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Announcement

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THE RAMASASTRULU MUNAGALA PRIZE, 1957

1. The prize will be awarded during the College Day and Conference in 1957.

2. The prize will be in the form of a medal and will be awarded to the member of the Union who submits the best account of research or enquiry, carried out by him on any agricultural subject.

3. The subject matter shall not exceed in length twelve foolscap pages, typewritten on one side.

4. Intending competitors should notify to the Secretary of the Madras Agricultural Students' Union with a covering letter giving the full name and address of the competitor. The author's name should not be shown on the paper, but should be entered as a *nom-de-plume*.

5. Four typewritten copies of the paper should be sent.

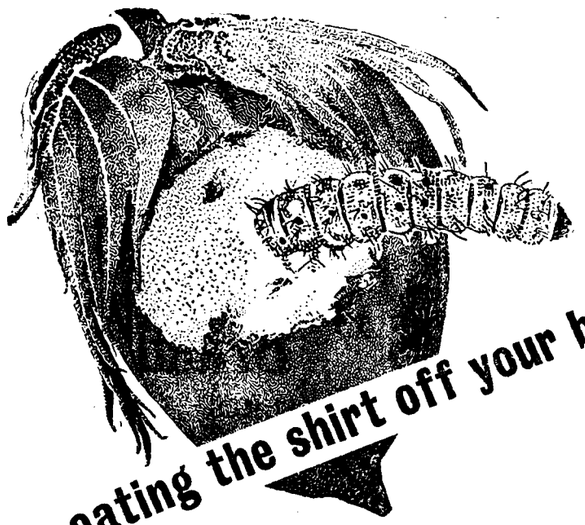
6. The name of the successful competitor will be announced and the prize awarded at the time of the College Day and Conference.

7. Paper or papers accepted will become the property of the Union, and the Union reserves to itself the right to publish all or any of the papers.

8. All references in the papers to published books, reports or papers by other workers must be acknowledged.

9. The last date for receipt of papers is 1st July 1957.

K. S. Shetty,
Secretary.



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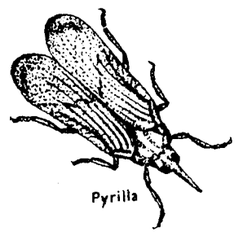

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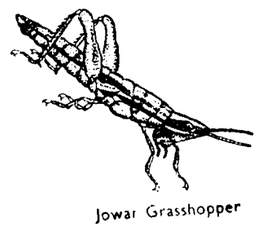

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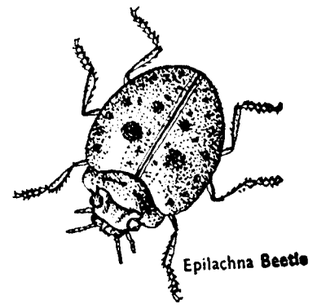

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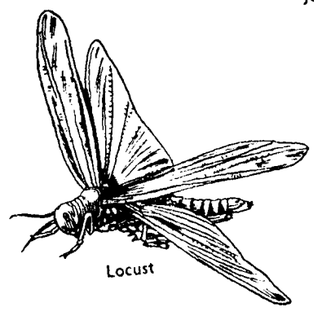

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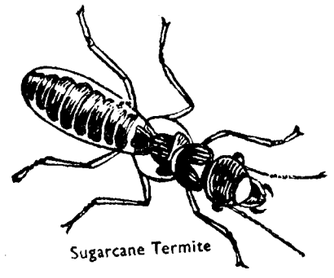

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JUBILEE SHIELD FOR CHEMISTRY

The Golden Jubilee rolling shield of the Chemistry Section to be awarded during the College Day and Conference to the best scientific workers in the field of Agricultural Chemistry.

Rules and conditions for the award:

(1) The shield will be awarded to the best scientific worker in the field of Agricultural Chemistry. All Scientific workers and Research students of the chemistry section at the Agricultural College and Research Institute, Coimbatore as well as in the Department of Agriculture, Madras State will be eligible for the award.

(2) The shield is a rolling one and will be awarded at the time of the Annual College Day and Conference of the Agricultural College and Research Institute every year.

(3) A committee to adjudge the best worker for the award shall comprise.

  (1) The Principal (Chairman — Ex-Officio)

  (2) The Government Agricultural Chemist (Ex-Officio)

  (3) A senior officer of the Research Council elected by Research Council).

(4) The award will be made to the worker adjudged as the best on the basis of the reports or papers containing either (i) an account of original research in which the author's share is the maximum or (ii) a critical discussion or analysis of any subject related to agricultural chemistry, throwing new light on or adding new knowledge to the subject.

(5) A certificate will also be awarded to the winner of the rolling shield.

(6) The shield shall be returned to the Government Agricultural Chemist after the award for keeping in safe custody.

(7) The award will not be made more than once to the same person.

(8) The power to modify the rules to suit any situation that may arise at any time rests with the Government.

Papers and reports etc. for the award are invited on or before the 15th of July 1957 by the undersigned.

A. Mariakulandai,
Government Agricultural Chemist.

Lawley Road P. O.

The Madras Agricultural Journal

Vol. XLIV — APRIL 1957 — No. 4

CONTENTS

The Madras Agricultural Journal

Vol. XLIV April 1957 No. 4

Editorial

The Community Development and the National Extension programmes are our charter for the economic development of Rural India. Initiated in 1952, to foster intensive joint effort of all the individuals composing the community and the various Government Development departments, the programme aims to create a new pattern of society with a progressive outlook among the rural people. These programmes, as some are apt to think, are not merely to provide some more food, clothing or shelter to the villagers. The idea is to change the outlook of the people and to arouse in the villager the desire for a richer and fuller life; to develop in him the requisite ability to look after himself. Indeed, the Community Development movement is a human movement and a national endeavour to mobilise all resources for the uplift of the villager. The programme, expressing the hopes and aspirations of our people has no parallel in its scope and magnitude with any programme in any other part of the world.

In a recent review of the Five Year Community Plan for the World, the United Nations Secretary, Dag Hammarskjoeld was all praise for India's achievements. He said in his report that there was possibly no other country where so much experience and knowledge have been built and accumulated in community development and added that the experience is important not only for the future of the Indian movement but highly relevant to other countries where national scale programmes are in the making.

According to a recent report of the Ministry of Community Development, much has been achieved during the last five years. The Community Development and the National

Extension programmes now cover over 222,000 villages with a rural population of nearly 130 millions. The number of families benefitted by the developmental activities number over eleven millions. In the field of agricultural production, it has been estimated that production rose by 20 to 25 per cent in these areas. The total quantity of fertilisers distributed was 14 million maunds and of improved seeds, over six million maunds. The achievements in the field of Animal Husbandry have also been equally encouraging. There are now nearly 6000 key villages and over 20,000 pedigree bulls have been distributed, which have all contributed to the improvement of livestock in the villages.

Even so, there is scope for further improvement in these areas. The Minister for Agriculture, Sri. M. Bhakthavatsalam, pointed out at the First Inter-State Seminar on Community Development at Kodaikanal early this month that it could not be said that all the people in the areas, particularly the poorest and lowest, had benefitted from the developmental programmes. The Minister stressed on greater efforts that have to be made to tackle the problem of the have-nots. In the attainment of higher targets in agricultural production, he referred to the need to examine whether the *Gram-Sevak*, a multi-purpose worker would be really able to discharge his functions fully under the agricultural programme. The success of the Community Development plan will be largely measured by the attainment of the production targets in the agricultural sector envisaged in the Second Five Year Plan. There is need for considerable strengthening of the hands of the Agricultural Department, commensurate with its responsibilites for the successful execution of the Plan programme.

Soils of Madras State
Part I - Distribution in Various Districts

by
P. K. R. MENON, and Dr. A. MARIAKULANDAI,
Agricultural College and Research Institute, Coimbatore.

Introduction : Madras State as in 1955 consisted of the following thirteen districts, Chinglepet, North Arcot, South Arcot, Salem, Coimbatore, Tanjore, Tiruchirapalli, Madurai, Ramanathapuram, Tirunelveli, Nilgiris, Malabar and South Kanara. It lies between longitudes 80 and 73 and latitudes 9 and 13. The total area of the State is about 38,500,000 acres and the total population is 42 millions. Rice is the staple food of the majority of the population with millets occupying the second place. The State is bound by the Bay of Bengal on the east and the Arabian sea borders the coast line on the west in the districts of Malabar and South Canara. No part of the State is very far from the sea and the climate on the whole is equable. The temperature in the interior districts may record of 100° to 105° in the height of summer while in the Coastal districts a maximum temperature near about 100° is normal. The west coast districts of Malabar and South Kanara enjoy an annual rainfall of about 100 to 150 inches while the east coast and the interior districts get an annual precipitation of about 30 to 40 inches only. In the Western region the rainfall is received mainly in the South West Monsoon (June to September) while in the rest of the state the North East Monsoon (October to December) is more important. Rainfall has had a profound influence on the type of soil which has developed in the regions of the state.

The total soil area of the State is in the neighbourhood of 27 million acres not taking into account Nilgiris district which has not been clearly classified. For revenue purposes, the soils have been classified into Black, Red, Alluvial and Arenaceous soils. The distribution of the different types in the various districts is given in the table.

TABLE I.

S. No.	Districts	Soils				Soil as percentage of total			
		Black	Red	Aluvial (in acres)	Arena-ceous	Black	Red	Alu-vial	Arena ceous
1.	Chingleput	5,99,510	12,45,140	—	90,480	30·51	63·37	—	4·57
2.	North Arcot	2,12,301	11,40,801	—	2,047	15·03	80·76	—	4·59
3.	South Arcot	15,06,811	15,20,380	—	3,45,166	44·67	45·00	—	10·23
4.	Salem	4,29,192	11,49,616	—	—	16·21	43·21	—	—

(Table I Contd.)

S. No.	Districts	Soils				Soil as percentage of total			
		Black	Red	Aluvial (in acres)	Arena-ceous	Black	Red	Alu-vial	Arena ceous
5.	Coimbatore	5,38,178	33,41,077	—	—	12 81	75·41	—	—
6.	Tanjore	5,70,456	2,42,993	2,38,724	84,788	23·78	10·14	12·03	3·53
7.	Tiruchirapalli	1,25,150	2,34,0'7	2,94,672	—	15·23	30 0	37 0	—
8.	Madurai	2,03,048	21,42,162	—	—	6·63	40 60	—	—
9.	Tirunelveli	6,38,236	21,36,965	—	—	24.00	73·00	—	—
10.	Ramanatha-puram	18,74,400	10,40,220	—	—	60·88	33·79	—	—
11.	Nilgiris	—	Not clearly classified			—	—	—	—
12.	Malabar	—	26,00,963	—	16,538	—	87·5	—	5·10
13.	South Kanara	—	2,101,915	—	34,714	—	78.90	—	1·30

TABLE II.

Distribution of Soils in Madras (Zacharias 1950.)

S. No.	Districts	Distribution of soils (Zacharias 1250)					Total (000) acres
		Black %	Red %	Arena-ceous %	Alluvial %	Mixed %	
1.	Chingleput	29	65	6	—	—	910
2.	South Arcot	35	62	3	—	—	1,327
3.	North Arcot	16	84	—	—	—	1,410
4.	Salem	40	60	—	—	—	1,803
5.	Coimbatore	24	76	—	—	—	963
6.	Tiruchirapalli	34	60	—	6	—	2,862
7.	Tanjore	48	21	7	24	—	1,182
8.	Madurai	14	86	—	—	—	1,322
9.	Ramanathapuram	73	27	—	—	—	1,123
10.	Tirunelveli	40	60	—	—	—	1,090
11.	Malabar	—	99	1	—	—	2,303
12.	South Kanara	—	98	2	—	—	1,961
13.	Nilgiris	—	Not recorded		—	—	—
				(Zacharias)			18,256

The distribution of the different soils in the various taluks of the districts and some of the general features are given below:

Chingleput: The general aspect of the terrain is that of an almost level plain with a series of sand-hills near the sea coast and broken up by a few rocky hills to the south. In the district there is a large area of sandy waste covered with shrub jungle. The three predominant types of soil are the black, red and arenaceous soils. Each may be classified under wet and dry and tabulated in each taluk as under:

Taluk % in each taluk	Black soil			Red soil			Arenaceous		
	wet	dry	Total	wet	dry	Total	wet	dry	Total
Maduranthakam	26·2	30·7	54·9	28·7	11·8	40·5	3·3	1·3	4·6
Conjeevaram	17·0	37·9	54·9	25·9	19·2	45·1	...	...	...
Chingleput	9·5	30·3	39·8	27·9	23·2	51·1	6·8	2·3	9·1
Saidapet	2·8	3·9	6·9	30·7	31·9	52·6	18·3	12·5	30·7
Sriperumbudur	2·2	18·4	20·6	36·4	43·0	79·4	...	...	...
Tiruvellur	7·6	17·2	24·8	46·2	29·0	75·2	...	...	...
Ponneri	0·4	5·3	5·7	43·1	46·5	87·6	6·4	0·3	6.7

Each kind of soil may be subdivided into three classes, clay, loam and sandy. Loam, clay and sand are considered in the order as regards their crop producing capacities. The red soil predominates in the northern taluks while the black soil is widespread in the southern taluks.

