Assam paddies and local strains made in the previous year were kept growing at Maruter and Coimbatore and with the opening of this station these were tried on the new station. The floods began 20 days after planting and reached a level of 3 feet and more in 15 days and continued for another 40 days. Thus the progenies had a severe test of deep-water conditions every 20 days after planting. It was found that eight progenies of cross between PTB. 15 and Co. 14 withstood these conditions and came to maturity with a fair number of tillers also. But there was severe stem borer up to 60 per cent of these progenies reducing the final yield. Even with this infestation, 400 to 500 lb. of yield per acre could be got. (Vide Table VI.) These were again planted in June 1952.

TABLE VI.—Showing performance of deep-water cross progenies (single plots).

Size of plot—10 cents. Sown—10th May 1952.		Transplanted—14th June 1952. Harvested—25th November to 16th December 1952.	
Cross progeny number.	Percent of stem-borer.	Yield per acre.	
		LB.	
1423		60	525
5051		48	370
3489		55	360
5053		55	380
1311		50	480
3452		60	380

Besides stem-borer most of these were damaged by birds also being the only patch of ripe grain.

7. Second crop.—(i) With a view to improve the quality of Nallarlur a common variety in the Collair with coarse red rice, crosses were effected between MTU. 9 and Nallarlur. These were studied at Maruter in previous years and promising selections made; and these were transferred to this station and studied in the second-crop season. Some of these progenies were found to be good, giving as good a yield as MTU. 9 and MTU. 15 and better than Nallarlur. The studies will be continued. Short duration cross progenies between wild rice (*Oryza sativa var spontanea*) and Co. 13 were tried at this station to see if they are better than Nallarlur. Seven of them gave as good a yield at MTU. 9 and better than Nallarlur. (Vide Table VII).

TABLE VII.—Performance of cross progenies.

Size of plot—20' x 6'. Sown—6th January 1952. Transplanted—6th February 1952.		Harvested—5th and 6th May 1952. Lay out—X, ABC X (x Nallarlur (burk), ABC cross progenies).	
Culture number.	Yield per acre.	Over Nallarlur standard.	
		LB. OZ,	
N x 60		11 3	30
12257		8 1	8
12396		8 12	12
3082		12 4	56
6775		8 9	30
6907		12 11	52
6804		10 13	42

(ii) N x 60 a progeny with fine rice and heavy tillering which was fixed from the cross between Kasipichodi and Nallarlur was raised on this station. It came to harvest on, 21st April 1952 that is ten days before the closure of canal and 15 days earlier than Nallarlur. Another bright feature is that it gave a very

satisfactory yield of 3,300 lb. per acre. Its grain is very fine and it fetches 15 per cent better price than the other dalwa varieties. After decontrol, the price of *Nallarl* has come down to Rs. 14 and the cost of $N \times 60$ is still ruling at Rs. 20 per bag of 166 lb. The cooking quality of this culture is very good and it can be consumed locally. But one defect is that even after cattle threshing, the long awns which it possess, are not removed completely. Hence the standard size gunny can hold only about 140 lb. of grain instead of the usual 160 lb. It was noticed that the cross is still heterogenous with regard to glume colour. Further selections were made to purify the culture. One of the objects of the station is to evolve a short-duration type which will come to harvest by the 30th of April on which date the canals are closed every year. Two years' results reveal that $N \times 60$ fulfilled this object as it came to harvest ten days before the closing of the canal. Moreover as it is a cross between *Nallarl* and *Kasipichodi* it appears to have inherited the drought resisting capacity of *Nallarl* as well as its resistance to pests and diseases. Further crosses were effected between *Nallarl* and MTU. 15. Crossed seed was secured for further study.

8. *Seasonal trials with $N \times 60$.*— $N \times 60$ was sown in two stages, first sowing was on 2nd January 1952 and second sowing on 12th January 1952, transplanted on 2nd February 1952 and 13th February 1952 respectively. The aim was to find out the suitable time for planting this variety and its susceptibility to stem borer. It was found that this season both the plantings were fair and gave a good yield and there was not much of stem-borer. (Vide Table VIII).

TABLE VIII.—Seasonal planting of $N \times 60$

	First Planting.	Second Planting.
1 Date of sowing	2nd January 1952.	12th January 1952.
2 Date of planting	2nd February 1952.	13th February 1952.
3 Date of flowering	20th March 1952.	25th March 1952.
4 Date of harvest	21st April 1952.	2nd May 1952.
	LB.	LB.
5 Dry weight per acre	3,500	3,143

9. *Other crops.*—Three thousand seedlings of *Gliricidia* were planted all round the farm and along the Government channel bund up to the boundary. Due to the unusual floods this year immediately after planting, a large number however perished. In the first week of June 1952 seed beds with *Gliricidia* and with *Sesbania* were sown. The seedlings came up well. They would be planted in the farm as soon as rains are received in July 1952. Twelve coconut seedlings were planted on the elevated piece of ground. Water chest nut was introduced in the pond. No germination was however noticed even after two months.

10. *Pests and diseases.*—In the case of first crop MTU. 3, MTU. 19 and Burma Akkullu were affected by stem-borer and the percentage of damage reached 50 per cent in stray plots. This year it was observed that MTU. 19 in Krishna district also suffered badly. In the second crop Co. 13 and TKM. 4 *Yerrasannavadlu* were affected by paddy blast and it spread to MTU. 9 and MTU. 15.

Seeds before sowings were treated with Agrosan G.N. Gamaxene D. 025 was dusted on the first crop seed beds to prevent infestation of swarming caterpillar. Rats were killed and controlled from multiplying more by baiting them with zinc-phosphide.

11. *Seed distribution.*—Eleven thousand pounds of paddy seed was distributed. Deep-water cultures were supplied to ryots of different places at their request for trial. These ryots are very much interested in cultivation and the performance in their fields will be helpful in recording the results of these cultures next year. Eight pounds of vegetable seeds were distributed.

12. *Financial statement.*—The financial statement for the year 1951-52 is furnished in Appendix I. The steps to increase the revenue are also indicated. (Appendix II.) The cost of cultivation is given in Appendix III.

DEEP-WATER RICE STATION,
PULLA.
5th August 1951.

G. VENKATANADHACHARY,
Assistant-in-charge

AGRICULTURAL COLLEGE AND
RESEARCH INSTITUTE,
LAWLEY ROAD P.O., COIMBATORE,
21st August 1952.

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

APPENDIX I.

FINANCIAL STATEMENT OF DEEP-WATER RICE STATION, PULLA, FROM 1ST JULY 1951 TO 30TH JUNE 1952).

Serial number and particulars.	Amount.	Head of account.
	RS. A. P.	
1. Pay and allowances—		
Pay of establishment (temporary)	3,344 7 0	40-C. Agriculture—Experimental Farm—A. Agricultural Research Station—Scheme for opening of a small station for work on deep-water paddies in West Godavari district.
Dearness allowance	1,443 9 0	
Travelling allowance	652 4 0	
2. Contingencies—		
Petty construction and repairs	1,985 8 0	
Other contingencies	222 6 6	
Apparatus and materials	177 6 6	
Dead stock	6,630 13 9	
Working expenses	5,979 2 0	
Other miscellaneous charges (rent)	595 0 0	
Dearness allowances	1,034 10 0	
	16,624 14 9	
3. Receipts—		
Miscellaneous	19 4 0	XXIX. Agriculture—Agricultural Receipts.
Value of produce transferred to district officers.	3,346 12 0	
	3,366 0 0	

APPENDIX II.

EFFORTS MADE TO INCREASE THE REVENUE OF THE STATION.

A. Wells.—No steps were taken in digging wells because this is a temporary farm. The storage capacity of the existing tank is increased by raising bunds enclosing the tank which can irrigate the first crop nurseries.

B. Growing of crops and reduce the fallow period.—In both first and second crop seasons paddy crops raised are covering the whole area of the farm. The interval of one month, between crop and crop is required for preparatory cultivation and so no crops are raised.

