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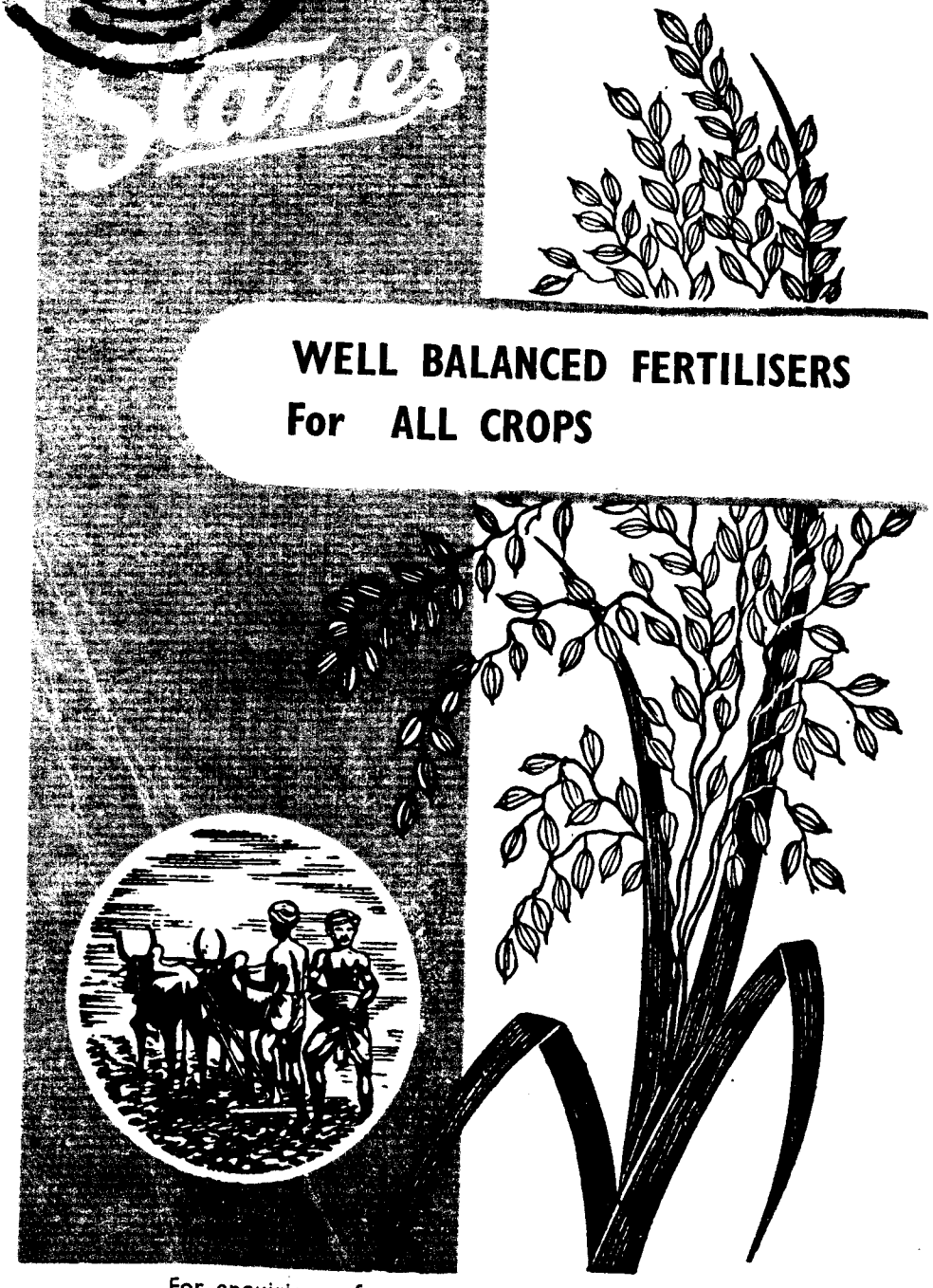

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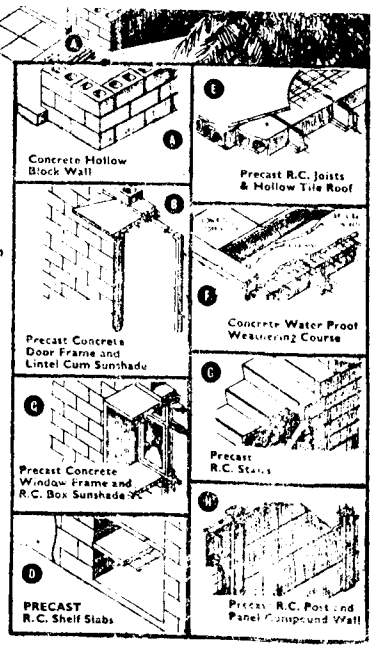

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The Madras Agricultural Journal

Vol. XLVIII January 1961 No. 1

Editorial

1961—Golden Jubilee Year of Madras Agricultural Students' Union: We wish all our members, contributors, subscribers a very happy and prosperous New Year. We also thank them and all others who had contributed in several ways to keep on the Madras Agricultural Journal successfully in the previous years and hope to have their continued help and whole hearted support in an ever-increasing measure in the New Year also.