North Arcot: The Western portion of the district is a flat plain running upto Javadi hills. The Central and Eastern parts are mostly hilly and the western portion rises to Mysore Plateau along the Chittor District of Andhra State. The most important soil of the district is the red ferrugenous soil with the broad types, loams and sands. Black soil occurs to the extent of only about 15% and is found mainly in the neighbourhood of the rivers Palar, Ponney and Cheyar and one or two irrigation tanks. Black clay soil is found chiefly in taluks of Gudiyatham, Wallajah, Arkonam, Cheyyar and Vellore. The distribution of the soils in the various taluks of the district is given below:

Taluk 1000 acres.	Black soil			Red soil	
	Clay	Loam	Sand	Loam	Sand
Tiruppathur	0·1	3·9	0·5	28·9	61·6
Gudiyatham	3·7	28·8	9·0	7·4	72·1
Wallajah	3·0	22·6	6·2	65·6	61·9
Arkonam	2·5	22·5	15·1	43·0	42·3
Cheyyar	2·6	23·1	3·7	32·2	45·6
Wandiwash	0·4	40·6	5·9	63·9	96·0
Vellore	1·4	8·5	2·3	78·4	13·6
Polur	0·1	10·3	1·9	104·2	19·9
Tiruvannamalai & Chengam	0·6	2·8	0·5	73·4	250·6

South Arcot: The terrain in the district is gently undulating except in the taluk of Kallakurichi which is mostly hilly. Nearly 60% of the district is made up of red ferruginous soil and the black soil which forms about 35% of the total occurs chiefly in Chidambaram, Virudachalam and Cuddalore taluks. The chief areas of red soils are the taluks of Gingee, Tirukkoyilur and Kallakurichi. Arenaceous soils are found in the coastal strips of Chidambaram, Cuddalore and Tindivanam taluks. The black soil is generally more fertile than the red and arenaceous soils.

Taluks % in each taluk.	Block soil.			Red soil		Arenaceous	
	Clay	Loam	Sandy	Loam	Sandy	Loom	Sandy
Chidambaram	43	30	2	11	3	7	2
Cuddalore	6	22	8	26	29	2	6
Tirukkoyilur	1	11	10	33	44	...	...
Tindivanam	10	18	1	25	35	2	8
Villpuram	10	20	3	24	42	...	...
Gingee	...	1	...	32	66	...	...
Kallakurichi	4	18	...	46	31	...	...
Virudhachalam	22	35	5	26	12	...	...
Average	12	19	4	28	33	1	2
		35		61		3	

Salem: The district may be divided into three divisions according to elevation. These are the Balaghat, Maraschal and Talaghat divisions, 3000, 1800 and 1000 feet respectively above the sealevel. The important soils of the district are the red and black soils with subdivisions into clayey, loamy and sandy groups. The black soil is more fertile than the red soil and occurs to small extent in nearly all the taluks particularly Dharmapuri and Krishnagiri. The red soil comprises three-fourths of the total land area.

Taluks % in each Taluk	Black Soil			Red Soil	
	Clay	Loam	Sandy	Loamy	Sandy
Hosur	...	8	11	19	61
Krishnagiri	...	12	12	4	64
Dharmapuri	...	20	6	9	64
Harur	1	7	1	10	81

Taluks. % in each taluk	Black Soil.		Sandy	Red Soil.	
	Clay.	Loam		Loamy.	Sandy.
Omalur	2	5	12	22	57
Tiruchengode	1	3	1	13	80
Salem	2	5	2	22	67
Attur	13	11	3	30	42
Namakkal	1	9	2	26	58
Rasipuram	2	6	3	23	64
Average	2	9	6	18	63

Coimbatore: Red and black soils occur side by side in many localities in the district. Red soil is loamy to sandy in character while the black is often clayey and sometimes loamy. The black soil is more fertile than the red soil. The rainfall in the district is on the average 20" to 25" per annum and water has been the limiting factor for cultivation. Well irrigation is the chief form of irrigation in the district. The extent of black and red soils of various types occurring in the taluks are approximately as follows:—

Taluk. % of total	Black soil.		Sandy	Red soil.	
	Clay.	Loam.		Loam	Sandy.
Kollegal	—	13·9	3.2	51·3	31·6
Gobichettipalayam	—	8·0	—	32·5	59·5
Bhavani	—	3·6	0·3	11·7	84·3
Erode	—	1·2	—	18·8	80·0
Dharapuram	0·2	1·0	—	10·6	85·2
Udumalpet	12·4	11·0	0·4	17·7	57·7
Palladam	6·0	7·9	8·2	14·1	63·8
Coimbatore	11·2	13·8	0·7	35·6	38·7
Avanashi	0·2	5·4	0·6	22·7	71·1
Pollachi	3·4	2·7	—	39·3	34·4

Tanjore: It is the granary of Madras State since most of the other districts depend on Tanjore for their rice. The northern and eastern portions of the district form the delta of Cauvery which irrigates more than half of the area. The Cauvery old delta comprises of the taluks of Kumbakonam, Mayavaram, Shiali and Nannilam and parts of Tanjore, Papanasam, Mannargudi, Tiruthuraipundi and Nagapattinam Taluks. The area brought under irrigation in the southern part of the district is known as the new delta and includes the whole of Pattukkottai Taluk, southern portion of Tanjore and Papanasam Taluks, the western portion of Mannargudi Taluk and parts of Arantangi Taluk. The soil in the new delta is lighter

and less fertile than the Cauvery Alluvium which forms the cultivated soil in the old delta. The distribution of soils in the different taluks of the district is as shown in the table :—

Taluks.	Wet. % of total wet.				Dry. % of total dry.			
	Alluvial.	Black.	Red.	Arenacious.	Alluvial.	Black	Red	Arenacious.
Tanjore	32	39	29	—	6	10	84	—
Papanasam	28	68	4	—	38	22	40	—
Kumbakonam	64	36	—	—	59	41	—	—
Mayavaram	70	23	—	7	61	21	—	18
Shiali	—	76	—	24	—	53	—	47
Nannilam	55	45	—	—	56	44	—	—
Nagapattinam	—	92	—	8	—	45	—	55
Mannargudi	—	87	13	—	—	15	85	—
Tiruthuraipundi	—	93	1·0	6	—	61	11	28
Pattukkottai	—	—	99·7	0·3	—	—	99·7	0·3
Arantangi	—	—	99	1	—	—	87	13

Tiruchirapalli : Except for the upland tracts near Panchamadai hills in Musiri and Perambalur Taluks, the district as a whole is flat or gently undulating from north west to south east. A few hills are also found in the north-western part in Vaiyampatti, Marungapuri and in Kulitalai Taluk. Some isolated rock masses are found in Tiruchirapalli, Golden Rock and Ratnagiri.

The lands on either side of the Canvery in Musiri, Lalgudi, Tiruchirapalli and Kulitalai Taluks are made up of Cauvery alluvium. The black soil is found chiefly in the eastern portion. The other type of soil present in the district is the red loamy to sandy soil and this is the main soil of the district. The distribution of the different soils in the taluks of the district is as follows :—

Taluks.	Alluvial Soil.		Black Soil.			Red Soil.	
	Clay	Loam	Clay	Loam	Sand	Loam	Sand.
	Percentage of the total for the whole district.						
Perambalur	—	—	5·0	7·5	2·3	1·0	0·7
Udayampalayam	—	—	1·0	0·3	7·2	0·4	3·0
Musiri	0·4	1·7	0·9	1·8	1·5	1·3	2·6
Lalgudi	0·3	1·2	0·6	1·2	1·0	0·9	1·8
Tiruchirapalli	0·2	0·7	0·4	0·8	0·7	0·6	1.1
Karur	—	—	0·1	0·1	—	4·6	35·1
Kulitalai	0·4	1·3	0·1	0·1	0·1	0·1	7·5

Madurai : The area is a level plain broken by isolated hills and rocks in the west. The predominant geological formation underlying the district is granite with gravelly laterite in the eastern part. The major soil type of the district is the red ferruginous soil, loamy or sandy. Black soil in considerable extent in Tirumangalam Taluk as a continuation of similar soil in Ramanathapuram and Tirunelveli Districts. In Periakulam, Mathurai, Palani and Nilakkottai Taluks there are extensive patches of black soil. The tops of the Kodai hills are covered with black soil with a dark yellowish clay substratum. The distribution of the soil in the different taluks is approximately as given below :—

Taluks.	Black Soil.	Red Soil.
Dindugal	2·8	97·2
Madurai	17·4	82·6
Melur	0·4	99·6
Nilakkottai	6·4	93·6
Palani	6·5	93·5
Periakulam	9·0	91·0
Tirumangalam	60·8	39·2

Tirunelveli : The southern half of the district contains black soil while the northern half consists of red soil, loamy or sandy in character. The Thamparvarani valley is made up of black loam. The black soil is more fertile than the red variety. The distribution of the soils in the taluks of the district is given in the following table.

Taluks In 1000 acres	Wet		Dry		Garden
	Black	Red	Black	Red	Red sandy loam
Ambasamudram	14·9	11·9	1·1	72·0	...
Kovilpatti	1·8	0·7	70·2	29·3	...
Nanguneri	0·1	10·9	2·0	87·0	...
Sankarankovil	3·6	6·8	32·4	57·2	...
Srivaikuntam	15·1	3·7	28·9	52·3	...
Tenkasi	6·5	17·3	0·7	85·5	...
Tiruchendur	7·6	8·1	3·2	81.1	...
Anjango	...	...	...	12·5	97·3
Tangarsevi	...	...	...	0·9	99·1

Ramanathapuram: The district is a part of a great plain stretching from the western Ghats to the Bay of Bengal with a few broken and detached hills in Srivilliputhur. Near the coast in the east there are a number of reefs, shoals and coral islands. 60% of the district is made up of the black soils and the rest consists of red laterite soil with some sand dunes and swamp along the coast. The black soil is found in the southern half of the district, in the taluks of Paramakudi, Sattur, Aruppukkottai. Mudukalatur and Ramnad. The black soil is more fertile than the red soil. Water is generally the limiting factor in the cultivation of these soils. The distribution of soils in the taluks are given below:

Taluks	Wet		Dry	
	Black	Red	Black	Red
Srivilliputhur	7·0	2·0	64·0	27·0
Sattur	2·6	...	82·6	14·8
Aruppukkottai	22·2	3·4	56·2	18·2
Paramakudi	34·5	...	65·5	...
Tiruvadanai	24·0	...	76·0	...
Mudukalatur	...	...	37·4	62·6
Sivagangai	...	37·8	...	62·2
Ramanathapuram	9·0	18·0	43·5	29·5

Malabar: The soils of Malabar are laterite and laterites. The rock formations of the district are granites and gnesses and these have been subjected to considerable leaching of 100 to 150″ of rainfall in the South West Monsoon from June to September, Where the rainfall exceeds 100 inches per annum the soils are mainly laterites while with less than 100 inches lateritic soils of silica sesgin of 1·3 to 2 have developed. The soils are devoid of bases and not fertile except in Wynad taluk where black and blackish soils have developed from forest washes. The laterites are often coarse in texture with considerable ferruginous gravel but loams preponderate and occasionally clays are met with. Along the coast considerable yamounts of sand soils are found especially in Ponnani taluk. The distribution of the different types of soils in the taluks of the district are as follows. Wynad taluk has not been surveyed systematically.

Taluks	Red clay	Red Loam	Red sand	Arenacious
In 1000 of acres				
Kottayam	0·7	174·8	5·0	...
Chirakkal	7·6	370·7	35·1	...
Kurumbarnad	6·0	200·7	27·6	3·2

Taluks	Red clay	Red Loam	Red sand	Arenacious
Calicut	0·2	165·1	10·7	1·3
Ernad	2·0	363·3	31·4	0·1
Walluvanad	...	303·0	63·5	...
Palghat	...	280·9	31·5	...
Ponnani	10·1	99·9	126·9	11·6
British Cochin	...	...	0·7	0·3

South Kanara: The district is a broken table land of laterite soil, 200-400 feet near the coast rising to 600 feet near the western ghat. The strip of land varies in width from 5 to 25 miles between the Ghat and the sea. It contains numerous ravines and valleys of rich alluvial soil. The soils of the district are ferrunginous or areanaceous and have wet, dry and garden cultivation. The principal rock is quartzosegneiss which decomposes into white, yellow or red clay finally converted into laterite by the heavy rainfall and high summer temperature. The distribution of the soils is as follows:

Taluks In 1000 of acres	Ferruginous	Arenaceous
Mangalore	221·1	19·3
Kasargode	361·0	11·4
Puthur	607·2	...
Udupi	205·4	7·5
Gondapur	276·3	3·0
Karkal	340·7	...

Nilgiris: The district is a plateau rising abruptly from plains. The interior consists chiefly of gravelly undulating plains divided by narrow valleys. The soils are shallow in higher slopes and on the lower lands deep rich loams are found as well as yellow ochre clay and in some places black peaty soils. The soils are subject to much inundation. There are four varieties of soils distinguished as black, brown, yellow and red. Level lands with black and red soils are fit for cultivation. High slopes are not suitable for ordinary crops but are much in demand for tea plantations. The major soils the district are laterites.

Summary: In this paper the distribution of soils as classified by the Revenue authorities are given for each district comprising the State and for the taluks of a district. The soils are classified mainly into black, red and arenacious soils. Nothing has been said about the nature of the soils, their properties and characteristics. Detailed information on these aspects will be presented in subsequent papers.