C. Avoiding wastage etc.—Rogues, weeds, etc., removed from the farm and waste straw from cattle shed were converted into compost by pit system.

D. Reducing the cost of production where possible.—(1) Three pairs of buffaloes were purchased during the fasli. In last fasli the cattle were hired out for ploughing and Rs. 500 were being spent. Some of this amount was saved and cost of production is reduced during this fasli.

(2) Yield is increased by the application of 150 lb. of super phosphate and 100 lb. of ammonium sulphate to the second crop paddy.

(3) By growing vegetables and selling them and by sale of fish in tank, the income of the farm was Rs. 19 on this account.

APPENDIX III.

COST OF CULTIVATION PER ACRE AT DEEP-WATER RICE STATION, PULLA.

									Second crop rice.
									RS. A. P.
Share of permanent improvements	..	..	..	..	..	..	..	..	Nil.
Preparatory cultivation	..	..	..	..	..	..	..	..	34 12 0
Manures and manuring	..	..	..	..	..	..	..	..	30 0 0
Seeds and sowing	..	..	..	..	..	..	..	..	11 5 0
After-cultivation	..	..	..	..	..	..	..	..	5 10 0
Irrigation	..	..	..	..	..	..	..	..	1 6 0
Harvest-threshing, cleaning, etc.	..	..	..	..	..	..	..	..	33 1 0
									116 2 0

Produce—								Value
Grain 2,940 lb. per acre	..	..	..	..	..	..	..	365 4 0
Straw 5,000 lb. per acre	..	..	..	..	..	..	..	20 0 0
								385 4 0
Less expenses per acre	..	..	..	..	..	..	..	116 2 0
Balance Profit	..	..	..	..	..	..	..	269 2 0

Rates—

Grain at Rs. 20-11-0 per bag of 166 lb.
Straw at 250 lb. per rupee.

N.B.—In the first crop, the entire area was devoted to experiments.

ANNUAL REPORT OF THE AGRICULTURAL RESEARCH STATION,
SATYAMANGALAM, FOR THE YEAR 1951-52 (FASLI 1361).

Introduction.—The Agricultural Research Station was sanctioned in G.O. Ms. No. 974, dated 12th May 1951, at the first instance for a period of one year on a temporary basis on leased lands with a grant of Rs. 47,500 towards non-recurring and Rs. 15,000 towards recurring expenses. The following staff was sanctioned: one Farm Manager, one Analyst, one clerk, one typist, two fieldmen, two maistri, one attender and two peons and the scheme was started on 7th August 1951 when the analyst joined duty at Coimbatore. The object of the scheme is to study the changes in the condition of the soil on the advent of irrigation and to find out suitable crops and manurial requirements for the Lower Bhavani Project ayacut. The farm is situated half a mile south of Satyamangalam village on the eastern side of the Satyamangalam-Erode road and is in one block, 50 acres in extent. There are four wells in the area, of which only two, in S. Nos. IB and 27 have some water. There was no water even during rainy season in the well in S. No. 31-A, while there was only a small spring in 30-C. The garden crops were irrigated with the limited amounts of water available in the two wells in S. Nos. IB and 27. Of the total area of 50 acres, 10.5 acres can be said to be under garden land cultivation being irrigated by wells. About 15 acres are reported to belong to Government having been assigned to the ryots temporarily under the project conditions without any patta right and resumption proceedings in respect of these are in progress.

2. Season and rainfall.—From a perusal of the rainfall records it is clear that the year had an abnormally low precipitation of 18.90 inches as compared to 66.32 inches received during 1950-51 and the average for the past ten years is 33.398 inches. The total rainfall was 7.23 inches in the month of November 1951, while October 1951 and January 1952 had no rains. In 1952, March was completely dry while the two months of April and May got only 1.65 inches of rain compared to over 12 inches received last year and to over 6 inches the average for the past ten years. The rains received were not useful and were quite unreliable. Thus, the year on the whole was bad for both the dry and garden land ryots. Statement showing the weekly rainfall is given, for the year 1951-52, as also for the previous year 1950-51, along with the average for the past ten years (Appendix V).

The annual average for the past ten years excluding 1951-52 is 33.398 inches.

3. Resume of work done—General.—At the time of taking over the farm the standing crops in the lands were—Ragi in about 2.64 acres, cholam in half an acre, tobacco nursery in about 3 cents and a few standing banana plants in about 1 cent.

Within about a month of taking over the lands rains were received, which necessitated the immediate sowing of dry crops, tenai, samai, maize, horsegram, gram, cowpea, lab-lab and sunnhemp, as pure crops and cholam and cumbu as mixed crops with cowpea, lab-lab, sunnhemp and gingelly. Total area thus cropped was about 41 acres of dry land. Due to non-receipt of rains from December 1951 the dry crops that gave very good promise at the start had a bad set back. Except, mai (local variety), cumbu, (Co. 2 and Co. 3) and tenai (Co. 1) which gave low yields of grain, other crops failed. Cholam and maize harvests were only of straw value.

In the garden land area tobacco was planted in about 3 acres and cotton in about 80 cents. Since the season for other food crops had passed, the area under tobacco had to be increased. Bananas were planted in 8 cents and 500 Sesbania seedlings planted for seed purposes. Water was drawn by mhotes with hired pairs of bullocks irrigating these garden crops. Of all the garden crops tobacco had a good

stand, the best being in S. Nos. 27 and IB. For want of water in the well in S. No. 30 the tender tobacco plants had to be abandoned without irrigations. However, out of a total area of 2.81 acres planted to tobacco an aggregate yield of 1,710 lb. was recorded. With the selection of suitable varieties there is good prospect for tobacco growing provided availability of water for irrigation is secured.

Bulk sowings were given prominence during the year, as water from the Lower Bhavani Project canals would be made available only from September 1952 and since the sources of well water-supply were most unreliable. The programme for experimental cultivation is under preparation and experimental work will start very soon.

Notwithstanding the above mentioned difficult position for experimental cultivation a few agronomic trials were taken up as detailed below:—

(1) Madras Uganda was grown as a summer crop and was sown on 15th March in 'Masipattam' as a new trial for the tract. It has come up very well so far, the plants are in flowers and bolls. There is an indication of a bright future for this 'Masipattam' cotton to be grown with irrigation and the observations are watched with interest.

Details of the trial.—Cotton is usually sown in this tract by September-October. The new trial with M.U.I. is to find out its suitability for the locality as an off-season crop. It was sown in March as a bulk crop.

(2) Observation plots of cholam were laid and three strains, viz., Co. 9, A.S. 8155, A.S. 8159 given by the Millet Specialist were tried with the local as control. The local was noticed to be earlier by a few days. More lodging was noticed in A.S. 8159. The yields recorded in each of the plots, five cents in area, were—

	I Block.	II Block.	Yield per acre.
	LB.	LB.	LB.
1 Cholam Co. 9	73	62	1,350
2 Cholam A.S. 8155	58½	77½	1,360
3 Cholam A.S. 8159	70	59	1,290
4 Cholam local Vellai	64	71	1,350

There was no difference in the yield among different strains.

Besides taking up the various preliminaries connected with the opening of a new research station, the following main items of works were attended to:—

(i) *Livestock.*—One pair of work animals was purchased and properly housed in a kutchra shed specially built for the purpose in the farm. Proposals to purchase three more pairs are put up for due sanction in this year 1952-53.

(ii) *Dead stock.*—Office equipments were being purchased as and when the need for the same arose. Ploughs and other implements are being purchased when their requirements are felt. A departmental oil engine was installed in S. No. I-B to facilitate irrigation.

(iii) *Miscellaneous—Parcelling of lands.*—As a preliminary for parcelling of lands contour levels were taken to facilitate the division of the fields into convenient plots according to contours and a contour map was also prepared. Proposals for dividing the fields into convenient plots with reference to the contours are made and the work will be attended to as soon as necessary sanction is accorded.