In 1961, the Madras Agricultural Journal enters upon the Golden Jubilee year of publications. The Journal was first published as a year book in 1911. From next year it was a quarterly till 1915 when it was converted into a monthly. However the yearly publications were numbered serially from 1913 onwards. The financial resources of the Union are limited. Yet due to the enthusiasm of those responsible for its production, it had managed to hold its own. The Madras Agricultural Journal has usefully served the cause of Scientific Agriculture in respect of research, education and extension for five decades. It is now recognized all over the world as an important Agricultural publication and is in the exchange list of several Agricultural Journals-Indian and Foreign. It is not only necessary to keep it going but also to improve it in several ways-to serve the cause of Agriculture better. We cannot do better than reproduce below the appeal of Hon. Sir P. T. Rajan, the then Minister for Public Works, inaugurating the celebrations held in connection with the Diamond Jubilee of Agricultural Education in Madras and Silver Jubilee of Madras Agricultural Students' Union in 1936 :–

" When the Secretary read his report, he appealed to the past students to join the Union in greater numbers and support its Journal. I wish to add my appeal to his, so that your Union and its Journal may continue to carry on the good work in promoting Agricultural Education and interests ".

We hope all interested in Agriculture will enrol themselves in the Golden Jubilee Year, especially the past students, in large numbers and make it possible to improve the Journal. We also request for contribution of articles on all aspects of Agriculture and on our part we assure promptness, punctuality and regularity in publication of the Journal with as much information as it is possible to put in within the pages that finances of the Union will permit.

Pongal : This month is not only the beginning of the New Calander Year but also the one ushering in *Thai* which starts with Pongal celebrations. Pongal is important to all Hindus and has special significance in Agriculture. It is a cultivators' festival. Tillers, labourers and cattle, who partnered in Agricultural production deserve to be remembered and respected on this occasion, for Agriculture is the mother of all industries and the maintainer of human life. We wish all our readers a very happy Pongal.

Biology of *Monomorium (Holcomyrmex) criniceps* Mayr. in South India

by

A. LEELA DAVID, M. SC.,

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Introduction : The small black house and garden ant, *Monomorium (Holcomyrmex) criniceps* Mayr. is well known in almost all areas in South India occurring round about houses and in dry gardens. Although its life history and habits are known from other parts of the world, not much is known from South India. The observations on the ant made in Coimbatore are given in this paper.

This is one of the commonest species occurring in dry and hard soil in fields, gardens and pathways around houses. It is usually found carrying grains in farm houses. On account of this habit, the whole group of *Holcomyrmex* has attained great importance as harvesters. Wheeler (1910) found that the hairs on the labium were greatly elongated and directed forward and concluded that the arrangement must aid in the carrying of the grains. By its varied food and its attendance on injurious insects like aphids it becomes one of the most important insects in this region.

Nesting : The ant is a terrestrial one and nests only in the soil. The site of the nest is usually in an open place without any vegetation covering it. It makes a small hole of about 5 mm in width and brings out the particles of earth to the entrance in pellets. These are left behind around the entrance as small loose craters about 10 mm away from the entrance to the nest. Neither the crater nor the entrance are very prominent and may sometimes be indistinguishable. From the entrance the nest goes deeper into the soil in winding galleries many of which are found in the upper layers of the soil within about half a foot. Internally the galleries extend to the sides to about two feet or more. The galleries ramify along the pathway and extend into chambers which are larger in size and may vary in size from one to three inches in different seasons. These chambers are used as granaries for storing grass seeds brought in by the workers. Another large chamber is found at a lower depth with the walls well plastered within which the different immature stages of the ant are found. Although the different instars of the larvae are housed in the same chamber, they are separated out into different groups according to their stage inside the chamber itself.

It is usual to find many nests in the same site. When examined some of them turn out to be auxiliary ones in which there may be no queen but only different kinds of workers. In these nests the granaries also are not generally found.