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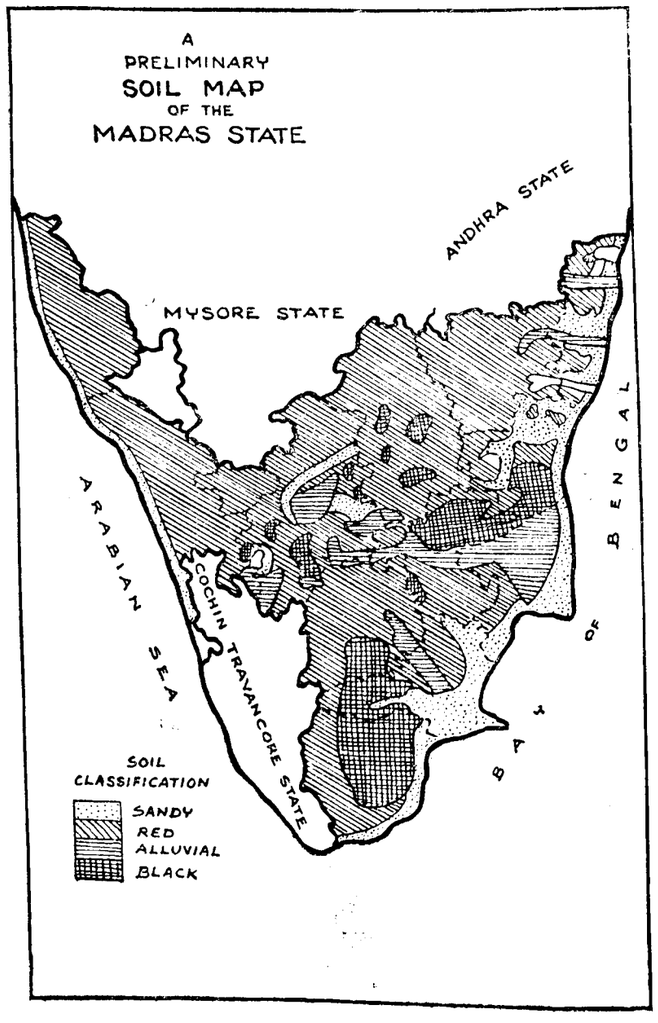

The Soil Map of Madras State as in 1955 is appended.

Mixed Cropping Trials with Ragi, Cotton and Groundnut

by

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Introduction: Groundnut is an important oilseed crop of South Arcot district which is raised in nearly 4 lakhs of acres. of which 55,000 acres are irrigated and the rest rainfed. Another important crop of this district is *Ragi* which is grown in 75,700 acres of which 61,500 acres are irrigated. Cambodia cotton is yet another important crop, raised in about 16,000 acres. It is grown as a rainfed crop except in a small area of 1,260 acres where it is grown under irrigated conditions. To increase the income per acre and put the land to more profitable use by growing more than one of these crops simultaneously, trials were laid out at the Research Station,Palur, the results of which are incorporated in this paper.

Previous Work: Groundnut grown year after year in the same land resulted in not only a lowering of the yield but also a deterioration in quality. To find out whether growing groundnut in rotation with a cereal or intersowing it with a cereal was more profitable and economical, experiments were laid out in as early as 1907. *Cumbu* and *Thenai* were the cereals included in the trials. *Ragi* was included in the trials conducted from 1912—13. It was found that *Cumbu* was better than *Thenai* for growing as a mixture with groundnut. A cereal crop following another cereal crop intersown with groundnut was decidedly of mutual beneficial effect to the cereal and groundnut crops. Cereal interplanted with groundnut gave a better return than cereal grown in rotation with groundnut. It was also found that under irrigated conditions, Cambodia Cotton was an excellent crop for rotation with groundnut. Trials showed that for growing as a mixture with groundnut, *cumbu* was the best cereal under dry conditions and *ragi* the best cereal under irrigated conditions.

Experiments also showed that there are two seasons in which *ragi* could be raised viz., May to September and December to March. In the former season *ragi* was grown as a pure crop and in the latter season groundnut was dibbled when *ragi* was in the shot blade stage.

Experiments were started in 1941—42 to find out whether cotton could profitably replace groundnut in the ragi-groundnut mixture. These experiments were continued upto 1944—45 and the

data of monetary value of the gross produce valued at constant rates for each of the commodities were analysed. Except in 1942–43 when cotton sown in January and groundnut sown in March topped the list, the local practice of planting *ragi* in January and intersowing groundnut in March was found to be the most remunerative, the next being cotton and groundnut sown together in January.

From 1945—46 the experiment was slightly modified with the following treatments:

(1) *Ragi* planted in January and groundnut dibbled in March.
(2) Cotton and Groundnut both sown in January.
(3) Cotton sown in January and groundnut in March.
(4) Pure crop of cotton sown in January.

The results showed that cotton sown in January and groundnut in March gave the highest monetary return in 1945—46 and that the mixed crop of *ragi* and groundnut gave the highest monetary return in 1947—48.

Experimental Work: To find out whether a mixed crop will result in a larger profit than a pure crop and if so which mixture will yield the largest profit, a co-ordinated experiment was laid out with the following treatments:

1. Ragi PLR. 1 alone.
2. Cotton P. 216 F alone.
3. Groundnut TMV. 4 alone.
4. Ragi + Cotton.
5. Ragi + Groundnut.
6. Ragi + Cotton + Groundnut.

The experiment was conducted in the December—September seasons of 51—52, 52—53 and 53—54, In the December–September season of 1954—55 another treatment namely cotton + groundnut was added on.

The following chronological order of sowing and planting was observed. Ragi nursery was raised in the beginning of December and transplanted by the end of December or beginning of January adopting a spacing of $6'' \times 6''$. A week later, cotton seeds were dibbled six inches apart in rows $2\frac{1}{2}$ feet apart. Groundnut kernels were dibbled six inches apart in rows 8" apart when ragi crop was in shot blade stage. Weeding, hoeing and irrigation were given as and when necessary. The ragi crop was harvested by the end of March and the groundnut crop by the end of June or beginning of July. The cotton crop alone remained in the field till the end of July.

The cost of cultivation for each treatment was separately worked out as also the gross value of the produce obtained from each treatment, based on the local market rates at the time of harvest (vide Table VI).

Discussion: The results of the trial conducted from December 1951 to September, 1952 are presented in Table I. It may be seen that the returns from the mixed crop of ragi + cotton + groundnut were significantly the highest, though on par with the returns from the mixed crop of ragi and groundnut. The value of the pure crop of groundnut was on par with that of the mixed crop of ragi and groundnut. The yield data show that the yield of ragi was reduced to an appreciable extent when grown mixed with cotton than when grown with groundnut or with both cotton and groundnut. The yield of cotton was reduced when it was grown mixed with ragi or both ragi and groundnut. Taking into consideration the value of the produce and the duration of the crop, it appears that the groundnut crop gave the largest return per unit of time while cotton gave the lowest.

The results of the trials conducted in the second year were in general agreement with those of the trials of the previous year. The mixed crop of ragi + cotton + groundnut, though on par with ragi + groundnut, gave the largest return (Vide Table II). The groundnut crop gave the largest return per unit of time while cotton gave the lowest. It may be seen that the yield of ragi was not however affected when grown mixed with cotton or groundnut or both. On the contrary, these mixtures appear to result in an increase in the yield of ragi. The yields of groundnut and cotton were reduced when grown mixed with ragi than when grown as pure crops.

Analysis of data gathered from the trials conducted in the third year shows that the mixed crop of ragi + groundnut gave significantly the highest return (Vide Table III). The value of the pure crop of groundnut, though on par with the value of the mixed crop of ragi + cotton + groundnut, was the next highest. The yield of ragi was increased when grown mixed with groundnut or cotton and remained unaffected when grown mixed with both groundnut and cotton. As in previous years, groundnut crop was found to give the highest value of produce per unit of time and cotton crop, the lowest value.

The results of the trials conducted in the fourth year were in general agreement with those of the trials of the third year. The value of the produce obtained from the mixed crop of ragi + groundnut was significantly the highest (Vide Table IV). The value of the

produce from the mixed crop of ragi + cotton + groundnut was the next best and was on par with that of the mixed crop of cotton + groundnut. It was found for the fourth year in succession that the highest value of produce per unit of time was obtained from the groundnut crop and the lowest value from cotton.

The results of the trials conducted in all the four years are summarised in Table V and from this table it may be seen that the yield of ragi was not much affected whether grown alone or mixed with either cotton or cotton + groundnut. But when ragi was grown mixed with groundnut, the yield of ragi was higher. An average yield of 735 lb. of Kapas was obtained from a pure crop of cotton whereas only 395 lb. was obtained when cotton was grown mixed with ragi. A still lower yield of 228 lb. of kapas was obtained when cotton was grown with ragi + groundnut. The yield of cotton was however increased when grown with groundnut, probably due to the beneficial influence of the leguminous crop. The average yield of 2084 lb. of pods was obtained from a pure crop of groundnut whereas only 1723 lb., of pods was obtained when groundnut was grown with ragi, 1300 lb. when grown with cotton and 1229 lb., when grown with ragi + cotton.

The mixed crop of ragi + groundnut has given the highest return of Rs. 666/- while ragi + groundnut + cotton has given the next highest return of Rs. 610/-. The pure crop of groundnut has given the next highest return. The pure crop of ragi has given the lowest return. Ragi, however, occupies the field for only 3 months while groundnut remains for 5 months and cotton for 6½ months. To have a better comparison, the value per unit of time was therefore worked out and it was found that the mixed crop of ragi + groundnut was the most profitable and a pure crop of cotton the least profitable.

Summary: It is most profitable to raise a crop of ragi inter-sown with groundnut. Fairly high returns are obtained by growing together the three crops of ragi, cotton and groundnut. The pure crop of groundnut also gives a good margin of profit. A mixed crop of ragi + groundnut gave the highest value of produce per unit of time while a pure crop of cotton gave the lowest.

Acknowledgments: The authors are deeply indebted to all Assistants of this Station who were in charge of these experiments.

TABLE I.

(December 1951 to September, 1952)

Treatments:

1. Ragi alone (PLR. 1)
2. Cotton alone (P. 216 F.)
3. Groundnut alone (TMV. 4)
4. Ragi + Cotton
5. Ragi + Groundnut
6. Ragi + Cotton + Groundnut

		Spacing:
Date of transplanting ragi	31—1—1952	6″ × 6″
Date of dibbling cotton	3—2—1952	2½′ × 6″
Date of dibbling groundnut	7—3—1952	8″ × 6″

Particulars	Ragi	Cotton	Ground-nut	Ragi+ Cotton	Ragi+ Ground-nut	Ragi+ Cotton Ground-nut	General mean	'Z' test satisfied or not	Stan-dard error	Critical Diffe-rence P=0·05
	1	2	3	4	5	6				
Yield per acre in lb. ..	1150	217	1291	734+156	1017+ 1036	961+156 +838	..	..	..	..
Value of produce per acre (Rs.) ..	114	96	268	141	311	344	212	Yes	22·4	65·8
Percentage on control ..	100	84	235	124	273	302	186	Yes	19·5	57·5
Cost of cultivation per acre (Rs.) ..	307	233	305	363	424	490	..	..	..	..
Net Profit or loss (Rs.) ..	193	—137	— 37	—222	—113	—146	..	..	..	..

Conclusion: 6, 5, 3, 4, 1, 2

TABLE II.

(January 1953 to September, 1953)

Treatments:

1. Ragi alone (PLR. 1)
2. Cotton alone (P. 216 F.)
3. Groundnut alone (TMV. 4)
4. Ragi + Cotton
5. Ragi + Groundnut
6. Ragi + Cotton + Groundnut

Spacing:

Date of sowing ragi	4—1—1953	
Date of transplanting ragi	3—2—1953	6″ × 6″
Date of dibbling cotton	12—2—1953	2½′ × 6″
Date of dibbling groundnut	4—4—1953	8″ × 6″

Particulars	Ragi	Cotton	Ground-nut	Ragi+ Cotton	Ragi+ Ground-nut	Ragi+ Cotton Ground-nut	General mean	'Z' test satisfied or not	Stan-dard error	Critical Diffe-rence P=0·05
	1	2	3	4	5	6				
Acre yield of produce in lb. ..	1144	758	1149	1208+416	1286+910	1296+289 +691	..	..	..	..
Value of produce per acre in (Rs.) ..	190	332	381	384	516	574	396	Yes	24·81	73·19
Percentage on control ..	100	175	201	203	272	302	208	Yes	13·04	38·47
Cost of cultivation per acre in (Rs.) ..	175	180	215	230	265	320	..	..	..	..
Net profit per acre in (Rs.) ..	+15	+152	+166	+154	+251	+254	..	..	..	..

Conclusion : 6, 5. 4, 3, 2, 1.