Fencing the farm area was done with the local 'Kalli' *Euphorbia antiquorum*, 'Kiluvai' *Commiphora berryi* and the available thorny bushes in the farm. Due to cattle and human trespass the live-fence planted are noted to be perishing. The need for fencing with a strong fence such as barbed wire is felt essential.

Initial picking of stones and pebbles over an area of 35 acres was done and the picked up stones were formed into temporary bunds along the field borders.

A plan of the Agricultural Research Station is appended (Appendix IV) to this report besides a short account of the origin and objects of the Agricultural Research Station, embodying the general climate and topography prevalent in the ayacut area comprising the Lower Bhavani Project (Appendix D).

RECEIPTS AND EXPENDITURE.

Expenditure.						RS. A. P.
Pay of establishment	..	..	..	..	..	4,890 4 0
Allowances	..	..	..	..	..	2,734 9 0
Contingencies	..	..	..	..	..	5,599 14 3
Total ..						13,224 11 3
Receipts	..	..	..	..	..	1,059 9 8

Cumbu straw and the undisposed tobacco were not taken into consideration.

(b) *Chemical.*—(i) Two samples of water collected from the two wells in Survey numbers I-B and 30 respectively of the farm area, were analysed. The results are—

TABLE I.—The Chemical Composition of well water.

Total solids.	No. I From S. No. I-B 67.2.	No. II From S. No. 30 43.6 parts per 100,000.
Expressed as salts—		
Calcium bicarbonate	21.88	20.25
Magnesium bicarbonate	21.86	13.18
Sodium bicarbonate	14.36	15.11
Sodium sulphate	7.31	0.99
Sodium chloride	15.22	11.70
Total ..	80.63	61.23

The data indicate that the waters are suited for irrigation and other farm purposes.

(ii) Due to the standing crops of ragi and cholam, the initial soil samples could not be collected from all the survey numbers of the station. Samples of soil were however collected from each of the dry and garden land areas of the station and analysed for their various constituents both mechanical and chemical. The figures of analysis are—

TABLE II.—The results of analysis of soils of agricultural Research Station Satyamangalam

Expressed as percentages on oven-dry basis at 100° C.				
Depth Lab numbers.	Dry area.		Garden area.	
	0—9" (1)	9"—18" (2)	0—9" (3)	9"—18" (4)
	PER CENT.	PER CENT.	PER CENT.	PER CENT.
Mechanical analysis—				
Clay	8.08	8.88	14.09	25.81
Silt	5.63	5.57	4.43	3.99
Fine sand	41.30	28.59	34.63	39.36
Coarse sand	44.37	57.94	47.33	39.39
Acid solubles	0.62	..	..	1.45
Total ..	100.00	100.98	100.47	100.00

Depth Lab numbers.	Dry area.		Garden area.	
	0—9"	9"—18"	0—9"	9"—18"
	(1)	(2)	(3)	(5)
	PER CENT.	PER CENT.	PER CENT.	PER CENT.
Chemical analysis—				
Iron oxide Fe_2O_3 ..	2.26	1.64	2.84	4.21
Alumina Al_2O_3 ..	3.82	3.66	4.72	8.26
Lime CaO ..	0.22	0.16	0.40	0.30
Potash K_2O ..	0.19	0.10	0.22	0.26
Soda Na_2O ..	0.10	0.15	0.24	0.37
Sulphuric acid SO_3 ..	0.03	0.03	0.03	0.05
Magnesia MgO ..	0.37	0.21	0.49	0.54
Loss on ignition ..	2.72	2.57	3.55	5.91
Insolubles ..	90.29	91.59	87.48	80.10
Total ..	100.00	100.01	99.97	100.00
Moisture ..	1.02	1.44	1.49	1.24
Total nitrogen ..	0.030	0.014	0.033	0.043
Total P205 ..	0.028	0.016	0.047	0.029
Available P205 ..	0.0025	0.0011	0.0024	0.0020
Available K2O ..	0.015	0.011	0.012	0.016
Organic carbon ..	0.140	0.041	0.158	0.145
Total solids ..	0.036 per cent.	0.031 per cent.	0.079 per cent.	0.044 per cent.
Total exchangeable bases ..	4.75 M.E.	4.46 M.E.	8.02 M.E.	9.1 M.E.
Ph. ..	7.54	7.68	7.69	7.82

These results indicate the poor and coarse nature and the low exchange capacity of the dry soil in general, as also the considerable difference in the fertility between the dry and garden land soils. The amount of improvement that could be effected by the conversion of the poor, open and dry soils into garden land soils is also indicated.

After the harvest of the crops that were standing at the time of acquiring the lands, and before the preliminary parcelling of the fields was taken up, a total of 48 samples of soil were drawn from 19 pits dug from the various survey numbers comprising the entire area. Three feet samples were collected from some, while only two could be had from others due to the appearance of the parent rock.

Of the 48 soil samples, thirty-four have been analysed for, mechanical composition, moisture, total soil, organic carbon, total nitrogen and the physical measurements like water holding capacity, pore space, volume expansion, apparent density and specific gravity. Analysis of the other samples is in progress. The results of all the analysis completed are furnished in Table B.

From the data for the mechanical analysis, it is observed that the texture ranges from sandy loams to loam in general. The organic matter content decreases with depth as is seen from the organic carbon content and is directly correlated with the total nitrogen content. The physical measurements indicate again direct relationship between the water holding capacity and the clay content. The water soluble salts are low, and all these show that problems concerning drainage and alkalinity do not arise.

However, the problem of moisture conservation is an important factor that has to be tackled, which means, that the building up and maintaining the fertility of the soil by increasing the soil organic matter is imperative at this Agricultural Research Station.

AGRICULTURAL RESEARCH STATION,
SATYAMANGALAM,
LAWLEY ROAD P.O., COIMBATORE,
31st October 1952.

T. S. DAKSHINAMURTI,
Farm Manager.
M. SANYASI RAJU,
Government Agricultural Chemist.

APPENDIX I.

A SHORT ACCOUNT ON THE ORIGIN AND OBJECTS OF THE AGRICULTURAL RESEARCH STATION, SATYAMANGALAM.

1. *Introduction.*—A survey of the ayacut area of the Lower Bhavani Project in Coimbatore district was conducted by the Chemistry section of the A.C. and R.I., Coimbatore, in 1933-34, i.e., more than seventeen years ago. In that survey the soils were examined for mechanical composition and for certain physical constants only and no attempts were made to evaluate their plant food content, lime status, etc.

It is stated that the idea of utilizing the waters of the river Bhavani for irrigation was first mooted as early as 1834 by Sir Arthur Cotton who proposed the construction of a reservoir in the Nilgiris. This idea was examined periodically. At one time a dam in the upper reaches of the Bhavani was seriously contemplated but it was dropped in favour of the present Lower Bhavani Project.

The present project provides for the construction of a dam across the Bhavani river about 10 miles above Satyamangalam after the Moyar river joins the Bhavani. The water thus stored is expected to irrigate more than two lakhs of acres, in Mettupalayam, Gobichettipalayam, Erode, Dharapuram and Bhavani taluks of Coimbatore district and a portion of Karur in Tiruchirappalli district. Irrigation water would be available in the channel from September to March every year.

Climate.—The climate of the area is hot and dry. The average rainfall of Coimbatore district is about 24 inches. There are 3 rainfall recording stations in the area at Satyamangalam, Gobichettipalayam and Erode. The annual rainfall at these stations along with the details for the south-west monsoon, north-east monsoon and others can be said to be about 9 inches, 12 inches and 7 inches respectively. This ayacut area, in common with the whole of the district, is known for the vagaries of both the monsoons.

2. *Location of the Agricultural Research Station.*—An Agricultural Research Station was recommended to be established in the ayacut area with the primary objective of studying and for selecting the crops best suited to the locality with the change over from the dry irrigated agriculture.