Seasonal History: The ant usually swarms during the rains received in the South West Monsoon in July and continues swarming till October. The winged males and females are found in numbers in the nests along with the other forms of the ant and move about freely. They fly out, mate and settle down to form new nests. The females drop the wings and find the nests by themselves. Many nests spring up during the rainy season due to the activity of the ants. The ants continue to be active and the nests may continue without interruption for a year or even more. Many nests continue side by side in the same site for many years also.

Organisation within the Colony: The nest contains only one queen and several varieties of workers. The workers vary in size from very small to very large ones. Usually there are two forms which are distinguishable which are called the worker minor and the worker major. All the workers from the smallest to the largest take part in all activities in the nest as well as outside.

In observation nests the workers were noticed grooming the eggs, larvae and pupae. Occasionally the queen also attended to this work on some of the larvae. The larvae which were not attended to were seen to shrivel and die. The queen sometimes ate away some of the grubs as part of the food.

Food and other Habits: The ant always uses a regular track through which both the incoming and the outgoing ones move. All the forms of workers take part in the work outside the nest and bring home the food material. The food generally consists of grains which are available in the vicinity. Cholam *(Sorghum)* is a favourite food but many kinds of grass seeds also are taken. *Cenchrus* is a common grass from which the seeds are taken and stored in the nest and hollyhock and other weeds also form a part of their diet. The grains are taken as whole ones to the nest with the husks still intact. The small workers are the most industrious trying to pull more than their weight. The large workers often move about without carrying any load but a limited number also help in the work. The chaff is removed in the nest and thrown outside which accumulates in small heaps. When the grains are stored they are kept separately in one

place near the brood chamber. Every nest contains several kinds of grains at the same time. The auxiliary nests do not contain any granaries.

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The ant usually moves rather slowly and steadily along a well-defined route. When an obstruction is placed on the track, a number of them crowd in the path indicating that the path is marked by scent rather than by sight. They take a long time to go over or around the obstruction. The path gets marked out clearly on the ground by the constant movement of number of ants on them. When the track leads through places covered with grass the ant tries to keep away from the grass as much as possible. When the ant has to climb on plants the path is not so regular but the individuals are seen to move along the same route. If more aggressive ants like *Camponotus* or *Monomorium* come across their way, the ants wait till the others go away and proceed on the journey. Neither of the ants attack each other on their regular routes. If the ants are disturbed near their nests they run about hastily and many of the large workers come out but active stinging is not restored to. The workers keep moving in and out during the time rather than attack the intruder. Very often single foragers are also found which should be of the 'scout' or 'excitement centre' type which search out sources of food and attract the others to such places.

Apart from grains, the ant also feeds on the honeydew of aphids like *Aphis gossypii* and *Aphis craccivora,* and of coccids on various plants. It takes also dead insects to its nest by the combined effort of a number of individuals. The remains of many of these insects are found in the entrances of the nests. The young ones are fed by the workers with regurgitated liquid food. Wheeler (1910) has observed that it feeds the young ones with bits of grains also. This has not been noted in the present case.

The population of the nest varies with the season and is most numerous in the semi-wet season in September-October. A nest examined in this season contained the following individuals. The counts of the ants were made by measuring out the ants in glass tubes in alcohol and taking the average of the contents of the tube.

Workers major	288	Grains stored Cholam	1/4 lb.
Intermediate forms	412	*Cenchrus* seeds	2 oz.
Workers	2644	Hollyhock	1½ oz.
Eggs	311		
Larvae	1044		
Pupae	289		

The ant does not prevent other ants coming near or nesting in the vicinity of the nest. Nests of *Monomorium (Monomorium)* sp. and *Pheidole javanica* have been found within half a foot of the nest and the individuals of the species coming in contact with each other every now and then.

It has been observed several times that when it is about to rain the ants shift the grains to places of safety. All the workers, whether they are big or small, carry loads or grain and move along a particular track both ways three or four abreast. They usually move to some place under the shade of a tree or a building. Even if the rain is not received the next morning the track is seen to be abandoned which indicates that the grain has been taken to a different place during the night. This shows that the humidity and pressure exert physiological reactions which influence the ants to take the stored material to places of safety in a more sheltered environment.

Life History : Observations on the life history were carried out in nests reared in jars in the laboratory. The nests were kept moist so as to allow the ants to mould them to the shape desired by them. Water and sugar solution were provided in the jar for their feeding. The eggs and larvae were separated out for studying the instars and the stadia. Workers were introduced with these eggs and larvae so that normal development may be obtained. The workers were replenished every now and then. The workers attended on the eggs and larvae but there was mortality among them. The grains gathered and stored in the nests by the ants were used for feeding the workers.