TABLE III

(December 1953 to September 1954)

Treatments:

1. Ragi alone—PLR. 1.
2. Cotton alone—P. 216 F.
3. Groundnut alone—TMV. 4.
4. Ragi+Cotton
5. Ragi+Groundnut
6. Ragi+Cotton+Groundnut

Spacing:

Date of sowing ragi	7—12—53	
,, transplanting ragi	2— 1—54	6′ × 6″
,, dibbling cotton	12— 1—54	2½′ × 6″
,, dibbling groundnut	18— 2—54	8″ × 6″

Particulars	Ragi	Cotton	Ground-nut	Ragi+ Cotton	Ragi+ Ground-nut	Ragi+ Cotton+ Groundnut	'Z' test satisfied or not	Stan-dard error	Critical Differ-ence P=O .05
	1	2	3	4	5	6			
Acre yield in lb.	1420	962½	3345	1712+560	1813+3045	1414+240½+2237			
Value of produce per acre (Rs.)	237	421	1115	285+345	302+1015	236+105 + 746			
Percentage on control	100	204·6	477·2	228	562·7	468·8	Yes	5·4	16·4
Cost of cultivation per acre (Rs.)	311	208	219	404	460	524			
Net profit or loss per acre (Rs.)	—74	+213	+896	+126	+357	+563			

Conclusion: 5 3 6 4 2 1

TABLE IV.

(December 1954 to September, 1955)

Treatments :

1. Ragi alone PLR. 1.
2. Cotton alone P. 216 F.
3. Groundnut alone — TMV. 4.
4. Ragi + Cotton.
5. Ragi + Groundnut
6. Cotton + Groundnut
7. Ragi + Cotton + Groundnut.

Spacing :

Date of sowing ragi	5—12—54	
Date of transplanting	31—12—54	6″ × 6″
Date of dibbling cotton	12— 1—55	2½′ × 6″
Date of dibbling groundnut	14— 2—55	8″ × 6″

Particulars	Ragi	Cotton	Ground-nut	Ragi + Cotton	Ragi + Ground-nut	Cotton + Ground-nut	Ragi + Cotton + groundnut	'Z' Test satisfied or not	Standard error	Critical Difference P=0·05
	1	2	3	4	5	6	7			
Acre yield of produce in lb. ..	2646	1002	2550	2349 + 445	2835 + 1900	820 + 1300	2349 + 227 + 1150	..	..	..
Value of produce per acre (Rs.) ..	234	282	359	208 + 125 = 333	251 + 267 = 518	231 + 182 = 413	208 + 64 + 161 = 434	Yes	17·7	52·4
Percentage on Standard ..	100	120·5	153·4	142·3	221·4	176·5	185·5	Yes	7·56	22·4
Cost of cultivation per acre (Rs.) ..	199	224	237	335	350	375	456	..	..	..
Net profit or loss (−) per acre (Rs.) ..	35	58	122	− 2	168	38	− 22	..	..	..

Conclusion : 5 7 6 3 4 2 1

TABLE V

	Ragi	Cotton	Groundnut	Ragi + Cotton	Ragi + Groundnut	Cotton + Ground-nut	Ragi + Cotton + Ground-nut
1952 Yield per acre in lb.	1150	217	1291	734 + 156	1017 + 1036	.. ..	961 + 156 + 838
1953 ,, ,, ,,	1144	758	1149	1208 + 419	1286 + 910	.. ..	1296 + 289 + 691
1954 ,, ,, ,,	1420	963	3345	1712 + 560	1813 + 3045	.. ..	1414 + 241 + 2237
1955 ,, ,, ,,	2646	1002	2550	2349 + 445	2835 + 1900	820 + 1300	2349 + 227 + 1150
Average yield per acre (4 years)	1590	735	2084	1501 + 395	1738 + 1723	820 + 1300	1505 + 228 + 1229
1952 Value of produce Rs.	114	96	268	141 ..	311 ..	.. ..	344 .. ..
1953 ,, ,, ,,	190	332	381	384 ..	516 ..	.. ..	574 .. ..
1954 ,, ,, ,,	237	421	1115	630 ..	1317 ..	.. ..	1087 .. ..
1955 ,, ,, ,,	234	282	359	333 ..	518 ..	413 ..	434 .. ..
Average value of produce (4 years)	194	283	531	372 ..	666 ..	413 ..	610 .. ..
Period for which the crop remains in the field (days)	90	195	130	195 ..	130 ..	195 ..	195 .. ..
Value of produce per unit of duration (per day)	2·16	1·45	4·08	1·91 ..	5·12 ..	2·12 ..	3·10 .. ..

TABLE VI

Value of produce in different years

	Ragi						Cotton			Groundnut					
	Grain per lb.			Straw per 100 lb.			per lb.			Grain per lb.			Haulms per 100 lb.		
	Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.
1952	0	1	7	1	0	0	0	7	0	0	3	4	1	0	0
1953	0	2	0	1	0	0	0	6	0	0	4	6	1	0	0
1954	0	3	1	1	0	0	0	7	0	0	4	0	1	0	0
1955	0	1	4	1	0	0	0	4	6	0	2	3	1	0	0

A Caution Against Possible Sterility Due to Vegetative Propagation in Horticultural and other Crops

by

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Vegetative propagation is being adopted at present in many of horticultural and other crops. The primary object in adopting such vegetative methods is to secure a homogeneous plant material of the parent. In the case of dioecious crops where fruits and seeds are required, it is particularly useful, as otherwise there is a chance of all the seed-raised plants turning out to be male plants that are of no use.

Sterility appears to be a common feature in crops and plants raised by vegetative means, either by cuttings, layers or other methods. Gates and Good speed (1916) have recorded that pollen sterility is a physiological condition which may be due to various causes, hybridization and mutability being only two of them. Stout quoted by Dorsey (1916) mentions three kinds of sterility 1. sterility from importence of pollen 2. sterility from incompatibility, and 3. sterility from abortion of the embryo. Sterility from incompatibility has been reported in several plants such as *Secale*, *Nicotiana*, *Cichorium* etc. Dorsey (1919) has given an exhaustive account of sterility in *plum* which he attributes to embryo abortion and incompatiblity. Rao (1923) has presented an account of pollen sterility in vegetatively raised *Thespesia populnea*, comparing it with seed raised plants.

There may be several causes for sterility but wherever there is vegetative propagation, sterility seems to set in, in a few generations, which may be expressed by shedding of flowers, fruits, irregular seed-setting or barrenness.

Of late, propagation by vegetative means is being resorted to indiscriminately, in almost all perennial and annual crops without proper enquiry into the effects of the methods adopted. In certain cases this may be inevitable or perhaps advantageous. To cite a few examples of sterility setting in due to vegetative propagation, mention may be made of *banana*, *crotons*, *sugarcane*, *sweet potato*, *roses*, *Bougainvillea*, *Hibiscus*, *turmeric* etc. which are not known to set seed, though complete sterility is not the rule of nature. Vegetative propagation in *tobacco*, *hemp*, *cinchona*, *senna*, *sweet potato*, *Gliricidia*

etc. in which seeds are not the desired products, is a welcome feature. Besides this, wherever parthenocarpy occurs, as in *banana* and certain *gourds*, vegetative propagation will be the best method of propagation without any disadvantages. There exist no two opinions about the superior vigour of seed-raised plants over those raised by vegetative means. For instance noxious weeds like *Trianthema portulacastrum* which propagate themselves by seed spread rapidly and in turn seed profusely. On the contrary, *Kikuyu grass*, *hariali* and *Cyperus rotundus*, which multiply by rhizomiferous stems set only scanty seeds showing very low percentage of germination. A causal observation of the pollen grains of *roses*, *Hibiscus*, *banana*, *Manihot* and other vegetatively-raised plants will indicate high percentage of sterility in pollen grains.

The present article is meant to point out the bad effects or advantages of vegetative propagation in certain crops and to suggest methods to overcome the difficulties. It is to be mentioned that there is not enough justification for vegetative propagation in certain crops like *coffee*, *groundnut*, *cashew*, *cotton*, *castor*, *cardamum* etc., where the seeds are the desired products. Though the explanation that vegetatively propagated plants will breed true, is correct, it need not be taken advantage of, at the expense of fertility. Hybridization within limits will enable us to evolve desirable types, which is being done in seed raised annuals like cereals and pulses. The following examples will indicate that vegetative propagation may be one of the major reasons for sterility in certain crops and repeated trials have to be conducted before the method is recommended for large-scale cultivation.

In crops like *mango*, vegetative propagation has to be adopted for obtaining quality fruits. The seed raised country mangoes are certainly healthier and there is not as much shedding of fruits and flowers as we find in grafted varieties. Yet we are prepared to sacrifice quantity for quality. Incidentally mango has the disadvantage of having the inflorescence in terminal position, being subjected to climatic disturbances. In *banana* the cultivated varieties which have been propagated vegetatively for long periods have lost their seed setting habit. The wild species such as *Ensete superba*, *Musa acuminata*, *M. balbisiana* and *M. textilis* which are propagated by seeds bear fruits with viable seeds. In banana vegetative propagation is decidedly an advantage since seeds are not the desired products. Besides this, the banana fruit develops parthenocarpically and as such pollen sterility does not interfere with fruit formation.

To aid in the parthenocarpic development of the fruit, the inferior position of the ovary is of much significance. But for the inferior position of the ovary and parthenocarpic development of the fruit, shedding of flowers or fruits may be exhibited, as in fruits developed from superior ovary. An observation of the pollen grains of the cultivated varieties of banana will show high percentage of sterility as contrasted with the pollen gains of wild species.

There is no justification for vegetative propagation in crops like *coffee*, *cotton*, *cashew*, *groundnut* etc., where seeds are the desired products. The Indian Coffee Board has been conducting elaborate trials to propagate coffee by vegetative means, (Sundaram - 1953 Pattabhiraman - 1953) the main objects being to obtain a homogeneous material and secure yields earlier. Much work is being done in cashew, recommending the vegetative propagation methods, particularly the advantages of air - layering (Abraham and Rao. V. N. M. - 1956) which is claimed to be one of the successful and easiest methods of cashew propagation. In cashew, seed is the part that is consumed and partial or complete sterility will certainly reduce the yield. Groundnut is an annual which has been so long successfully propagated by seeds and much breeding work has been done to evolve superior strains. Recently Bhavanisankar and Srinivasulu (1955) have investigated the possibility of raising the crop by vegetative means. The results of the investigations have favoured the arguments advanced in this paper. The growth is reported to be quicker but there was no pod formation.

In conclusion it is clear from a few cases like *roses*, *Bougainvillea*, *Hibiscus*, *Sugarcane*, *ginger*, *banana* etc., which have been vegetatively propagated from time immemorial that method of propagation may be one of the major reasons for sterility. It is a common sight to see enormous shedding of flowers in *Thespesia populnea*, *Gliricidia* and *Hibiscus*, which are generally raised by cuttings. The seed raised plants of *T. populnea* on the sea shores in Madras and Ramanathapuram Dt. seed profusely which show high percentage of germination. Cardamum when raised by rhizomes very frequently results in the production of barren capsules. Occasional reversion to cultivation by seeds is desirable.

Propagation by cuttings is recommended in the Cucurbits, at least in the genus *Coccinea indica*, which develops fruits by parthenocarpy, a character of the genus. Attempts are being made to propagate cotton by grafting methods, in spite of the fact that

it is the epidermal hairs on the seeds that are the desired products in cotton. The study may be of academic interest but recommendation of the methods has to be done with great caution after enquiring into the effects, with regard to fertility.

It is finally suggested that comparative studies of pollen fertility can be made in certain annuals like *onion* or *garlic*, raising them by seeds and bulbs. There may be several causes for sterility but wherever vegetative propagation is adopted, sterility appears to set in, in a few generations and the above mentioned examples will have to warn us the possible consequences due to asexual methods of propagation, where seeds are the desired products.

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ERRATA

M. A. J. Vol. XLIV. No. 2, Page 48 — 53.

Page 47 lines 1 and 7 :
'Ripersia Oryzae' to be corrected as 'Ripersia oryzae'

Page 47 line 6 :
'Pets' to be corrected as 'pests'

Page 47 line 24 :
Omission : Insert the word 'the' between words 'of' and 'pest' occurring in lines 23 and 24.

Page 48 line 27 :
'Acre' to be corrected as 'area'

Page 49 line 30 :
'Folixol' to be corrected as 'folidol'

Page 51 lines 12 and 13 :
Words omitted : Insert "this interval" between words 'treatment' and 'was' in lines 12 and 13

Page 51 line 30 :
Repetition : Delete the words "and systox 0, 15 %"

Preliminary Studies on Storage of Coconut Oil

by

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Coconut oil is one of the important edible oils in India, chiefly on the West Coast and in Bengal. Besides the production in the country, India imports annually about 30,000 tons of coconut oil valued at over 4 crores of rupees. Coconut oil is obtained by crushing the dried kernal of the mature coconut known as 'Copra'. Copra is generally prepared by drying the broken nuts (i. e., nuts cut into halves) in the sun and the oil is extracted by crushing the copra in the village 'Ghani' or in power driven expellers. The major, if not, almost the entire quantity of the copra of commerce is made and oil is extracted during the summer months of February to May as the weather in that period is bright (thus favourable for copra making) and the largest yield of nuts and outturn of copra and oil are obtained during these months. Practically no crushing of copra for oil is done during the rainy season. It, therefore, becomes necessary to store the coconut oil for pretty long periods and as it easily becomes rancid, a proper method of storage has to be found out. The conditions of storage vary widely. Apart from using numerous containers, substances like jaggery are added to the oil. Perkins (1919) has studied the rancidity of Philippine coconut oil and found out that the oil of low initial acidity remained sweet during two years exposure to air and light. He has further stated that the first stage in rancidity is hydrolysis, the rapidity of which varies with initial acidity and seems to be accelerated by the action of air, light and fat soluble enzymes. But no systematic study seems to have been made so far, on the deterioration of the quality of oil under various conditions. Preliminary studies were therefore conducted to study the deterioration of the oil, at the Oilseeds Laboratory at Coimbatore.