Consequently the Government were pleased to sanction the opening up of an Agricultural Research Station at Satyamangalam as a typical representative of the Lower Bhavani Project ayacut, in their G.O. Ms. No. 974, dated 12th May 1951, for a period of one year from the date of sanction. A block of 50 acres was selected, after an extensive though rapid survey between mile stone 38/4 furlongs and 38/7 furlongs to the east of Satyamangalam-Erode road and north of the distributary that is being dug at present. A major portion of the block has an average soil depth of 12 inches with gravel and stones strewn across its surface and is typical of the project ayacut.

3. *Topographical details of the Agricultural Research Station.*—The soils are porous and open in texture, the proportion of the finer fractions—silt and clay—to that of the coarser fractions in the dry soil is small, being in the order of 1:6. The soil overlies disintegrated and weathered rocks and are derived mainly from granite and gneissic rocks. These may be said to represent marginal lands. They have a slope in a southern direction, towards the river Bhavani and so could be commanded by the gravitational flow from the distributary. The study of the contour level of the station indicates a difference of 30 feet.

There are four wells in this area and by augmentation of the water-supply they could be made useful for growing crops in the off season when the project supply is closed.

The poor and open nature of the shallow soils and the rolling land with a slope towards the river are the factors in combination facilitating good drainage. Their total—water soluble—salt—content is small. Thus, problems concerning drainage and alkalinity do not arise. On the other hand, the problem of moisture and its retentivity along with the building up of the soil fertility looms large for a solution at this Agricultural Research Station.

APPENDIX II.

TABLE B.—Results of analysis of soil samples from the dry land area of Agricultural station, Satyamangalam.
Mechanical analysis.

Survey number	Pit number	Depth number	Lab number	34B			34C			34A			33C			33A		
				Composite of Pits I & II			Pit number I.			Pit number I.			Pit number I.			Pit number I.		
				0-9"	9-18"	18"-27"	0-1'	1'-2'	2'-3'	0-1'	1'-2'	2'-3'	0-1'	1'-2'	2'-3'	0-1'	1'-2'	2'-3'
Head of Analysis—				5	6	7	8	9	10	11	12	13	14	15	16			
I—																		
Clay	..	..	..	20-85	24-34	20-31	31-29	23-80	18-35	25-66	13-37	9-09	26-75	24-86	28-53			
Silt	..	..	..	2-35	3-75	5-08	3-63	5-10	4-43	3-55	3-34	2-47	2-86	4-19	1-10			
Fine Sand	..	..	..	19-50	16-37	14-29	20-88	13-70	13-02	14-17	17-74	14-26	17-41	13-15	16-08			
Coarse Sand	..	..	..	58-35	53-78	54-19	43-20	50-64	66-30	57-86	68-30	73-07	51-95	56-16	52-32			
Acid Solubles	..	..	..	..	1-76	6-13	1-00	0-66	..	..	..	1-11	1-03	..	1-97			
Total	..	..	..	101-05	100-00	100-00	100-00	100-00	102-10	102-24	102-65	100-00	100-00	100-36	100-00			
II—																		
Moisture	..	..	..	2-17	2-74	2-56	2-54	2-48	1-68	2-09	1-08	0-56	1-87	1-89	1-95			
Organic Carbon	..	..	..	0-192	0-168	0-134	0-192	0-167	0-08	0-202	0-084	0-075	0-251	0-142	0-182			
Total Solids	..	..	..	0-038	0-033	0-04	0-023	0-045	0-05	0-035	0-04	0-03	0-02	0-038	0-03			
III—																		
Total Nitrogen	..	..	..	0-038	0-038	0-027	0-026	0-029	0-024	0-021	0-013	0-008	0-032	0-012	0-026			
Water holding capacity	..	..	..	36-14	41-55	39-90	42-28	41-10	36-43	41-42	34-78	30-72	41-60	41-50	38-59			
Pore space	..	..	..	47-01	50-05	49-58	50-66	51-77	46-44	48-53	44-82	41-28	51-14	51-39	50-07			
Vol. Expan/100 cc. of soil	..	..	..	8-57	9-87	6-48	7-91	6-84	3-17	11-45	5-86	1-50	2-85	3-55	5-7			
Apparent density	..	..	..	1-39	1-3	1-3	1-30	1-28	1-30	1-4	1-4	1-4	1-3	1-3	1-4			
Specific Gravity	..	..	..	2-4	2-4	2-4	2-4	2-4	2-4	2-6	2-5	2-5	2-6	2-5	2-5			
Head of analysis—																		
I—																		
Clay	..	..	..	14-90	10-23	22-36	28-74	25-24	27-82	26-99	16-96	36-41	29-19	22-94	10-03			
Silt	..	..	..	0-76	3-93	2-28	0-73	2-86	3-46	6-51	3-75	4-71	5-59	5-56	14-28			
Fine Sand	..	..	..	14-99	18-88	18-51	20-56	16-49	15-75	24-47	20-55	21-13	18-17	22-04	19-46			
Coarse Sand	..	..	..	69-87	65-30	56-39	48-63	55-30	52-47	34-18	59-71	38-24	46-04	49-55	37-74			
Acid Solubles	..	..	..	..	1-71	0-46	1-34	0-11	0-50	8-29	..	..	1-01	..	1-49			
Total	..	..	..	100-52	100-00	100-00	100-00	100-00	100-00	100-00	100-97	100-49	100-00	100-09	100-00			
II—																		
Moisture	..	..	..	1-02	1-76	1-57	2-35	1-96	1-85	2-62	1-51	2-47	2-25	1-87	3-29			
Organic Carbon	..	..	..	0-09	0-008	0-198	0-171	0-009	0-191	0-034	0-044	0-20	0-13	0-057	0-157			
Total Solids	..	..	..	0-024	0-027	0-017	0-022	0-022	0-03	0-164	0-089	0-043	0-055	0-058	0-10			
III—																		
Total Nitrogen	..	..	..	0-017	0-008	0-034	0-035	0-024	0-038	..	..	..	..	..	..			
Water holding capacity	..	..	..	35-34	38-41	32-40	34-10	31-42	29-91	43-28	36-08	41-91	44-31	36-99	38-78			
Pore space	..	..	..	44-0	43-92	47-76	52-0	51-45	48-31	48-72	46-62	48-33	50-88	49-25	51-53			
Vol. Expan/100 cc. of soil	..	..	..	2-0	1-48	7-01	7-89	5-48	6-55	9-1	8-2	5-63	12-9	10-5	0-69			
Apparent density	..	..	..	1-4	1-4	1-4	7-9	1-3	1-4	2-3	2-3	2-3	2-4	2-4	2-6			
Specific Gravity	..	..	..	2-5	2-6	2-5	2-5	2-6	2-4	1-3	1-4	1-3	1-3	1-4	1-3			

TABLE II.—Results of analysis of soil samples from the dry land area of Agricultural Research Station, Satyamangalam—cont.

Head of analysis—	Mechanical analysis—cont.											
	31-A			30			29			27		
	Pit number I—cont.	Pit number I—cont.	Pit number I—cont.	Pit number I.	Pit number I.	Pit number I.	Pit number I.	Pit number I.	Pit number I.	Pit number I.	Pit number II.	Pit number II.
Survey number	1'-2'	2'-3'	2'-3'	0-1'	1'-2'	2'-3'	0-1'	1'-2'	2'-3'	0-1'	1'-2'	1'-2'
Pit number	29	30	31	32	33	34	35	36	37	38	39	40
Depth number	..	..	..	..	..	..	..	..	..	..	..	..
Lab number.	..	..	..	..	..	..	..	..	..	..	..	..
Clay ..	6.89	4.65	39.61	24.91	30.50	26.84	21.54	14.11	30.64	7.71	18.74	27.30
Silt ..	7.41	3.05	15.18	21.26	24.50	3.43	13.37	12.11	5.51	3.48	3.35	4.55
Fine sand ..	19.94	11.52	18.07	21.31	17.71	19.55	16.84	18.63	9.02	14.71	18.83	17.98
Coarse sand ..	51.28	80.56	25.34	28.98	20.43	57.51	47.33	53.94	53.25	74.75	59.30	50.20
Acid Solubles ..	14.48	0.22	11.80	3.54	6.86	0.67	0.92	1.21	1.58	..	..	..
Total ..	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Moisture ..	3.49	3.29	6.46	6.87	5.75	2.22	2.92	2.57	1.11	0.80	1.53	2.18
Organic Carbon ..	0.046	0.01	0.062	0.055	0.109	0.148	0.046	0.01	0.062	0.055	0.109	0.148
Total Solids ..	0.069	0.045	0.053	0.068	0.055	0.07	0.024	0.035	0.055	0.023	0.022	0.066

Total Nitrogen ..	..	..	..	..	..	..	..	..	..	..	..	..
Water holding capacity ..	34.53	28.96	61.67	47.42	49.35	40.85	..	..	..	..	..	..
Pore space ..	47.11	44.32	70.79	42.41	57.50	51.77	..	..	..	..	..	..
Vol. Expan/100 cc. of soil ..	0.6	0.7	4.3	5.5	2.0	1.5	..	..	..	..	..	..
Apparent density ..	2.5	2.6	2.4	2.4	2.5	2.6	..	..	..	..	..	..
Specific Gravity ..	1.4	1.5	1.2	1.2	1.3	1.4	..	..	..	..	..	..