The eggs were about 0·25 mm. in length and lasted on an average 7·58 days with a range of from 4 to 10 days. There were three instars in the larval stage with the stadia ranging from 2 to 4, 5 to 7 and 2 to 3 days with averages of 2·5, 5·9 and 2·4 days. The puapae were naked attended on by the workers and queen. The duration ranged from 7 to 9 days with an average 7·9 days. The total life cycle lasted 26·3 days.

Parasites and Inquilines : No parasites were noted on the ants or their larvae.

A spider closely resembling the ant has always been found to be associated with the ant. It moves about freely with the ant in the pathways and enters the nest also. It has been noted also inside

the nest. The ant tolerates the spider and does not harm it in anyway. This mimicking and free-access condition is of the synoekete - xenobiosis relationship of the inquilines.

Economic Status of the Ant : The harvesting and storing of useful grains makes the ant an enemy of the farmer. Apart from the loss that may be incurred by the carrying away of the grains, the ant helps in transporting the seeds of the plants concerned and disseminating them to the fields as weeds in the standing crop. After rains some of these seeds sprout out in patches in the field and give indication of the activity of the ants.

The ants also attend on aphids and coccids and give them scope for multiplication and dissemination. However the presence of the ants give indication of the aphids and coccids which otherwise may not be distinguishable.

Being an ant closely associated with the ground it walks on, it can easily be kept in check by the application of insectides around places where its incursions are to be avoided. Chlordane, Heptachlor or Aldrin applied around nurseries have kept the ants away and given good germination of seeds. The complete eradication of the ant is, however, difficult as it is able to find alternative places for building the nest with comparative ease.

Acknowledgments : The writer thanks the University of Madras for kindly according permission to publish the material which formed part of a thesis for the M. Sc. degree. Thanks are also due to Sri M. Basheer, the then Government Entomologist who acted as supervisor for the study.

REFERENCE

Wheeler, W. M. 1910 Ants — their structure, development and behaviour.

Twenty-five Years of Scientific Marketing in Madras State

by

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State Marketing Officer, Madras

and

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A. Introduction : In 1928, the Royal Commission on Agriculture in their report, portrayed vividly the disabilities under which the producer was labouring and the exploitation to which he was exposed to, in an unorganised and uncontrolled system of marketing agricultural produce. Subsequently the Banking Enquiry Committee and the Provincial Economic Conference of 1934 laid stress in their reports the necessity for taking up with immediate effect a programme of intensive development of organised marketing of agricultural produce including livestock products, so as to help the farmer to secure his due share of the price paid by the consumer.

B. Marketing Section : In pursuance of the above recommendations, the Government of India organised in 1934, a Central marketing department headed by the Agricultural Marketing Adviser to the Government of India. At about the same time, the Madras Government also took effective steps and appointed a Provincial Marketing Officer (now called the State Marketing Officer) to work under the Director of Agriculture. The subjects dealt with by the marketing section in Madras State are as follows :

(i) To conduct market surveys of the various commodities.

(ii) To organise regulated markets for better buying and selling.

(iii) To arrange grading of produce.

(iv) To act as a bureau of market intelligence for furnishing information on various aspects of marketing like the trend of prices, demand, supply etc., to the public and private sectors.

(v) To explore markets for the produce and suggest export-quotas for surplus commodities like chillies, onion, etc.

(vi) To help schemes on co-operative marketing, warehousing, weights and measures, forward-marketing, etc.,

C. Work done so far : *Market Survey :* The proof of the pudding is in the eating of it. The producer should be able to readily market his commodity at a fair price and cash his labours. For the marketing section to give proper advise to the ryot a survey of the current marketing practices for each commodity is essential. These market surveys are planned and conducted to spot weak points in the existing marketing systems and secure enough material for building up a foundation for developing a scientific and hence a profitable marketing system. Spot investigations and collection of information by personal enquires were made from producers, traders, intermediaries, manufacturers, consumers and others connected with the marketing. These surveys covered all the important aspects of marketing such as trends in production, utilisation, net available supplies, prices and price spreads, market practices in respects of assembling and distribution, transport, storage, processing, commercial classification, standardisation and grading, financing, markets, market charges and market functionaries and the recommendations for improvement in the marketing practices. Besides furnishing detailed information on the above lines to the Agricultural Marketing Adviser to the Government of India, for publication of the All India survey reports, the marketing section of Madras State has so far brought out survey reports of Madras State for 52 commodities (including both agricultural and livestock products), out of which six were published. As a result of the marketing surveys conducted, the malpractices noticed in the trade were noted and suitable legislative measures like ;

(i) the control of forward trading ;
(ii) enforcement of weights and measures ;
(iii) setting up of licenced warehouses ; and
(iv) regulation of markets,

were taken up. Recently a special Assistant Marketing Officer for survey has been appointed to revise and bring up-to date the survey reports, with a view to publish them gradually for the benefit of the marketing community.