Materials and Methods: The oil intended for the study was obtained from the Agricultural Research Station, Nileshwar where it was made by crushing the copra prepared at the the station itself. One tin of 36 pounds of oil was received in 1949 as well as in 1952. Immediately on receipt the oil was kept inside the laboratory to allow it to settle. The studies were conducted under three main conditions viz., (1) stored in containers of various metals (2) stored in bottles covered with cellophane paper of different colours (3) stored

after addition of different materials. Samples of oil intended for the study were prepared by drawing small quantities of the oil at different depths in the tin and the oil was then stored in the different containers. One sample was boiled and kept in a 1 lb. bottle. The metal containers were of aluminium, tin and earthern jar. Red, blue, green, yellow, orange and pink coloured cellophane papers were used for the colour treatments. Materials added to the different bottles were salt and jaggery. About $\frac{1}{4}$ lb. of these materials were used for each bottle of oil. The sample oil stored for the investigation was cloudy and opaque. The oil to which jaggery and salt was added, got clarified in 24 hours.

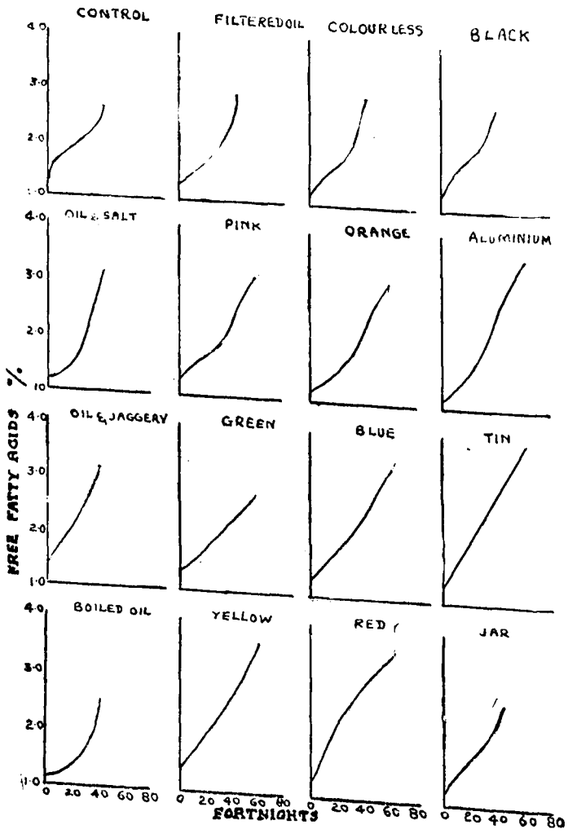
Samples of 10 c. c. of oil were drawn from the different treatments at fortnightly intervals and the free fatty acids content estimated. The other characters like smell, refractive index, colour etc., were noted both at the commencement and termination of the study.

The first series of studies was started in 1949 and the second in 1952.

Results: Results are presented in table I and II. Taking free fatty acids formation as a measure of deterioration of the quality of oil, it may be stated (vide graph).

1. Among the various treatments viz., additions of salt or jaggery and boiling or filtering oil, addition of salt was found to improve the keeping quality upto more than 20 fortnights. Boiled oil was also equally good from the point of view of low fatty acids content, but the smell was rancid.
2. While none of the colours was found preferable to control, red coloured paper covers was found to accelerate the deterioration in quality to a considerable extent.
3. Aluminium containers depressed the rate of deterioration to a greater extent than tin while the jar container comes in between the two.

Discussion: It was found that addition of salt or jaggery reduced the rate of free fatty acid production keeping the quality good for, as long as 20 fortnights. Similarly boiling the oil was found to keep the free fatty acid content low. It is found in natural fats of vegetable origin that there is an induction period during which there is negligible oxygen absorption and as such acidity is not developed. Addition of salt or similar substances is likely to still



further reduce the rate of oxidation by neutralizing the free fatty acids developed. The above said induction period is prolonged by either addition of certain organic compounds or inhibitols or washing in boiling water (Hilditch and Sleight Holme) (1922). Regarding red coloured light, accelerating the deterioration in quality, findings are not in line with various workers like Emery and Henley (1922). In general when wave length of light becomes less than 490 mλ the catalytic activity is increased and rancidity is lowered at wavelength higher than 490 mλ. It is not clear how red light with a wave length of about 767 mλ is found to increase the activity rendering the oil more rancid than light with lower wave length. Further experiments in coloured bottles instead of using coloured paper over ordinary bottles, may give dependable results. Certain metals like

copper are found to accelerate the onset of rancidity (Lea) (1936). It is not clear how aluminium comparatively lowers the rate of rancidity. A study on comparative deleterious effects of various metals on the onset of rancidity may throw some light on the property of aluminium in lowering the rate of rancidity.

Summary : Studies were conducted on the keeping quality of coconut oil by storing them under different conditions viz., various metallic containers, glass containers covered with cellophane paper of different colours, and also adding various substances like jaggery, salt etc. Fortnightly samples were drawn for determination of free fatty acids content, as a measure of the quality. Addition of salt was found to be good and helped to reduce the rate of deterioration considerably. Addition of jaggery was also fairly good.

Acknowledgment : My thanks are due to Sri. M. M. Krishna Marar, Agronomist, Central Coconut Research Station, Kasargode who kindly assisted in the analysis of the fortnightly samples of oil during 1949—50.

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TABLE I.

Percentage of Free Fatty Acid.

S. No.	Date	Months interval	Control	Oil and salt	Oil and jaggery	Boiled oil	Filtered oil	Pink	Green	Yellow	Colour-less	Orange	Blue	Red	Black	Alu-minium	Tin	Jar
1.	12—7—49	0	1·19	1·18	1·20	1·19	1·25	1·21	1·25	1·25	1·17	1·21	1·26	1·32	1·26	1·12	1·20	1·20
2.	9—8—49	1	1·28	1·17	1·30	1·17	1·27	1·30	1·25	1·31	1·23	1·24	1·37	1·30	1·30	1·23	1·35	1·41
3.	4—10—49	2	1·57	1·28	1·55	1·20	1·43	1·50	1·48	1·55	1·44	1·37	1·49	1·48	1·55	1·44	1·61	1·49
4.	29-11—49	2	1·78	1·32	1·78	1·33	1·58	1·54	1·56	1·66	1·51	1·42	1·72	1·94	1·65	1·56	1·85	1·62
5.	24—1—50	2	1·82	1·44	1·80	1·40	1·72	1·74	1·64	1·84	1·64	1·56	1·91	2·15	1·93	1·76	1·99	1·96
6.	21—3—50	2	1·90	1·48	2·22	1·42	1·68	1·76	1·64	1·84	1·64	1·64	1·80	2·12	1·94	1·78	2·10	1·82
7.	16—5—50	2	1·96	1·52	2·36	1·46	1·72	1·78	1·80	1·99	1·72	1·80	1·94	2·35	2·00	1·96	2·38	1·95
8.	11—7—50	2	2·00	1·66	2·43	1·50	1·76	2·01	1·88	1·98	1·74	1·90	1·98	2·34	2·17	1·99	2·36	1·94
9.	5—9—50	2	2·08	1·98	2·43	1·54	1·95	1·98	1·96	2·01	1·88	1·94	1·98	2·73	2·20	2·18	2·56	2·19
10.	31-10—50	2	2·12	2·21	2·73	1·63	2·00	2·10	2.00	2·52	2·03	1·94	2·16	2·87	2·20	2·32	2·36	2·20
11.	26-12—50	2	2·24	2·57	2·88	1·72	2·19	2·15	2·20	2·50	2·37	2·14	2·25	2·92	2·72	2·40	2·48	2·49
12.	20—2—51	2	2·62	2·84	3·18	2·44	2·42	2·29	2·45	2·69	2·89	2·22	2·43	3·01	2·87	3·34	2·71	2·64
13.	30-11—51	9	2·85	4·72	4·68	4·65	4·59	3·19	2·85	3·64	5·01	3·20	3·43	3·55	4·25	3·70	3·97	4·59
14.	23—3—56	5½ Years	11·58	10·75	8·65	10·48	12·25	9·80	8·43	8·28	11·19	7·85	10·05	9·84	9·60	8·66	6·78	10·24

TABLE II.

Treatments	Final Refractive Index	Smell		Taste	
		Start	Final	Start	Final
Control	1·4520	Normal	Rancid	Good	Rancid
Oil and Salt	1·4530	Normal	do	Good	do
Oil and Jaggery	1·4535	sweet smell	do	Fresh	do
Boiled oil	1·4525	sweet smell	do	Fresh	do
Filtered oil	1·4530	Normal	do	Fresh	do
Pink	1·4525	Normal	do	Fresh	do
Green	1·4530	Normal	do	Good	do
Yellow	1·4530	Normal	do	Good	do
Colourless	1·4530	Sweet	do	Good	do
Orange	1·4530	Normal	do	Good	do
Blue	1·4535	Normal	do	Good	do
Red	1·4535	Normal	do	Good	do
Black	1·4535	Normal	do	Good	do
Aluminium	1·4535	Sweet	do	Fresh	do
Tin	1·4530	Sweet	do	Fresh	do
Jar	1·4530	Normal	do	Fresh	do
	Refractive Index at Start 1·4534				

The Red Hairy Caterpillar — (*Amsacta Albistriga W*) and its Field-Scale Control

by

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Introduction: This is a very serious pest of dry crops and its occurrence is more or less an annual feature in most of the red sandy loam tracts of the south. A full-grown specimen measures about 2″ in length and is reddish brown in colour, with numerous hairs on its body. The caterpillars are polyphagous in habits, as they feed freely on almost any green vegetation, but among cultivated crops, they are particularly destructive to groundnut and cumbu. They feed freely also on ragi, cowpea, castor, cholam, cotton etc. The pest generally occurs in its millions in definite broods and moves from field to field in a particular direction. In the case of groundnut, the damage is something terrific, since the entire foliage and flowers are grazed away, leaving the fields bare with the stems and the midribs of the leaves. The yield from such infested fields is reduced practically to nothing. The season of incidence of the pest may vary from tract to tract, as it is influenced, to large extent by the local rainfall and the agricultural practices as well.

Life History: The full-grown caterpillars seek shady spots under trees and hedges, sandy corners, etc., shortly after a heavy downpour, burrow about 6″ into the soil and pupate. The pupae remain as such under the soil and begin to transform themselves into adults, with the receipt of the first showers during the next season. Such developed specimens await inside their pupal case and emerge as adults, exactly on the third day, late in the evening, after the next sharp rain. The emergences occur in definite broods, corresponding with those of the caterpillars which had gone down to pupate during the previous season. The adults pair almost immediately and oviposit the same night. The eggs are laid in cream-coloured masses, almost anywhere, but when there are standing crops, the lower side of the leaves is preferred. The egg-laying capacity of a female is about 800 eggs. Tiny caterpillars, dark in colour, hatch out in 3 to 4 days. They feed gregariously on the lower side of the leaves scraping the surface for the next 4 or 5 days. The presence of these groups is readily indicated by the mottled colour of the leaves. These

larvae attain a length of about ¾″ and develop an ashy brown colour in about 10 days and slowly spread to the plants nearby. The next phase is more destructive as the worms develop a voracious appetite and begin to disperse in large numbers. They assume a reddish colour as they grow and the active feeding continues for about another 15 days. The full-grown specimens await the next sharp shower, after which they burrow into the soil and pupate. The life cycle is thus repeated annually. The caterpillars are incapable of borrowing into the dry soil, and as such, failure of the rains at the critical stage, may often result in the wholesale annihilation of the worms. Hence the rainfall at this stage may help to determine the intensity of attack during the next season.

Control Measures: (Previous work) (i) *Mechanical:* The methods advocated during the earlier days consisted of a thorough hand-picking and destruction of moths, as they emerge from the soil, later on the egg-masses and the groups of the young caterpillars and finally of the grown up caterpillars. Their migration to the next field was prevented by digging trenches across the direction of their progress and a prompt destruction of the specimens collected there. A systematic digging out and collection of pupae also was attempted.

(ii) *Insecticidal methods:* Exploratory trials with BHC, DDT, & Toxaphene formulations indicated the usefulness of BHC 10% dust against the young caterpillars in the gregarious stage; Toxaphene 20% dust against the half-grown specimens and BHC 50% WP spray at 0·1% strength and Folidol 1 in 1000 against the full-grown stages.

Work done: With the background of the existing knowledge on the life-history and the control measures and of the very serious potentialities of the pest, some tangible method had to be evolved, which would, at the same time appeal readily to the average dry land ryot.

Earlier observations have indicated that the young caterpillars in their gregarious phase, are the most vulnerable, with the added advantage that their destruction would nip the pest in its bud stage, before the real damage starts.

BHC 10% dust – the cheapest of the newer synthetic insecticides – was found to confer the desired results to a remarkable degree. It is easy to note the mass emergence of the moths during the season (i. e., the third evening after every rain). They are attracted to lights and bonfires and the presence of the nefarious pest can also be traced

from such sources. Giving them time to lay their eggs and for the caterpillars to hatch out, the gregarious stage may be present in the field for 3 or 4 days from about the 6th day after every sharp rain. The intensity of the population can readily be detected on a closer scrutiny of the field, by the mottled colour of the leaves.