Head of analysis—	Mechanical analysis—cont.											
	31-A			30			29			27		
	Pit number I—cont.	Pit number I—cont.	Pit number I—cont.	Pit number I.	Pit number I.	Pit number I.	Pit number I.	Pit number I.	Pit number I.	Pit number I.	Pit number II.	Pit number II.
Survey number	1'-2'	2'-3'	2'-3'	0-1'	1'-2'	2'-3'	0-1'	1'-2'	2'-3'	0-1'	1'-2'	1'-2'
Pit number	29	30	31	32	33	34	35	36	37	38	39	40
Depth number	..	..	..	..	..	..	..	..	..	..	..	..
Lab number	..	..	..	..	..	..	..	..	..	..	..	..
Clay ..	11.94	18.99	26.35	33.78	28.55	17.97	24.52	35.21	29.29	21.56	41.88	41.11
Silt ..	3.44	2.64	4.81	6.51	6.38	3.25	3.80	2.98	19.27	17.87	15.35	19.12
Fine sand ..	13.18	20.32	19.50	15.86	14.30	11.88	22.33	17.47	21.24	18.85	15.96	15.77
Coarse sand ..	72.46	57.98	48.62	45.67	53.59	67.56	52.34	44.71	31.80	40.52	21.92	21.80
Acid solubles ..	..	0.07	0.72	..	..	..	..	..	..	1.20	4.89	2.20
Total ..	101.02	100.00	100.00	101.82	102.82	100.66	101.99	100.37	101.60	100.00	100.00	100.00

Moisture ..	1.16	1.47	2.08	3.24	2.77	2.02	1.89	2.72	3.23	4.00	6.45	6.72
Organic carbon ..	0.091	0.14	0.24	0.15	0.10	0.05	0.188	0.168	0.177	0.222	0.122	0.061
Total solids ..	0.012	0.037	0.025	0.053	0.083	0.022	0.027	0.045	0.025	0.086	0.134	0.081

Total Nitrogen ..	..	..	..	..	..	..	..	..	..	..	..	..
Water holding capacity ..	..	..	..	..	..	..	..	..	..	..	..	..
Pore space ..	..	..	..	..	..	..	..	..	..	..	..	..
Vol. Expan/100 cc of soil ..	..	..	..	..	..	..	..	..	..	..	..	..
Apparent density ..	..	..	..	..	..	..	..	..	..	..	..	..
Sp. gravity ..	..	..	..	..	..	..	..	..	..	..	..	..

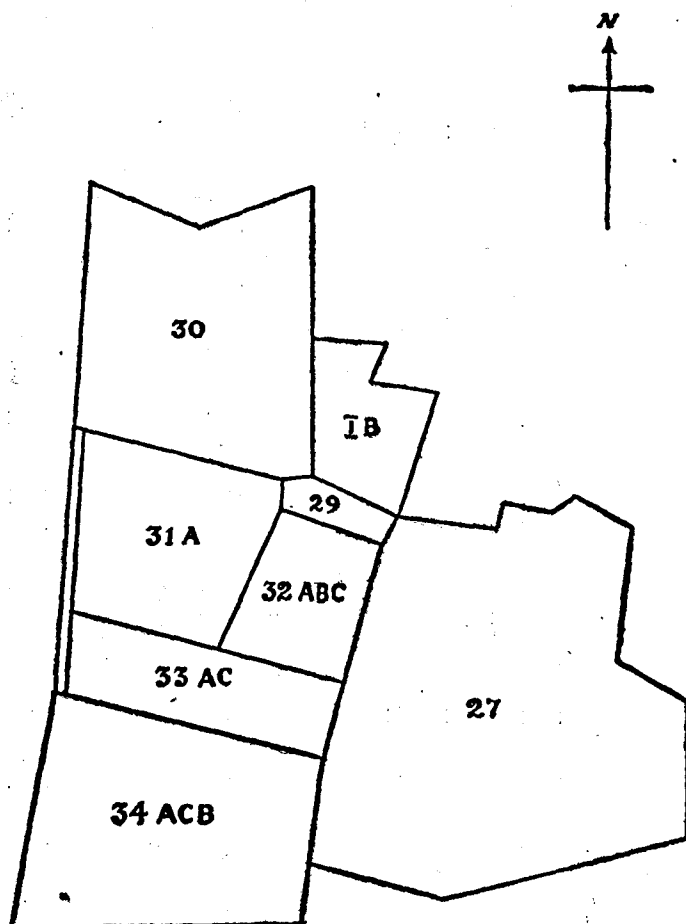
APPENDIX III.

ATTEMPTS TO INCREASE THE INCOME OF THE AGRICULTURAL RESEARCH STATION,
SATYAMANGALAM.

- 1 Putting up of live-fence.
- 2 Planting green manure yielding trees and plants.
- 3 Reducing expenditure under buildings, etc.
- 4 Growing commercial crop like tobacco.
- 5 Resuming the project lands given to ryots on temporary patta.

APPENDIX IV.

AGRICULTURAL RESEARCH STATION
• SATYAMANGALAM •



ANNUAL REPORT OF THE AGRICULTURAL RESEARCH
STATION, SATYAMANGALAM

FINANCIAL STATEMENT SHOWING THE PROFIT OR LOSS IN BULK CROPS
FOR THE YEAR ENDING 1951-52—cont.

Field number.	Expenditure.			Receipts.		
	Crop grown.			Crop and details of yield data.		
			RS. A. P.			RS. A. P.
33-A & 33-C.	Tenai Co. 1	.. ..	49 3 0	Tenai grain	.. ..	54 10 6
30	Tenai Co. 2	.. ..	7 0 6	Tenai straw	.. ..	1 14 0
29,	Samai local	.. ..	62 5 0	Nil.		
33-A,				Samai grain	.. ..	53 2 3
32-B & 32-C.				Samai straw	.. ..	9 8 0
27	Maize	.. ..	9 1 0	No cobs-straw	.. ..	6 0 0
30	Lab-lab (Tenkasi)	.. ..	2 7 0	Nil.		
30	Redgram (Tenkasi)	.. ..	4 6 0	Nil.		
30	Cowpea C. 57	.. ..	2 13 6	Nil.		
30	Sunnhemp	.. ..	13 12 0	Sunnhemp seeds	.. ..	5 10 0
	Total	.. ..	848 3 9	Total	.. ..	1,090 10 11
I-B	Cholam observation	.. ..	106 1 3	Cholam grain	.. ..	58 10 9
I-B	Cholam Co. 9	.. ..	123 11 6	Cholam straw	.. ..	115 0 0
27	Cotton M.U.I.	.. ..	6 11 0	Cholam grain	.. ..	81 1 0
30	Do.	.. ..	18 6 0	Cholam straw	.. ..	245 0 0
30	Do.	.. ..	49 15 0	Kapas 5 lb.	.. ..	2 0 6
30	Tenai Co. 3	.. ..	24 11 0	Kapas 6 lb.	.. ..	2 7 0
I-B	Tobacco	.. ..	386 15 6	Kapas 15 lb.	.. ..	29 11 6
I-B	Do.	.. ..	100 4 6	Nil.		
27	Do.	.. ..	387 7 6	Tobacco	.. ..	*220 11 6
30	Do.	.. ..	68 12 0	Do.	.. ..	*78 8 0
30	Do.	.. ..	93 8 0	Do.	.. ..	*210 11 0
				Nil.		
				Tobacco	.. ..	*85 10 0
			2,214 11 0			
						2,211 4 8
	Add expenses towards the harvest, threshing and cleaning of ragi including compensation to ryots on the standing crops.		523 7 0	Value of ragi got and transferred to malt factory (valued at current market rates) 3,706 lb. at 5 lb. per Re.		741 3 4
	Add one-third apportionment of the supervisory staff, i.e., Farm Manager, fieldmen and maistries for the period in the year.		1,061 10 4	....		...
	Total expenses	.. ..	3,799 12 4	Total receipts	.. ..	2,952 8 0

Hence, loss Rs. 847-4-4.