Regulated Markets : Between the producer and the consumer, goods ordinarly change hands many times. There are a lot of intermediaries like commission agents, brokers and other itinerant dealers in the process of marketing a produce. Various malpractices such as false weights, unauthorised deductions and allowances, absence of any machinery to easily settle disputes between buyers and sellers, and adulteration are prevalent. The innocent producer

from the village is helpless under such conditions of marketing. To afford him proper marketing facilities, regulated markets were established for a few selected crops under the Madras Commercial Crops Markets Act of 1933. This act is to be replaced by the Madras Agricultural Produce Markets Act of 1959, under which the marketing of all the agricultural and livestock commodities is contemplated in the regulated markets. The salient features of a regulated market are as follows :

(a) Provides a meeting place for the producers and consumers to come together.

(b) The market charges are specified and are within reasonable limits.

(c) Weights done by licenced weighmen are correct and are tested periodically.

(d) Amenities to the producer by way of a storage shed, cart park, water-cistern for cattle, lavatary etc., are all provided in the market yards.

(e) Market intelligence regarding the arrivals, sales, prices at the important marketing centres are furnished to the buyers and sellers so that they may know the trend of the market.

(f) Prompt payment by the buyer to the seller is insisted upon.

(g) It serves as a pooling place for affording bulk purchases.

(h) Suitable quality standards and standard contract forms for buying and selling are adopted.

(i) Transcations take place in public and hence the dealings are fair.

(j) Prices paid are the best, due to competition between the buyers.

The following are the Market Committees and the Regulated Markets established under the Madras Commercial Crops Markets Act.

Name of the Market Committee	Commodities notified	Year of Starting	No. of regulated markets opened.
Coimbatore	Cotton, Groundnut, Tobacco	1935	5
South Arcot	Groundnut, Cotton, Gingelly	1939	9
Ramnad	Cotton, Groundnut	1952	—
Tirunelveli	Cotton	1952	—
North Arcot	Groundnut	1953	8
Trichy	Groundnut, Tobacco	1958	4

The six market committees, regulating transactions in cotton, groundnut, tobacco and gingelly having 26 regulated markets in all, have been opened so far. Regulated Markets are likely to be established in South Arcot, Thanjavur and Trichy districts in the near future for paddy under the Madras Commercial Crops Markets Act. By the end of the third five year plan 103 regulated markets in the different districts are expected to be established.

Grading : Grading of produce creates mutual confidence between the buyers and sellers, the consumer gets the quality he desires and the producers a better return. With a view to benefit both the producer and the consumer, the Government of India passed the Agricultural Produce (Grading and Marking) Act, 1937, authorising the Agricultural Marketing Adviser to prescribe grade standards for different types and varieties of agricultural produce including some animal husbandry products based on the analysis of samples and in consultation with the interested parties. Commodities thus graded are called "AGMARK" products. The symbol "AGMARK" is a shortened form for "Agricultural Marketing". These "Agmark" graded products stand assured for purity, freshness and standard quality. Besides a higher turn-over in sales and better prices, the "Agmark" products facilitate easy export, being standardised products. It enables easy quotation of prices.

AGMARK grading is voluntary in the case of commodities consumed in the country. Suitable persons or corporate bodies are authorised by the issue of a certificate of authorisation, to grade their produce under "AGMARK" by the Agricultural Marketing Adviser to the Government of India on the recommendations of the State Marketing Officer. A system of strict quality control is enforced both by the Central and State Governments by drawing check samples at the consuming centres even. Important commodities graded under "Agmark" for consumption within the country are: Ghee, Butter, Gingelly oil, Hen eggs, Rice, Sugarcane Jaggery, Potatoes, Sathukudi Orange and Mangoes. Attempts are being made to grade cocoanut oil, castor oil, honey, duck eggs, pulses and cotton. Besides the articles graded for internal consumption on voluntary basis, commodities like sannhemp, tobacco, wool, bristles and essential oils (Sandalwood and lemongrass oils) are compulsorily graded for export, as per notifications issued under Section 19 of the Sea Customs Act 1878. The Second Five Year Plan provides extension of compulsory grading in respect of export of pepper, ginger, cardamom, vegetable oils, hand picked groundnuts, hides

and skins, tanned leather, kapok and myrobals. The grading for export is supervised directly by the Directorate of Marketing and Inspection.