A thorough dusting of the entire field with BHC 10% dust at this stage, would practically annihilate the entire young larval population and the few that may either survive or escape can be easily disposed off later. Considerable economy could be effected if the ryot would only spot out the infested plants and treat them alone. Two or three rounds of treatment may be necessary depending upon the magnitude of the subsequent emergences. For a thorough and complete control, the co-operation of all the ryots in a village is necessary. All of them should take up the treatment almost simultaneously and complete it within a day or two.

The above 'modus' was given a fair trial over two compact and extensive blocks of groundnut, each extending about 400 acres at Usilampatti and Kallupatti (Madurai district) during September and October 1956. About 15 lb per acre of BHC 10% dust were required for the treatment and even one round was found to give a satisfactory protection to the crop.

The overall cost of the treatment is not likely to exceed Rs. 5/- per acre even if more than one round of dusting was necessary. Considering the wholesale ruin which the pest is capable of inflicting on the crop, it is worth spending the small amount as it will be within the economic limits of the average dry land ryot.

Economics: The average yield of groundnut (rainfed) is 1500 lb of pods per acre. In case of severe incidence loss will be heavy and it may exceed even 75%. As such by spending Rs. 5/- per acre it will be possible to avert a loss of about 1100 lb per acre.

Summary: Red hairy caterpillar pest of groundnut can easily be controlled at a nominal cost provided the control measure is taken up by the ryots of a particular area at the proper time on a co-operative basis. By dusting BHC 10% dust within a week after the emergence of the moth, the pest can be annihilated completely at a cost of about Rs. 5/- per acre.

Acknowledgements: The authors are very grateful to Sri K. C. Thomas, District Agricultural Officer, Madurai for the active propaganda carried on about the control of the pest with BHC 10%. Our acknowledgements are also due to Sri S. R. Willington, B. A., B. T., Block Development Officer Usilampatti who permitted the sale of insecticides to the ryots at concession rates and to Sri S. Venkataswamy, B. sc. (Ag.), Extension Officer (Agriculture) for having taken pains to distribute the insecticides to the villagers on the spot and for the help rendered in conducting the trial.

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ERATTA

(Madras Agricultural Journal Vol. XLIV (3) Page 106)

Page 106 Add as para three the following :
"There is no published record of this fungus from this country. It is however widely prevalent in the Indo-Malayan region, Africa, Australia and in the West Indies. (Wardlaw 1935 ; 1937.")

Page 106 Last two lines. For Mardlaw — Read 'Wardlaw'.

A Note on the Control of 'Seedling Blight' of Cotton

'Seedling blight' of cotton caused by the fungus *Pellicularia filamentosa* (Pat.) Rogers, was found to cause considerable damage to cotton in seedling stage resulting in gappiness in the field. This fungus is also reported to attack a great variety of cultivated plants, including cotton, beet, lettuce, onions, radish, turnip, brassicae, pea, bean (Phaseolus), lucerne (alfalfa), flax, potato, tomato, cereals and lawn grasses causing 'damping off' of seedlings (Brooks 1953).

As the above disease was found to often interfere with the studies on cotton 'black arm' the following preliminary investigations were made on the disease and its control.

(1) **Inoculation studies:** (a) *Soil inoculation:* The sterilized soil was inoculated with the pure culture of *Pellicularia filamentosa* isolated from infected cotton seedlings and mixed thoroughly before sowing. Out of the 40 seeds of M. C. U. 1 cotton sown it was found that none germinated in the inoculated series while the germination was 80% in the uninoculated control. The fungus was reisolated from the ungerminated seeds from the inoculated series.

(b) *Inoculation on seedlings:* Cotton seedlings of different age groups viz, one week, 2 weeks, 3 weeks, 6 weeks and 8 weeks were inoculated by placing the culture of the fungus at the collar region of the seedlings. It was observed that the fungus was able to infect the seedlings upto 6 weeks old but not seedlings 8 weeks old.

(2) **Effect of Seed treatment:** Treating the seeds with Agrosan at the rate of 1 gram per lb. of seed was found to be not effective in controlling the disease. Hence higher dosages at the rate of 4 gm, 8 gm, 10 gms and 12 gms per lb. were tried and sown in pots in which the soil was mixed with fungus culture. The results are given in table I. In all the treated series the germination was found ranging between 38 to 52% while there was no germination at all in the untreated seeds sown in inoculated soil as control. Even some of the germinated seedlings in the seed treated series were found to be attacked and killed by the fungus.

TABLE I.

Effect of seed treatment on the incidence of disease in infected soil.

Sl. No.	Treatment	No. of seeds sown	No. of seeds germinated
1.	Agrosan at 4 gm/lb of seed	40	15
2.	Agrosan at 8 gm/lb ,,	40	20
3.	Agrosan at 10 gm/ ,,	40	20
4.	Agrosan at 12 gm/ ,,	40	21
5.	Untreated seed sown in inoculated soil (control)	40	Nil
6.	Untreated seed sown in soil not inoculated with the fungus (as control)	40	40

(3) **Soil treatment with fungicides:** In order to find out the efficacy of soil drenching in controlling the disease experiments were conducted by using six different fungicides. Ten days old M. C. U. 1 Cotton seedlings were inoculated with the fungus culture and the drenching with the fungicides was done 24 hours after inoculation. The results are given in table II.

TABLE II.

Effect of drenching the soil with fungicides.

Treatment	Number of seedlings treated	No. of seedlings infected 10 days after treatment	Percentage of infection
1. Dithane Z. 78 (1½ lb in 100 gallons of water)	80	14	17·5%
	80	..	..
2. Wet Ceresan (0·1%)	80	2	2·5%
3. Leytosol (0·1%)			
4. Cheshunt compound (1 oz in 2 gallons of water)	80	34	42·5%
	80	30	37·5%
5. Cupravit (1 lb in 40 gallons)	80	16	20·0%
6. Bordeaux Mixture (1%)	80	58	72·5%
7. Control (Untreated)			

It is seen from the above table that the treatments viz. Ceresan (Wet) 0·1% and Leytosol 0·1% both Organo mercury compounds are markedly superior to others in controlling the disease. The other fungicides although much superior to the untreated series, have recorded high mortalities ranging from 17·5 to 42·5%. Hence the use of wet ceresan or Leytosol at 0·1% strength (1 oz in 6¼ gallons of water) may be recommended wherever the disease is found to occur.

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Trials with Cinchona Spent Bark Compost as Manure for Potatoes

Objective : With a view to examine the utility or otherwise of compost prepared from the spent Cinchona bark as manure for food crops as desired by the Government, trials were carried out at the Agricultural Research Station, Nanjanad during the main crop season of 1956.

Experimental : The experimental plots were laid out in field No. 34. There were six treatments in all, each replicated six times. The Great Scot variety of potatoes, at the usual seed rate, was planted on 23-4-1956 after the application of the manures as per the usual farm practice. The crop was harvested on 6—9—1956.

Results : The layout and the statistical summary are given below :

PARTICULARS

Season and crop : Main crop potato — 1956
Layout : Randomised replicated plots 6 x 6
Treatments :
1. Control (No manure or fertiliser mixture)
2. Farm yard manure at 5 tons per acre.
3. Cinchona spent bark compost at 5 tons per acre.
4. Nanjanad mixture at 1946 lb. per acre.
5. Farm yard manure at 5 tons plus Nanjanad mixture at 1946 lb. per acre (2+4).
6. Cinchona spent bark compost at 5 tons + Nanjanad mixture at 1946 lb. per acre (3 + 4).

Statistical summary :

	1	2	3	4	5	6	S. E.	"F" value satisfied of not	C. D. P = 0·05
Acre yield of tubers in pounds ..	5800	9533	6067	13667	17400	13000	1590	Yes	3,275
Percentage on control ..	100·0	164·4	104·6	235·6	300·0	224·1	27·4	..	56·50

Conclusions : 5, 4, 6 2, 3 1.

Conclusions : The first year of trials have indicated that there is no significant increase in yield due to the application of Cinchona spent bark compost over the unmanured control. Actually the yield was just a little over a third of the yield that was obtained from the application of Nanjanad mixture over a basal dressing of 5 tons of farm yard manure. The yield due to Cinchona spent bark compost at 5 tons applied alone was about two-thirds of that obtained due to the application of Nanjanad

mixture. As between the application of the Nanjanad mixture over the Cinchona spent bark compost and the same applied over the farm yard manure, there was a difference in yield of 4400 lb. of potatoes in favour of the latter.

The application of Nanjanad mixture alone had given a yield of 13.667 lb. per acre. But in combination with the Cinchona spent bark it gave a slightly lower yield of 13,000 lb. It is therefore clear that the Cinchona spent bark compost is of little value for manuring potatoes, either alone or as a basal application in place of the farm yard manure over which the usual Nanjanad mixture is generally applied.

The trials have revealed that the Cinchona spent bark has no effect on improving the yield of potatoes, but tends to depress the yield considerably. The depressing effect may possibly be due to the following causes namely :

(1) The possibility of the formation of toxic material in the soil due to the residual alkaloids in the Cinchona spent bark compost thereby causing inactivation of the soil microbiological activity.

(2) The presence of free alkali used for the extraction of the alkaloid which might create unfavourable soil condition in regard to physical, chemical and biological aspects.

Since the Cinchona spent bark has not proved its usefulness as a manure, no further work in this line is contemplated to be pursued.

Acknowledgements : The authors are thankful to the Director, Cinchona Department for evincing a keen interst in the studies and placing at our disposal Cinchona spent bark compost for the trials.

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7th November, 1956.

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Study of the Free Amino Acids in Paddy Plants in Relation to the Incidence of Blast Disease.

Recently, Otani (1) reported that the amount of soluble organic nitrogenous components such as amino acid and amide is correlated with the susceptibilty of rice plant to blast disease. The chemical basis of resistance of the rice plant to blast disease has been of great importance to our State and work already done (2) has indicated the necessity of searching other venues than the silica content. This note deals with the preliminary attempts made to evaluate the role of free amino acids in regard to susceptibility to blast.

The use of circular paper chromatography for the identification and estimation of free amino acids in plants has been worked out by Radhakrishnan *et al* (3) and advantage was taken of this method for the identification of free amino acids in this study.

Paddy plants of varieties Co. 4 (a strain resistant to blast) and ADT. 10 (susceptible strain of paddy) were grown in pots under water logged condition. Samples of leaves were collected at the time of ear formation for study. Otani (1) found that both at the ear head formation stage and boot stage the leaves of rice plants contain more soluble organic nitrogen than at other growing stages.

The free amino acids were identified by running chromotograms using the technique of Giri and Rao (4). The chromotograms (Plates 1 to 3) obtained indicate the following:—

(i) The presence of the bands relating to Leucine-Isoleucine, Valine-methionine, tyrosin, proline, Alanine, glutamic acid-threonine, glycine, aspartic acid, asparagin and histidine was identified in both the varieties Co. 4 and ADT. 10.

(ii) Greater concentration of all the amino acids in general and glycine, aspartic acid, glutamic acid-threonine and alanine and valine in particular were found in the susceptible variety ADT. 10 than in the resistant type Co. 4 as judged by the intensity of colour and width of the bands on the chromatograms. This observation is in general agreement with the findings of Otani (5) viz., Glycine, l-alanine, aspartic acid, d-glutamic acid and asparagine are used to better advantage by the blast fungus than urea, dl-valine, l-leucin, l-cystin, dl-norleucine, dl-methionine, tyrosine, arginine hydrochloride and dl-ornithine hydrochloride.

Further studies are in progress.

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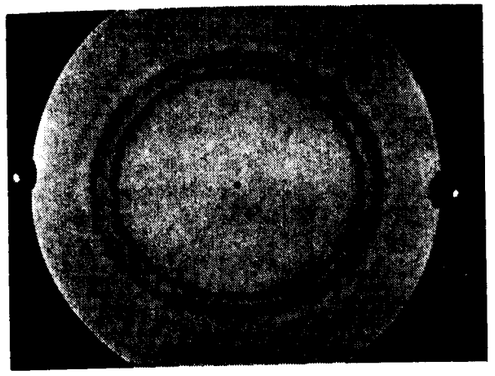
CHROMATOGRAMS OF AMINO ACIDS IN PADDY LEAVES



Variety Adt 10 (susceptible to blast)

Plate 1

Variety Co 4 (Resistant to blast)

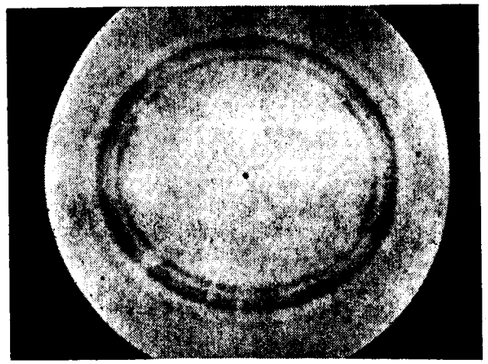
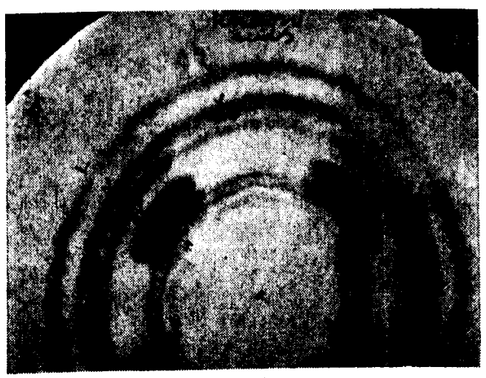


Plate 2

Mixed Chromatogram



Legend

L	— Leucine
V	— Valine
Tyr	— Tyrosine
Pr	— Proline (not coloured prominently)
Al	— Alanine
GLV-TH	— Glutamic acid Threonine
GLY-AA	— Glycine–Aspartic acid
Asp	— Asparagin
Hi	— Histidine
Try	— Tryptophane

Plate 3

Book Reviews

Principles of Agronomy by V. T. Subbiah Mudaliar, Retired Agronomist and Professor of Agriculture, Agricultural College, Coimbatore. pp 440. The Bangalore Printing and Publishing Co. Ltd., Bangalore-2, 1956. Price Rs. 17-8-0.