* The produce is not sold but valued.

Statement of rainfall--cont.														
Month.	Week.	1950-51.			1949-50.			1948-49.			Average for the past ten fiscal years.		Average for the past year (since the inception of the Station) from 6th August 1951 to 6th June 1952.	
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
North-west monsoon--cont.														
November-December-- cont.	13-19	..	..	..	..	..	..	0-960	..	0-207	0-7	..	..	
December-January	20-26	..	..	..	..	..	..	..	1	0-314	0-6	..	..	
	27-3	..	..	..	..	..	..	..	..	0-033	0-1	..	..	
	4-10	..	..	..	..	..	..	..	..	0-214	0-7	..	..	
	11-17	..	1	0-330	..	..	..	..	..	0-033	0-1	..	..	
	18-24	..	..	..	..	..	..	..	..	0-067	0-3	..	..	
	25-31	..	..	..	..	..	..	..	..	0-011	0-1	..	..	
Total ..		11-960	22		9-080	20	11-560	19		15-181	25-4	7-330	11	
Hot weather.														
February	1-7	..	..	..	..	..	..	..	..	0-025	0-1	..	..	
	8-14	..	..	..	..	..	..	..	..	0-121	0-2	..	..	
	15-21	..	..	..	0-520	2	..	..	..	0-163	0-3	..	..	
	22-28	..	..	..	0-140	1	..	..	..	0-990	0-2	0-400	2	
March	1-7	..	..	..	..	..	..	..	..	0-287	0-2	..	..	
	8-14	..	..	..	..	..	..	..	..	..	..	..	..	
	15-21	..	..	..	0-140	1	..	..	..	0-500	0-5	..	..	
	22-28	..	..	..	0-450	1	..	..	..	0-184	0-8	..	..	
March-April	29-4	..	2	8-470	0-230	1	0-540	1	1-225	1-20	0-8	..	..	
	5-11	..	1	0-810	0-470	1	0-770	2	0-832	1-5	1-7	..	..	
	12-18	..	4	3-900	..	..	1-310	5	0-894	1-7	..	..	..	
	19-25	..	..	..	..	..	0-050	1	0-505	1-3	..	..	..	
April-May	26-2	..	..	..	..	..	..	..	0-454	1-2	1-000	1	..	
	3-9	..	1	0-220	..	..	1-540	3	0-641	1-4	..	..	..	
	10-16	..	..	..	0-900	2	1-740	2	0-782	1-7	0-160	1	..	
	17-23	..	3	3-390	0-040	1	1-980	7	1-776	2-2	..	..	..	
	24-30	..	2	2-530	0-690	1	..	..	0-976	1-7	0-550	1	..	
May-June	31-6	..	..	..	0-330	1	1-790	3	0-378	1-1	..	..	..	
Total ..		19-320	13		3-910	12	9-720	24		10-733	17-1	2-110	5	
Grand total ..		36-810	50		22-760	58	29-270	61		33-398	62-6	18-960	28	

APPENDIX VI.

The cost of cultivation of bulk crops in the Agricultural Research Station, Satyamangalam during the year 1951-52 were—

	Per acre.		
	RS.	A.	P.
1 Cholam ..	15	11	0
2 Cumbu ..	18	8	0
3 Tenai ..	21	0	0
4 Samai ..	19	4	0
5 Horsegram ..	16	2	2
6 Lab-lab ..	16	4	0
7 Cholam and lab-lab ..	13	6	0
8 Cholam and sunnhemp ..	22	14	0
9 Cumbu and lab-lab ..	26	6	0
10 Cumbu and cowpea ..	26	6	0

APPENDIX VII.

FINANCIAL STATEMENT SHOWING THE PROFIT OR LOSS IN BULK CROPS FOR THE YEAR ENDING 1951-52.

Field number.	Crop grown.	Expenditure.			Receipts.		
		RS. A. P.			Crop and details of yield data.		
30	Cholam Co. 1 ..	14	1	0	No grain setting straw valued.	60	0 0
27	Cholam Co. 4 ..	15	13	9	No grain straw yield ..	33	0 0
27	Cholam Co. 5 ..	60	10	0	Do. ..	127	8 0
27	Cholam Co. 6 ..	61	4	0	Do. ..	147	0 0
27	Cholam Co. 1 and lab-lab ..	3	5	9	Straw lab-lab dried off.	6	9 0
30	Cholam Co. 11 and sunnhemp.	75	10	3	Sunn hemp seeds cholam dried off.	13	2 0
27	Do.	6	2	6	Cholam * dried off sunnhemp seeds.	3	12 0
34-B	Cumbu Co. 3 ..	69	5	6	Cumbu grain ..	61	3 0
					Cumbu straw ..	13	8 0
34-C	Cumbu Co. 1 and lab-lab ..	17	14	6	Cumbu grain ..	155	0 0
					Cumbu straw ..	24	5 0
					Lab-lab ..	1	5 7
34-A*	Cumbu Co. 2 and cowpea ..	65	8	0	Cumbu grain ..	93	3 6
					Cumbu straw ..	16	3 0
					Cowpea ..	12	14 5
34-B	Cumbu local ..	13	15	0	Cumbu grain ..	0	12 0
					Cumbu straw ..	0	2 0
27	Horsegram ..	86	9	0	Horsegram ..	114	0 0
					Bhusa ..	7	2 5
30	Do. ..	1	9	0	Nil.		
31-A	Do. ..	8	6	0	Nil.		
31-A & 33-A,	Tenai Co. 3 ..	87	2	0	Tenai grain ..	64	14 3
					Tenai straw ..	4	6 0

LIST OF THE GLOSSARY OF SCIENTIFIC NAMES.