For analysing and grading ghee and oils, a well equipped chemical laboratory costing about Rs. 12,000 is required. In order to facilitate the smaller ghee and oil merchants to grade their ghee and oils and market the same, Government grading laboratories under the control of the State Marketing Officer, Madras were established in important trading centres like Coimbatore, Dharapuram and Karur. Three more laboratories are being established at Madras, Madurai, and Virudhunagar. In the third five year plan, it is proposed to open five more laboratories, so that a chain of Government laboratories would be available for all the ghee and oil merchants in Madras State, to have their produce tested and graded before marketing. A state grading laboratory at Vellore provides facilities for grading sugarcane jaggery, rice etc.

Grade specifications have already been prescribed by the Agricultural Marketing Adviser to the Government of India for 115 Agricultural products. These specifications are revised whenever necessary, in order to keep them in tune with latest trends in the trade. Specifications for different varieties also have to be fixed, according to their nature. In Madras State for rice alone grade specifications for 41 varieties of rice have been fixed.

In Madras State, rice grade was started in 1938–39. Grading of hen eggs, sathukudi oranges, mangoes, jaggery and potatoes was started in 1939–40. Grading of ghee and gingelly oil was taken up in 1948–49. Grading of Groundnut oil was done from 1957 onwards. The quantities graded for the past 5 years in some commodities are given hereunder :

	Rice (St. Maunds)	Ghee (St. Maunds)	Gingelly Oil (St. Maunds)	Groundnut Oil (St. Maunds)	Potatoes (St. Maunds)	Hen Eggs (Nos.)
1955—'56	7254	7206	...	...	2940	296828
1956—'57	8896	3609	6087	...	10549	81775
1957—'58	46043	9030	6884	1555	8105	1862207
1958—'59	45363	11840	9283	4442	5885	1644404
1959—'60	55000	16167	4302	3150	3662	2851427

The grading activities have been expanding, though the quantities graded when compared with the total marketable surplus is very negligible. The reasons for the same have to be analysed and set right so as to see that this vital forward measure is implemented in full.

Grading activity would increase automatically with the consumer demand for graded articles. The Government of Madras have ordered that Government controlled institutions like the hospitals, hostels, jails, borstal schools, etc., should set an example to the public by going in for Agmark Products only, even if the price is 5% more than the ungraded goods. An Assistant Marketing Officer with adequate subordinate staff has been sanctioned by the Government of Madras for expanding the grading activities in this State. Due to the propaganda done by the Special staff the number of packers during 1960–'61 who were authorised to grade and who were recommended by the State Marketing Officer for issue of authorisation certificate are as follows, when compared to the figures in the previous years.

	Rice	Ghee	Gingelly Oil	Groundnut Oil	Potatoes	Eggs
1955—'56	1	7	...	...	5	8
1956—'57	11	8	4	...	2	7
1957—'58	17	17	7	1	6	9
1958—'59	24	21	8	1	9	16
1959—'60	58	35	8	1	14	21
1960—'61 (upto Sep. end)	143	83	24	6	52	61

Tangible results achieved in enlisting packers in enough numbers should ensure continuous supply of graded articles to the consuming public. The Agmark Packers' Association has been established in Madras State, perhaps the first of its kind in India and it is expected that this organisation would be able to create in the public mind the confidence that "Agmark" articles are the best choice for all, at reasonable prices. A sister institution to voice forth the views of the consumers called the Agmark Consumers' Association is being arranged to be started shortly and this Association is expected to do wide propaganda door to door, for the "Agmark" products, so that the real live forces in the households, namely the womenfolk, may be convinced of the excellence of Agmarked Products and insist on their getting only such articles.

The consumption of Agmark Products can considerably be increased, by enforcing the Prevention of Food Adulteration Act a little more vigorously, so that the prices may get settled down, without undue competition from the adulterated stuff. A fillip may be given by giving preference to graded articles for booking of

wagons so that the quality of the Agmark Products may be maintained. This would be especially true in the case of perishable articles like the potatoes, eggs, mangoes, sathukudi oranges and limes.

D. Future Programme : Development of Marketing in Madras State is imperative, if only to consolidate the gains accrued as a result of the greater production achieved through the various "grow more food schemes" in this State. Provision has been made in the third five year plan, for the expansion of the marketing section, providing for an Assistant Marketting Officer for each district, so as to be able to study the marketing problems and advocate the scientific marketing principles, for the solution of the same. With more production and better marketting amenities, the ryot in Madras State will have very few problems after the Third Five Year Plan and an era of peace and plenty is visualised.