There are no text books in Agronomy for the South Indian student and this book fills in a great need felt by the students of Agricultural Colleges. The book is very well written in an easy style understandable by the present day student and together with its companion volume 'Field crops of South India' largely covers the syllabus prescribed by the South Indian Universities. The author has succeeded in covering the entire field of agronomy of the tropical regions. The book is highlighted with many examples and illustrations drawn from the authors of wide experience of South Indian agricultural conditions.

Written by an ex-Professor who has taught the subject in the primier Agricultural College of South India for nearly two decades, the book can be safely recommended to the students preparing for the B. Sc. degree course in Agriculture, in South India and elsewhere. The only regret is that a useful and popular publication as this should have been priced at Rs. 17—8—0 which is much beyond the capacities of many students.

Handbook of some South Indian Weeds: Revised and enlarged by C. Rajasekhara Mudaliar and J. Sakharam Rao. (Govt. Press, Madras. Pp 488, Rupees 7/-.)

This handbook which made its appearence in 1932 soon ran out of stock just because it was so much in demand on account of its usefulness to the students of Agriculture, Botany and officers of the Agricultural department. Thanks to the authors who have done the revision in a very able manner.

The book is neatly printed and runs to 488 pages and is profusely illustrated. I wish the paper used for printing the matter and the coloured illustrations was of a better type. The authors have added another 64 weeds to the 108 that were described in the first edition. Of the additional 64, 50 are described in great detail with apt illustrations. The frontispiece a life like coloured drawing of the water hyacinth and the other three coloured drawing of *Centella asiatica*, *Lippia nodiflora*, *Marselia quadrifoliata* have enhanced the attraction of the book. The book is divided into seven chapters, the last of which gives exhaustive and uptodate information on chemical herbicides and hormones employed in the eradication of weeds. The book has an useful glossary and an index of botanical names and families. It is needles to state that a book of this kind is what is needed by students of Botany, Agriculture, Ayurveda and in fact anybody and everybody interested in natural history. The authors deserve to be congratulated for having brought out the revised edition.

S. N. C.

Weather Review — For March, 1957

RAINFALL DATA (IN INCHES)

Division	Station	Total rainfall for the month	Departure from normal	Total since 1st January 1956
North	Madras (Meenambakkam)	0·0	— 0·3	Tr
	Tirurkuppam*	0·0	— 0·1	0·0
	Vellore	1·6	+ 1·3	1·6
	Gudiyatham*	0·1	— 0·3	0·1
East Coast	Palur*	0·0	— 0·4	0·1
	Tindivanam*	0·0	— 0·6	0·2
	Cuddalore	0·8	+ 0·1	1·2
	Nagapattinam	0·0	— 0·8	0·4
	Aduthurai*	0·0	— 0·6	0·8
	Pattukottai*	1·2	+ 0·3	2·3
Central	Salem	0·8	+ 0·3	0·8
	Coimbatore (A. M. O.)* ..	£	— 0·2	0·5
	Coimbatore	0·0	— 0·5	0·4
	Tiruchirapalli	0·0	— 0·4	Tr
South	Madurai	0·0	— 0·7	Tr
	Pamban	0·0	— 0·7	1·2
	Koilpatti*	0·4	— 0·9	1·9
	Palayamcottai ..	2·6	+ 1·6	3·2
	Ambasamudram* ..	0·6	— 1·4	1·6
	Nagarcoil	1·6	+ 0·1	1·8
Hills	Kodaikanal	1·3	— 0·5	2·4
	Coonoor*	3·6	+ 0·3	7·0
	Ootacamund*	1.5	+ 0·9	1·9
	Nanjanad*	1·9	+ 1·1	2·1

Note:— 1. *Meteorological Stations of the Madras Agric. Dept.
2. £ Rainfall from 0·02″ to 0·04″
3. Tr. less than 0·02″

Scattered showers occured in south Tamilnad on the 1st and 3rd March 1957, and in the Madras State on 5—3—57, followed by dry weather on two days. North Madras had local showers on 8—3—57. Thundershowers occured at a few places in Madras on 9—3—57. Ootacamund recorded an isolated shower on 10—3—57, the weather in the rest of Tamilnad being dry. Dry weather prevailed throughout the State for six days, which was broken by thundershowers at a few places in interior Tamilnad on 16—3—57. Showers occured at a few places in south Madras on 27—3—57. Thereafter weather was dry in Madras State upto 30—3—57. A feeble trough of low lay off the Madras Coast on 28—3—57, but became unimportant soon. On 31—3—57 a few showers occured in interior Madras.

Day temperatures were below normal in parts of Madras almost throughout the month.

The note-worthy rainfalls and the Zonal rainfall for the month are furnished below:

Noteworthy Rainfalls for the month

S. No.	Date	Name of place	Rainfall in inches
1.	5—3—57	Vellore	1·6
2.	7—3—57	Pattukkottai	1·2
3.	9—3—57	Coonoor	2·1

Zonal Rainfall for the month in inches

Name of Zone	Rainfall for the month	Departure from Normal	Remarks
North	0·4	0·2	Above normal
East Coast	0.3	— 0·3	Below normal
Central	0.2	— 0·2	do
South	0·9	— 0·3	do
Hills	2·1	0·5	Above normal

Agricultural Meteorology Section,
Lawley Road P. O.,
Coimbatore, 23—4—1957

C. B. M. & M. V. J.

Departmental Notifications

Gazetted Officers — Postings and Transfers.

Name and present post	Posted as
Azariah, M. D., Asst., A. R. S. Nanjanad.	Supdt., A. R. S. Nanjanad.
Bhavani Shankar Rao, M., Oil Seed Specialist, Coimbatore.	Whole time Vice-Principal, Agrl. College, Coimbatore.
Balasubramaniam, C., Agrl. Meterologist,	Reception Officer, Agrl. College, Coimbatore in addition to his duties as Agrl. Meterologist, Coimbatore.
Dakshinamurthy, T. S., A. D. Pondichery.	D. A. O. Cuddalore.
Ekambaram, C., Asst.; Agrnomist, Sugarcane Res. Station, Nellikuppam.	Cane Development Officer, Tiruchirapalle.
John Dorairaj, D., Asst. in Chemistry, Coimbatore.	Asst. Chemist, Sugarcane Res. Station, Nellikuppam.
Fuzlullakhan, Asst. Fruit Specialist, Coonoor.	Officer on Special duty (Spices), Ernakulam.
Muthuswami, S., Teaching Asst., Coimbatore.	D. A. O. Gramdhan Work, Madurai.
Neelakantan, L., Asst. Cotton Specialist, Srivilliputtur.	Oil Seed Specialist, Coimbatore.
Ramaswami, S., D. A. O., Coimbatore.	Cane Development Officer, Madras.
Sriraman, K., Secretary, Coimbatore Market Committee, Tiruppur.	Asst. Marketing Officer, Madurai.
Subramania Iyer, K. H. Asst. Marketing Officer, Madurai.	D. A. O., Coimbatore.
Shanmuga Nainar, T. P., Soil Conservation Asst., Tiruchirappalle.	Asst. Agrl. Engr., Kodaikanal
Samuel Joshua Moses, Extension Officer, Tirunelvelly.	D. A. O., Sattur.
Thandayutham, K., Asst. Agrl. Engr., Kodaikanal.	Asst. Agrl. Engr Mechanical, Pudukottai

Upper Subordinates

Name and present post	Posted as
Venkatachalam, T., A. D., Madathukulam.	A. D., Uthukuli.

Review of Market Conditions of Commercial Crops in the areas of Market Committees for the month of February, 1957

Cotton: (In this section: Cdy = 784 lb.
Pothi = 280 lb.)

Tiruppur: There were no rains during the month. In Palladam area the Karunganni crop experienced scarcity of water. The arrivals of new crop began in the month. There was an opening stock of 2901 cdys of Cambodia and 93 cdys of Karunganni lint and 3005 cdys of Cambodia and 19 cdys of Karunganni were received which included 464 cdys of Cambodia and 9 cdys Karunganni lint ginned locally. The total despatches from Tiruppur amounted to 2415 cdys of Cambodia and 66 cdys of Karunganni lint inclusive of 768 cdys sent in all to Kerala, Tanjore, South Arcot, North Arcot, Tirunelveli, Mysore, Madurai and Tiruchirapalli. The closing balance left over at the end of the month was 3491 cdys of Cambodia and 46 cdys of Karunganni lint.

The Kapas market opened with 1883 pothis of Cambodia and 56 pothis of Karunganni and the total arrivals were 8198 pothis of Cambodia and 63 pothis Karunganni. 6557 pothis of Combodia and 67 pothis of Karunganni kapas were disposed off leaving a closing balance of 3524 pothis of Cambodia and 52 pothis of Karunganni at the end of the month.

The cotton market in Tiruppur was firm and the prices ruled at Rs. 845/- to Rs. 925/- per candy of Cambodia lint; Rs. 841/- to Rs. 845/- per candy of Karunganni lint, Rs. 112/- to Rs. 116/- per pothi of Cambodia Kapas and Rs. 85/- to Rs. 96/- per pothi of Karunganni Kapas.

Ramanathapuram District: The crop condition is not good and there has been a slight set back in the early arrivals of cotton. Mill representatives have largely pushed in for the purchase of Karunganni cotton and the market in general was active in anticipation of a slight

fall in the future arrivals. Arrivals of Karunganni kapas in the Virudunagar market gradually improved during the latter part of the month. The Uganda market however continued to be dull with practically no transactions in Kapas or lint. The three markets of Sattur, Rajapalayam and Virudunagar opened with a stock of 800 pothis of Kapas and 2060 cdys of lint at the beginning of the month, and 4450 pothis of Kapas and 990 cdys of lint were received. Disposals totaled 4600 pothis of Kapas and 1220 cdys of lint. The closing stock at the end of the month was 650 pothis of kapas and 1830 cdys of lint.

The prices of Karunganni kapas opened at Rs. 88/- and improved gradually and closed at Rs. 100 to Rs. 106. Karunganni lint opened at Rs. 770 to 790 and improved in sympathy and closed at Rs. 818 to 826. The prices quoted were Rs. 1096 for M. U. 2 certified and Rs. 977 for M. U. 1 Certified.

South Arcot District: All the markets of the District started with an opening stock of 140 pothis of Cotton. The two markets at Villupuram and Panruti put together had a receipt of 575 pothis. Despatches to Coimbatore district accounted for 580 pothis. The closing stock at the end of the month was 135 pothis. The average price quoted per pothi of 280 lbs. of Kapas was Rs. 83—4—0 at Villupuram and Rs. 58/- at Panruti.

Groundnuts: (In this section: Cdy = 531 lb. of kernels
Bag = 82 lb. of pods)

South Arcot District: All the markets of this district opened with a stock balance of 4,500 tons of Groundnut kernels at the beginning of the month. Since the season had come to a close, arrivals to the markets were on the decline. Receipts from Tanjore, Madurai, Tiruchirapalli districts totalled 1182 tons and imports from Andhra State were 1157 tons while local arrivals amounted to 2161 tons. The off-take by Mills and Chekkus in the district for crushing totalled 4168 tons and 230 tons respectively. Despatches to other districts like, Tanjore, Tiruchirapalli, Coimbatore accounted for 479 tons while export to Pondicherry State was 5 tons. Wastages were calculated at 91 tons. The closing stock with the trade at the end of the month was 4027 tons.

The lack of buying support for oil has caused a downward trend in the prices of kernels during the month. The average prices ranged from Rs. 145 to 161 per candy of 531 lbs. in the several markets according to quality.

North Arcot: The Groundnut market in this district was inactive with little or no transactions. The prices of oil during the month violently fluctuated owing to the obsence of steady demand. Both the arrivals and the transactions in the district were not heavy. The offtake was

poor on account of the handicaps experienced by the crushers to embark on new purchases as they were not able to sell the oil on hand. Thus business was left to small scale crushers who operated to cater to local demand. As a result fresh arrivals were affected due to accumulation of stocks. In general, the markets in the district did not attract much arrivals due to sellers' reluctance in expectation of higher prices. The markets opened with 2591 tons of pods and 306 tons of kernels and 302 tons of pods and 561 tons of kernels were received. Total disposals came to 615 tons of pods and 508 tons of kernels leaving a closing balance of 2278 tons of pods and 359 tons of kernels at the end of the month.

The prices of kernels since the beginning of the month had been declining because of poor demand. The prices ruled around Rs. 145/- to 156/- per candy while that of oil was around Rs. 308/- to Rs. 310/-. The prices of groundnut pods and oil cake ruled at Rs. 15 to 17 per bag of 80 lbs. and Rs. 8/- to Rs. 8—8—0 per Imperial Maund respectively.