Common name.	Scientific name.	Common name.	Scientific name.
Acid lime ..	<i>Citrus aurantifolia</i> , Swingle.	Gogu ..	<i>Hibiscus cannabinus</i> , L.
Agave ..	<i>Agave sisalana</i> , Perrine.	Gooseberry ..	<i>Ribes grossularia</i> , L.
Allspice ..	<i>Pimento officinalis</i> , Lindl.	Grape fruit ..	<i>Citrus paradisi</i> , Macf.
<i>Alu bokara</i> (Guj.) ..	<i>Prunus communis</i> , Hunds., var. <i>insititia</i> .	Grape vine ..	<i>Vitis vinifera</i> , L.
Amarantus ..	<i>Amarantus</i> spp.	Greengram ..	<i>Phaseolus aureus</i> , Roxb.
Apple ..	<i>Pyrus malus</i> , L.	Groundnut ..	<i>Arachis hypogaea</i> , L.
Arecanut ..	<i>Areca catechu</i> , L.	Guava ..	<i>Psidium guajava</i> , L.
<i>Arika</i> (Tel.) ..	<i>Paspalum scrobiculatum</i> , L.	Guinea grass ..	<i>Panicum mazinum</i> , Jacq.
<i>Avarai</i> (Tam.) ..	<i>Dolichos lablab</i> , L.	<i>Heral</i> ..	<i>Citrus</i> sp.
Avocado ..	<i>Persea americana</i> , Mill.	Horsegram ..	<i>Dolichos biflorus</i> , L.
Banana ..	<i>Musa paradisiaca</i> , L.	Indian Mulberry ..	<i>Morinda citrifolia</i> , L.
Barley ..	<i>Hordeum vulgare</i> , L.	Indigo ..	<i>Indigofera anil</i> , L.
Beet root ..	<i>Beta vulgaris</i> , L.	<i>Ipecacuanha</i> ..	<i>Psychotria ipecacuanha</i> , Stokes
<i>Bendekai</i> (Tel.) ..	<i>Hibiscus esculentus</i> , L.	Jack or Jak ..	<i>Artocarpus inaequalis</i> , Merr.
Bengalgram ..	<i>Cicer arietinum</i> , L.	Jalap ..	<i>Ipomoea purga</i> , Hayne.
Betel vine ..	<i>Piper betle</i> , L.	Jamberi ..	<i>Citrus jambhiri</i> , Lush.
Bilimb ..	<i>Averrhoa bilimbi</i> , L.	Jasmine ..	<i>Jasminum</i> , spp.
<i>Bili-kichili</i> ..	<i>Citrus</i> sp.	<i>Jonna</i> (Tel.) ..	Same as cholum.
Bishop's weed ..	<i>Carum copticum</i> , Benth.	Jujube ..	<i>Zizyphus jujuba</i> , Lam.
Bitter gourd ..	<i>Momordica charantia</i> , L.	Kapok ..	<i>Eriodendron anfractuosum</i> , DC.
Blackgram ..	<i>Phaseolus mungo</i> , L.	<i>Karamani</i> (Tam.) ..	<i>Vigna unguiculata</i> , Walp.
Blast on paddy ..	<i>Piricularia oryzae</i> , Br. and Cav.	<i>Karunganni</i> cotton (Tam.) ..	<i>Gossypium arboreum</i> var. <i>neglectum</i> forma <i>india</i> (H. and G.)
Bread fruit ..	<i>Artocarpus incisa</i> , L.	Khatta ..	<i>Citrus aurantium</i> (L.), Tanaka
Bullock's heart ..	<i>Anona reticulata</i> , L.	Khatta (Hindi) ..	<i>Citrus</i> sp.
Cabbage ..	<i>Brassica oleracea</i> , L. var. <i>bulbosa</i> , DC.	Kichili ..	<i>Citrus madraspatna</i> , Tanaka.
Cambodia cotton ..	<i>Gossypium hirsutum</i> , L.	Kikuyu grass ..	<i>Pennisetum clandestinum</i> Hochst.
Cardamom ..	<i>Elettaria cardamomum</i> , Maton.	Knol khol (Hindi) ..	<i>Brassica oleracea</i> , L. var. <i>gongylodes</i> , L.
Carrot ..	<i>Daucus carota</i> , L.	Kolakattai grass (Tam.) ..	<i>Cenchrus ciliaris</i> , L.
Cashewnut ..	<i>Anacardium occidentale</i> , L.	Kola nut ..	<i>Cola acuminata</i> , Schott.
Castor ..	<i>Ricinus communis</i> , L.	<i>Kolinji</i> (Tam.) ..	<i>Tephrosia purpurea</i> , Pers.
Cauliflower ..	<i>Brassica oleracea</i> , L., var. <i>botrytis</i> , L.	<i>Kollaganjeru</i> (Tel.) ..	<i>Ipomoea hispida</i> , Roem. and Sch.
Celery ..	<i>Apium graveolens</i> , L.	Kollu (Tam.) ..	<i>Dolichos biflorus</i> , L.
Cheent orange ..	<i>Citrus sinensis</i> , Osbeck.	Korai (Tam.) (Weed) ..	<i>Cyperus bulbosus</i> , Vahl. and C. rotundus, L.
Cherimoyer ..	<i>Anna cherimolia</i> , Mill.	Korai (Tam.) (cultivated) ..	<i>Cyperus corymbosus</i> , Rottb. <i>Cyperus parviflorus</i> , Rottb.
Chicory ..	<i>Cichorium intybus</i> , L.	Korali ..	<i>Setaria pallidifusca</i> , Stapf and Hubbard.
Chillies ..	<i>Capiscum annum</i> , L.	Korra (Tel.) ..	<i>Setaria italica</i> , Beauv.
<i>Cholam</i> (Tam.) ..	<i>Sorghum</i> spp.	Kudiraivali (Tam.) ..	<i>Echinochloa frumentacea</i> , Link.
Cinnamon ..	<i>Cinnamomum zeylanicum</i> , Bl.	Kumquat ..	<i>Citrus Japonica</i> , Thunb.
Citrange ..	<i>Citrus</i> sp.	Lab-lab ..	<i>Dolichos Lablab</i> , L.
Clove ..	<i>Eugenia aromatica</i> , Baill.	Ladies fingers ..	<i>Hibiscus esculentus</i> , L.
Clover ..	<i>Trifolium</i> sp.	Langsat ..	<i>Lantium domesticum</i> , Jack.
Cluster beans ..	<i>Cyamopsis tetragonoloba</i> , Taub.	Leek ..	<i>Allium porrum</i> , L.
Cocoa ..	<i>Theobroma cacao</i> , L.	Lemon ..	<i>Citrus limon</i> , Burm., f.
Coconut ..	<i>Cocos nucifera</i> , L.	Lettuce ..	<i>Lactuca sativa</i> , L.
Coriander ..	<i>Coriandrum sativum</i> , L.	Lime ..	<i>Citrus aurantifolia</i> (Christm Swingle).
Cotton ..	<i>Gossypium</i> spp., see Cambodia <i>Karunganni</i> , Nadam, Pulichai and Uppam.	Lima beans ..	<i>Phaseolus lunatus</i> , L.
Cowpea ..	<i>Vigna unguiculata</i> , Walp.	Lime galgal ..	<i>Citrus</i> sp.
Crab apple ..	<i>Pyrus baccata</i> , L.	Litchi ..	<i>Litchi chinensis</i> , Sonn.
<i>Cumbu</i> (Tam.) ..	<i>Pennisetum typhoides</i> , Stapf and Hubbard.	Loquat ..	<i>Eriobotrya japonica</i> , Lindl.
Cumin ..	<i>Cuminum cyminum</i> , L.	Lucerne ..	<i>Medicago sativa</i> , L.
Custard apple ..	<i>Anona reticulata</i> , L.	Lupin ..	<i>Lupinus</i> , spp.
Dhalincha ..	<i>Sesbania bispinosa</i> Fawcett & Rendle, Pers.	Mace ..	<i>Myristica fragrans</i> , Houtt.
Durian ..	<i>Durio zibethinus</i> , Murr.	Mahalung ..	<i>Citrus medica</i> , L.
Elephant grass ..	<i>Pennisetum purpureum</i> , Schum.	Malze ..	<i>Zea mays</i> , L.
Fig ..	<i>Ficus Carica</i> , L.	<i>Manathakali</i> (Tam.) ..	<i>Solanum nigrum</i> , L.
Foot-rot of paddy ..	<i>Fusarium moniliforme</i> , Sheld, var. <i>maius</i> , Wt. and Rg.	Mandarines ..	<i>Citrus nobilis</i> , Lour., var. <i>dell-closa</i> , Swingle.
Fox glove ..	<i>Digitalis purpurea</i> , L.	Mango ..	<i>Mangifera indica</i> , L.
<i>Gabbucheni</i> ..	<i>Citrus</i> sp.	Mangosteen ..	<i>Garcinia mangostana</i> , L.
<i>Gajanimma</i> (Tel.) ..	<i>Citrus penninesculata</i> , Tanaka.	Mesquite ..	<i>Prosopis juliflora</i> , DC.
<i>Ganja</i> (Tam.) ..	<i>Cannabis sativa</i> , L.	Mokri ..	<i>Citrus</i> , sp.
Garlic ..	<i>Allium sativum</i> , L.	Mulberry ..	<i>Morus alba</i> , L.
Giant pumpkin ..	<i>Cucurbita maxima</i> , Duchesne.	<i>Nadam</i> cotton (Tam.) ..	<i>Gossypium arboreum</i> <i>utmyensis</i> (H. and G.)
Gingelly ..	<i>Sesamum orientale</i> , L.		
Ginger ..	<i>Zingiber officinale</i> Bosc.		