Fodder Problem in India—a Suggested Solution

by

R. M. SAVUR, M. A. (Cantab). *

A higher standard of living implies and includes a higher standard of nutrition. Improvement in the nutritional level needs an increase in the protein content of the food for which purpose animal proteins are more valuable.

In a predominantly vegetarian country most people will have to depend on milk and milk products as their only source of animal protein, especially for the more vulnerable group - growing children, nursing mothers and pregnant women.

A rapid increase in milk production for both rural and urban areas is not only desirable but imperative. Nutritionists have estimated that at best a 300 per cent increase in total milk production is necessary for India's requirements of milk and milk products.

* Sri R. M. Savur, Y. R. Farm, Padnekat B. O., Kanhangad.

A whole host of experts like Sir John Russel, Dr. Norman Wright, Dr. K. C. Sen, have investigated all aspects of the problem. Their unanimous opinion has been :

(a) That the main reason for the very low milk yields of Indian cattle is they are maintained in a state of semi-starvation,

(b) Milk yields are absurdly too low when compared with the proved potentialities of many Indian breeds as milking animals,

(c) The 300 per cent increase in total milk output required by nutritionists could be provided without improving their potential milking capacity, if they are adequately fed and managed for two or three bovine generations. Better feeding and management will at the same time remove the other failings, viz., slow rate of growth, late maturity and long dry periods,

(d) Improved breeding without improved feeding is completely ineffectual and that, therefore, improved feeding must be given first priority over improved breeding.

The Problem : According to Sen and others (quoted by Whyte) an increase of 10 per cent in the acreage under fodder crops will suffice to meet the needs of the present cattle population. The problem is how the cultivator with 5 acres or less of cultivated land (with little or no grazing) can incorporate fodder production into his arable farming system.

The Solution : The writer, in seeking a solution to this very problem which faced him, reached the conclusion that the only solution lay in growing some dual purpose, grain-cum-fodder crop other than paddy. Paddy is ruled out because its straw is extremely poor fodder, its nutrition ratio being 1 in 40 or even less, the lowest nutritive ratio for raising milk yields being 1 in 10. To achieve this higher nutritive ratio a good legume hay should be fed along with the cereal straw.

The only way in which the needs of both man and animal can be integrated is by introducing quick growing dual or triple purpose fodder plants and legumes on arable land so that the farmer can use his crop in one form or other depending on seasonal needs or the current economic condition. There is no other solution to the problem.

Choice of Species : (a) *Legume :* First the legume hay is the most valuable fodder as its nutritional ration is 1 : 4. Cowpea hay is the best hay as it is superior in nutritive value even to soyabean or alfalfa. Cowpea also produces heavier yields of fodder in less time than any other legume. Certain varieties of lablab are also heavy producers of fodder. No information about its nutritive value is available to the writer who presumes that it cannot be much inferior to cowpea in this respect. An additional advantage is that by growing lablab varieties in addition to cowpea the growing season for green fodder can be prolonged. In the writer's opinion there is no other cowpea equal to the New Era for heavy yields of fodder as well as edible grain of high quality for human consumption.

The breeding work in the Pulses section at the Millet Research Station at Coimbatore has produced most impressive results especially in the breeding of improved bean varieties. Some of them are heavy producers of fodder and grain but the only disadvantage is their long duration. This has been corrected by further crossing and two such crosses which the writer saw in the field at his last visit to the Millet Station were reported to be great improvements. Though further improvement is possible and is being pursued, these three varieties will adequately meet the immediate need.

(b) *Cereal :* Sorghum is an obvious choice of all the cereals. It is the heaviest producer of both grain and straw. Over and above all these qualities it has the lowest water requirements and the greatest capacity to recover completely from short period of drought. The nutritive value of sorghum grain is higher than that of wheat.

The fundamental research work on Sorghum as well as the breeding of improved varieties carried on at the Millets Station of the Coimbatore Agricultural Research Institute has achieved international reputation. Nowhere else in the world has so much work of such immense value been done. Vastly improved varieties of grain sorghum have been evolved. But the improvement of fodder sorghum and grain-cum-fodder varieties falls far short of the standard reached in the improvement of grain sorghums.

The reason for this is not far to seek. The prime consideration for evaluating a forage species has been completely overlooked. This is not surprising as the Specialists and research

workers know little or nothing about livestock and livestock feeding. Livestock farmers place the greatest importance on the digestibility of the fodder. The higher the fibre content in a forage species the lower is the digestibility quotient. A stemmy grass like elephant grass is less valuable than a leafy grass like Guinea grass because the stems are less digestible than the leaves. The prime consideration, therefore, in evaluating a forage species is its leaf-stem ratio. The wider the ratio the better the variety from the livestock feeding view point.