Ramanathapuram District: Harvest of groundnut during the month came to a close which in turn reduced the local arrivals. In the absence of greater arrivals of local crop coupled with the upward tendency of the oil market noticed during the last month, millers rushed for purchases in other markets and were importing them during the month for local consumption. The transactions in oil during the month were moderate and as a result an accumulation of stocks of about 10,000 bags of kernels and 15,000 tons of oil were reported during the close of the month. The market at Virudunagar opened with a stock of 95 tons of pods alone. About 290 tons of pods and 4800 cdys of kernels were added as receipts. Disposals during the month accounted for 290 tons of pods and 2500 cdys of kernels leaving a closing stock of 95 tons of pods and 2300 cdys of kernels at the end of the month.

The closing prices for Groundnut Kernels were Rs. 150 to 171 per candy, that of pods at Rs. 14 to 17/- per standard maund, that of oil at Rs. 22 per tin of 35 lb. and Rs. 8·75 to 9 per standard maund for cake.

Gingelly: (In this section: Bag = 168 lb.)

South Arcot District: The opening stock with the trade stood at 377 bags. Arrivals decreased due to slack season and accounted for 318 bags. Receipts from other districts like Madras and Tiruchirapalli amounted to 119 bags. Country chekkus took 385 bags for crushing. Despatches to other districts like, Tiruchirapalli, Tanjore, Coimbatore came to 57 bags. The closing stock with the trade at the close of the month stood at 372 bags. The prices were firm during the month. The average prices ranged from Rs. 69/- to 81/- per bag according to quality.

Tobacco: (In this section Cdy. = 500 lbs.)

Tiruppur: Disposals of Tobacco in Tiruppur Market accounted for 1895 cdys of chewing and 200 cdys of Cheroot tobacco. Despatches were mostly to places like Madurai, Ramanathapuram, North Arcot, South Arcot, Tiruchirapalli, Tirunelveli, Tanjore, Salem, Madras, Mysore, Charbatra, Nilgiris, Andhra, Bombay and Kerala States. The market closed with a stock of 9975 cdys of chewing and 440 cdys of cheroot tobacco.

The chewing tobacco market was dull, while the cheroot tobacco market was steady.

The prices ranged during the month as follows:

Variety	(Per Candy of 500 lbs.) *I Grade* Rs.	*II Grade* Rs.	*III Grade* Rs.
1. *Chewing Tobacco-Sun-cured:*			
(a) Meenampalayam	300 to 325	200 to 275	150 to 175
(b) Other varieties	200 to 235	130 to 170	75 to 105
2. *Cheroot varieties:*			
Sun cured (grown in Erode and Bhavani Taluks)	260 to 350	200 to 250	120 to 160
3. *Chewing varieties:*			
Pitcured (grown in Palladam and Salem areas)	200 to 225	150 to 200	100 to 150

Review of Administrative Activities of Market Committees for February, 1957.

General: Except Coimbatore Market Committee and South Arcot Market Committee all other Market Committees are functioning under 6-A of the Act, under their revenue heads of the districts concerned. The objections in the cases of Tirunelveli Market Committee and Ramanathapuram Market Committee are yet to be cleared. The election to the one seat pending in this Market Committee has to be conducted.

The following are the progress of licencing by the Market Committees during the month.

	Section 5 (1)		*Section 5 (3)*		*Weighmen.*	
	A.	B.	A.	B.	A.	B.
North Arcot Market Committee	148	341	145	305	93	190
South Arcot Market Committee	287	754	243	660	234	621
Coimbatore Market Committee	112	175	113	170	81	136
Ramanathapuram Market Committee	—	—	—	—	—	—
Tirunelveli Market Committee	—	—	—	—	—	—

A: During the month.

B: Upto the end of the month from January, 1957.

One meeting of the Coimbatore Market Committee was held on 15—2—57 when 22 subjects were discussed and disposed of. Meetings of the appointment sub-committee and the Executive sub-committee were also held in this Market Committee during the month.

Quality analysis: The South Arcot Market Committee continued its work on the analysis of Groundnut kernels marketed in its market yards. During the month sixty six samples were drawn and analysed in three markets of the South Arcot Market Committee. The crop marketed at Cuddalore was more wet than that marketed at Tirukoilur and Vridachalam. Seventeen samples contained total refraction below 4 per cent, 47 samples contained total refraction from 5 to 8 per cent and the remaining two lots contained refraction above 8%.

Quality competition: The South Arcot Market Committee during the month secured 69 entries for the quality competition for winter crop of Groundnut taking the total entries to 197.

Crop & Trade Reports

Bengal gram — 1956—'57 — First Report — Madras State: The area sown with Bengal gram upto 25th December 1956 is estimated at 3,400 acres. Compared with the area of 3,200 acres estimated for the corresponding period of the previous year the current year's estimate is an increase of 6·3 percent. The present estimate is less than the average area of 4,100 acres calculated for the five years ending 1955—'56 by 17·1 percent. The area under the crop is nil or negligible in the districts of Tanjore, the Nilgiris and Kanyakumari. A decrease in area is estimated in the districts of Salem, Madurai and Ramanathapuram and an increase in the other districts of the State except South Arcot, where the area estimated is the same as that for last year. The condition of the crop is reported to be generally fair in all the districts of the State.

Cotton — Third Forecast Report — 1956—'57 — Madras State: The area sown with cotton upto 25th November 1956 is estimated at 655,100 acres. Compared with the area of 636,000 acres estimated for the corresponding period of the previous year, this is an increase of 3·0 percent. Compared with the average area of 596, 400 acres calculated for the five years ending with 1955—'56, the present estimate is an increase of 9 8 percent. The area estimated is the same as that of last year in the districts of Chinglepet, North Arcot, and Kanyakumari. A decrease in area is estimated in South Arcot district and increase in the other districts of the State, except the Nilgiris where the area under Cotton is little or negligible. The condition of the crop was generally satisfactory in all the districts except in parts of Salem, where the crop was shinted due to heavy rains received in October and November 1956. The seasonal factor for the State as a whole works out to 99 percent of the normal as against 98 percent of the normal for the previous year. On this basis, the total yield works out to 220,000 bales of 392 lb lint as against 207, 100 bales of 392 lb lint for the previous year and an average yield of 187, 300 bales for the five years ending 1955—'56, representing an increase of 6·2 percent and 17·5 percent respectively.

The estimated area and yield of cotton by varieties in the current year together with the corresponding figures for the previous years are given below.

	Variety		Area in '00 acres		Yield in '00 bales of 392 lb lint.	
			1956—'57	1955—'56	1956—'57	1955—'56
	1		2	3	4	5
1.	Madras American	Irrigated	789	753	566	539
	Cambodia	Unirrigated	742	711	217	208
2.	Madras American	Irrigated	333	319	238	228
	Uganda	Unirrigated	551	540	144	141
		Total	2415	2323	1165	1116
3.	Karunganni		2655	2581	654	631
4.	Karunganni ordinary		925	913	242	236
		Total	3580	3494	896	867
5.	Uppam, Nadam and Bourbon		551	538	138	87
6.	Kanyakumari District		5	5	1	1
		Grand Total	6551	6360	2200	2071

Paddy Second Report — Madras State — 1956—'57: The area sown with paddy in the Madras State upto November, 1956 is estimated at 4,230,000 acres. Compared with the corresponding estimate of 4,139,000 acres for the previous year, this is an increase of 2·2 percent. The area estimated in the current year in the Nilgiris district is the same as that for the previous year. A decrease in area is estimated in Tirunelveli and Kanyakumari districts and an increase in area in all the other districts of the State. The yield in terms of rice is estimated at 2,005,000 tons on the basis of results of crop cutting experiments for the past few years adjust to accord with the actual seasonal conditions in the current year. Compared with the corresponding estimate of 1,870,000 tons for the previous year, the current year's estimate shows an increase of 7·2 percent.

Groundnut Third or Final Report - 1956—57 - Madras State: The area sown with groundnut in the Madras State in 1956—57 is estimated at 1,800,800 acres. Compared with the area of 1,778,100 acres, the provisional figure, according to the Season and Crop report for the previous year, the current year's estimate shows an increase of 1·3 per cent. Compared with the average area of 1,752,100 acres calculated for the five years ending 1956—57 this is an increase of 2·8 percent. The area under the crop is negligible in the Nilgiris District. A decrease in area is estimated in the Districts of Tiruchirapalli, Madurai and Tirunelveli and an increase in all the other districts of the State, except Kanyakumari District where the area estimates is the same as that for last year.

The harvesting of winter or main crop is reported to be in progress. The condition Factor for the State as a whole works out to 95 percent of the normal as against 92 percent the previous year. On this basis, the yield in terms of unshelled nuts works out to 854,800 tons as against 8,21,100 tons for the previous year according to the provincial figures of the Season and Crop report representing an increase of 4.1 per cent. Compared with the average yield of 7,54,700 tons calculated for the five years ending 1955—56 the present estimate is an increase of 13·3 per cent. The wholesale price of groundnut (machineshelled) per standard maund of 82 2/7 lb. or (3,200 tolas) as reported from some important market centres on 1st February 1957 was Rs. 24—13—0 at Coimbatore, Rs. 25—7—0 at Erode and Rs. 26—5—0 at Cuddalore and Salem. Compared with the price which prevailed during the corresponding period of the previous year, the current price reveal a rise of 14·7 per cent at Cuddalore and Coimbatore, 24·8 per cent at Erode and 30·4 per cent at Salem.

Sugarcane — Third Forecast Report — 1956—57 — Madras State: The area under sugarcane in the Madras State upto 25th December 1956 is estimated at 109,800 acres (97,390 acres under planted crop and 12,410 acres under ratoon crop). Compared with the area of 1,06,540 acres (94,380 acres under planted crop and 12,160 acres under ratoon crop) estimated for the corresponding period of last year this is an increase of 3·1 per cent. Compared with the average area of 1,01,200 acres for the five years ending 1955–56, the present estimate is an increase of 8·5 per cent. The area estimated is the same as that of last year in the districts of Chingleput, Tanjore and Tirunelveli. A decrease in area is estimated in the Ramanathapuram district and an increase in the other districts of the State except the Nilgiris where the acreage under the crop is little or negligible. The crop was affected by early shoot borer in parts of South Arcot, Salem, Tanjore and Tiruchirapalli districts. It was also affected by smut in parts of South Arcot, North Arcot, Salem, Madurai, Tanjore and Tiruchirapalli districts. The seasonal factor for the State as a whole works out to 98 per cent of the normal as against 97 per cent in the previous year. On this basis the total yield works out to 2,916,390 tons of

cane, the gur equivalent of which is 3,20,850 as against 2,813,270 tons of cane with a gur equivalent, of 3,09,750 estimated for the corresponding period of the previous year and an average production of 2,508,820 tons of cane with a gur equivalent 2,76,920 tons representing an increase of 3·2 per cent and 16·2 per cent.

The average wholesale price of jaggery per maund of 82 2/7 lbs. or 3,200 tolas at important market centres on 5—1—57 was Rs. 16–7–0 at Coimbatore, Rs. 16–2–0 at Madurai, Rs. 15–5–0 at Tiruchirapalli, Rs. 14–13–0 at Cuddalore and Rs. 14–2–0 at Salem. Compared with the prices which prevailed in the corresponding period of last year these prices show an increase of 62·3 per cent at Madurai.

Redgram — 1956 — '57 Second Forecast Report — Madras State: The area sown with red gram in Madras State upto 25th December 1956 is estimated at 1,43,200 acres. Compared with the area of 1,48,200 acres estimated for the corresponding period of last year, there is a decrease of 3·4 percent. The present estimate is less than the average area of 1,48,900 acres for the five years ended 1955—56, by 3·8 percent. The crop is mainly grown in the districts of South Arcot, North Arcot, Salem, Coimbatore and Tiruchirapalli. The area estimated is the same as that for last year in Tirunelveli and Kanyakumari districts. An increase in area is estimated in the districts of Coimbatore, Tanjore and Madurai, and a decrease in all the other districts of the State except the Nilgiris district where the area under the crop is nil or negligible.

The crop has been harvested in most of the districts. The yield per acre is expected to be normal in Ramanathpuram district and below normal in all the other districts of the State. The seasonal factor for the State as a whole works out to 97 percent of the normal as against 93 percent in the corresponding period of last year. On this basis the total yield works out to 20,700 tons of cleaned grain, which is the same as that for the last year. The present estimate shows an increase of 6·2 percent compared with the yield of 19,500 tons of cleaned grain calculated for the five years ending 1955—56. The average wholesale price of redgram dhall per standard maund of 82–2/7 lbs or 3,200 tolas on 11—1—'57 was Rs. 20—15—0 at Vellore and Rs. 27—8—0 at Tirunelveli. Compared with the price which prevailed on 12—1—1956 the present price reveals an increase of 12·2 percent at Tirunelveli and 23·2 percent at Vellore.

The Madras Agricultural Students' Union.

PATRONS.

1. Dewan Bahadur C. Arunachala Mudaliar, Zamindar of Chunampet
2. Raja Sri Krishnachandra Gajapathi Narayana Dev, Maharaja of Parlakimidi
3. Sri V. C. Palaniswami Gounder, M. L. A., Vellaikinar, Coimbatore
4. Sri C. P. Ramaswami Ayyar, Ootacamund
5. Sri R. Jeevandass, Varnasi, Parlakimidi
6. G. R. Hilson Esq., Norwich, England
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