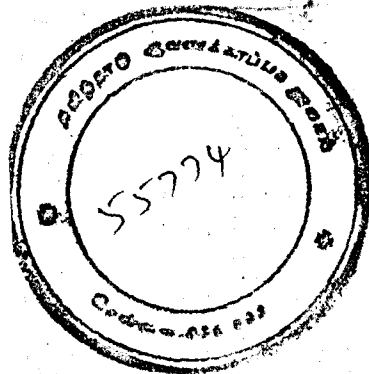
APPENDIX V.

Statement of rainfall.

Statement of rainfall.

[illegible]

Common name.	Scientific name.	Common name.	Scientific name.
Nanal (Tam.) (wild cane).	<i>Saccharum spontaneum</i> , L.	Rice case-worm	<i>Nymphula depunctalis</i> , Gr.
Napier grass ..	<i>Pennisetum purpureum</i> , Schum.	Rose ..	<i>Rosa</i> spp.
Neem ..	<i>Azadirachta indica</i> , A. Juss.	Rose apple ..	<i>Eugenia malaccensis</i> , L.
Nendran (Mal.) ..	<i>Musa paradisiaca</i> , L., var. Nendran.	Safflower ..	<i>Carthamus tinctorius</i> , L.
Nutmeg ..	<i>Myristica fragrans</i> , Houtt.	Saffa (Tel.) ..	Same as cumbu.
Oats ..	<i>Avena sativa</i> , L.	Salabush ..	<i>Atriplex</i> sp.
Oilpalm ..	<i>Elæis guineensis</i> , Jacq.	Samal (Tam.) ..	<i>Panicum miliare</i> , Lam.
Onum (Tam.) ..	<i>Carum copticum</i> , Benth.	Santra ..	<i>Citrus poonensis</i> Hort. Tanaka (syn. <i>C. chrysocarpa</i> Lush).
Onion ..	<i>Allium cepa</i> , L.	Sapota ..	<i>Achras sapota</i> , L.
Orange ..	<i>Citrus sinensis</i> , Osbeck.	Seethaphal (Tel.) ..	<i>Anona squamosa</i> , L.
Orange chinee ..	<i>Citrus sinensis</i> , Osbeck.	Senna ..	<i>Cassia angustifolia</i> , Vahl.
Paddy ..	<i>Oryza sativa</i> , L.	Snake gourd ..	<i>Trichosanthes Anguina</i> , L.
Paddy, gall fly ..	<i>Pachydiplosis oryzae</i> , M.	Soft rot of ginger ..	<i>Pythium</i> Butleri, Subrm.
Paddy silver shoot ..	<i>Pachydiplosis oryzae</i> , M.	Sour orange, country.	<i>Citrus aurantium</i> var. <i>Bigaradia</i> Rump.
Paddy stem-borer ..	<i>Schænobius incertellus</i> , W.	Soursop ..	<i>Anona muricata</i> , L.
Palmyra ..	<i>Borassus flabellifer</i> , L.	Soya bean (Soy bean)	<i>Glycine max</i> , Merr.
Pamparapanas (Tel.)	<i>Citrus paradisi</i> , Macf.	Sorghum ..	<i>Sorghum</i> spp.
Paniparagu (Tam.)	<i>Panicum miliaceum</i> , L.	Spotted boll-worm	<i>Earias fabia</i> , S.
Papaya ..	<i>Carica papaya</i> , L.	Do. ..	<i>E. insulana</i> , B.
Passion fruit ..	<i>Passiflora edulis</i> , Sims.	Star apple ..	<i>Chrysophyllum Cainito</i> , L.
Peach ..	<i>Prunus Persica</i> , Stokes.	Strawberry ..	<i>Fragaria vesca</i> , L.
Pear ..	<i>Pyrus communis</i> , L.	Sugarcane ..	<i>Saccharum officinarum</i> , L.
Peas ..	<i>Pisum sativum</i> , L.	Sunamukhi (Tel.) ..	<i>Cassia angustifolia</i> , Vahl.
Pepper ..	<i>Piper nigrum</i> , L.	Sunn hemp ..	<i>Crotalaria juncea</i> , L.
Persimmon ..	<i>Diospyros Kaki</i> , L.	Surinamacherry ..	<i>Eugenia uniflora</i> , Lam.
Phalsa ..	<i>Grewia asiatica</i> , L.	Sweet orange ..	<i>Citrus sinensis</i> , Osbeck.
Phillipesara (Tel.)	<i>Phaseolus trilobus</i> , Ait.	Tangelo ..	<i>Citrus</i> sp.
Pine apple ..	<i>Ananas comosus</i> , Merr.	Tangerine ..	<i>Citrus nobilis</i> , Lour, var. <i>deliciosa</i> Swingle.
Pink boll-worm	<i>Platyedra gossypiella</i> , S.	Tapioca ..	<i>Manihot utilisima</i> , Pohl.
Plantain ..	<i>Musa paradisiaca</i> , L.	Tegapesara (Tel.)	<i>Phaseolus sublobatus</i> , Roxb.
Plum ..	<i>Prunus domestica</i> , L.	Tenai (Tam.) ..	Same as Korra.
Pomegranate ..	<i>Punica Granatum</i> , L.	Teosinte ..	<i>Euchlæna mexicana</i> , Schrad.
Pomelo ..	<i>Citrus paradisi</i> , Macf.	Thrips ..	<i>Thrips Oryzae</i> , W.
Potato ..	<i>Solanum tuberosum</i> , L.	Tobacco ..	<i>Nicotiana Tabacum</i> , L. and <i>N. rustica</i> , L.
Prickly-pear ..	<i>Opuntia dillenii</i> , Haw.	Tomato ..	<i>Lycopersicum esculentum</i> , Mill.
Prune ..	<i>Prunus domestica</i> , L.	Turmeric ..	<i>Curcuma longa</i> , L.
Pulchra cotton (Tam.)	<i>arboreum</i> Var. <i>neglectum</i> form <i>bengalensis</i> (H. and G.)	Uppam cotton (Tam.)	<i>Gossypium herbaceum</i> , L.
Pummelo ..	<i>Citrus grandis</i> , Osbeck.	Varagu (Tam.) ..	Same as Arika.
Pumpkin ..	<i>Cucurbita pepo</i> , L.	Variga (Tel.) ..	Same as Panivaragu.
Pungam (Tam.) ..	<i>Pongamia glabra</i> , Vent.	Vasambu (Tam.) ..	<i>Acorus calamus</i> , L.
Queensland nut ..	<i>Macadamia ternifolia</i> , F. Muell.	Vempali (Tel.) ..	<i>Tephrosia purpurea</i> , Pers.
Quince ..	<i>Cydonia oblonga</i> , Mill.	Vishnukranthi (Tel.)	<i>Evolvulus alsinoides</i> , L.
Radish ..	<i>Raphanus sativus</i> , L.	Walnut ..	<i>Juglans regia</i> , L.
Ragi (Tam.) ..	<i>Eleusine coracana</i> , Gaertn.	Water melon ..	<i>Citrullus vulgaris</i> , Schrad.
Rambutan (Burm.)	<i>Nephelium lappaceum</i> , L.	Wattle ..	<i>Acacia</i> , spp. (Australian).
Redgram ..	<i>Cajanus cajan</i> (L.) Millsp.	Wheat ..	<i>Triticum</i> spp.
Rice ..	<i>Oryza sativa</i> , L.		
Rice bug ..	<i>Leptocoris acuta</i> , Th.		



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