As far as the writer's limited knowledge goes., the fodder sorghums commonly grown in Coimbatore as well as the newer varieties developed are all single stemmed, non-tillering, tall varieties. As one characteristic of sorghum is that the number of leaves is strictly limited the increase in height is simple due to elongation of the internodes. Thick sowing is the practice adopted for ensuring thin stems. How does this crowding of plants alter the leaf/stem ratio and size of the leaves? Effect on yield of grain only as a result of closer spacing is dealt with by Subramaniam *et. al* (1960).

Ideal of a dual purpose sorghums : To solve his own urgent fodder problem a very large number of sorghum varieties were tried over a period of several years by the writer on his farm. For evaluating, these, necessary characteristics of an ideal dual purpose sorghum were formulated.

1. Short duration – 120 to 130 days for grain.
2. Thin, sweet, juicy stems with wide leaf/stem ratio.
3. Free and uniform tillering.
4. Freedom from leaf and stem diseases.
5. Heavy yield of good quality, small, pearly grain with wide germ endosperm ratio.
6. Loose panicle not easily damaged by birds or caterpillars.
7. Good ratooning capacity.
8. Adaptability to a wide variety of soils and all seasons.

Sorghum margaritiferum was found to approach nearest to this ideal except for its long duration (Table C). The next step therefore was to seek the help of a plant breeder. The whole problem was discussed fully with Dr. B. W. X. Ponnaiya who agreed

that this defect should and would be removed by crossing with some other varieties. The writer's suggestion that the most suitable variety for the other parent would be *grass shallu* or M. S. 8375 was acceptable. A beginning was made with *grass shallu* sorghum and some hybrid seed secured. The result from sowing the seed is eagerly awaited.

Acknowledgment : The writer owes an irrepayable debt of gratitude to Dr. B. W. X. Ponnaiya who from the very day of his assuming office as Millets Specialist has to this day evinced greatest interest in the writer's needs and helped him in every possible manner. The writer is equally indebted to Sri A. Subramaniam and his encyclopaedic knowledge of sorghum type collections of the Institute which enabled him to pick and strongly recommend *S. margaritiferum* as the one variety most likely to meet the special traits demanded. Thanks are also due to Miss K. Meenakshi for the help she has rendered.

Appendix

A. Average analysis of whole cereal grains
(Moisture free basis)

	Starch	Protein	Per cent Oil	Ash	Germ	Bran
Sorghum (misc. var and kafir)	69·46	13·00	3·61	1·93	10·5	6·3
Wheat, White	66·90	9·90	1·96	1·84	2·0	13·2

B. Seeding value of Legume Hays

Kind of Hay	Moisture	Protein	Fat	N. free ext. Energy content	Ash	Fibre
Cowpea	10·4	16·1	3·2	40·3	10·2	19·8
Soyabean	8·4	15·9	3·9	38·8	8·9	24·1
Alfalfa	8·7	15·9	2·7	36·8	8·8	27·1

From USDA Farmers' Bulletin 1153 quoted by Alhgren in "Forage Crops" 2nd edition, p. 151.

C. Leaf stem ratio and tillering of S. margaritiferum

No. of tillers including main stem	Five plants 3 months after transplanting 1	2	3	4	5	Total	Average per plant
	7	12	18	25	34	96	
Leaf weight 137·5 tolas Stem weight 103·0 ,,	Leaf stem ratio						1·33

(Author's Experimental Data)

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Importance of Periodic Renewal of Improved Cotton Seed

by

L. NEELAKANTAN, M. A., *

In order to raise a good crop of a standard specification, it is very essential to grow an improved variety of the crop. It is well known that improved strains of cotton secure better returns from an acre to the grower than unselected bulk. The Madras Agricultural Department has recommended the following superior breeds of cotton for cultivation in the districts named against each.

American (Cambodia)	MCU. 1	... Madurai, Ramanathapuram and Tirunelveli.
	MCU. 2	... Madurai, Ramanathapuram, Tirunelveli, Salem, South Arcot and North Arcot.
	P. 216–F	... Tanjore, and Tiruchirapalli.

* Formerly Cotton Specialist, Madras State. Now Deputy Director (Seeds), Govt. of India, New Delhi.

Desi (Karunganni)	K. 2	... Ramanathapuram, Tirunelveli and part of Madurai.
	K. 5	... Coimbatore, Tiruchirapalli, Salem and part of Madurai.

In the year 1957–'58, MCU 1 and K 5 were valued at Rs. 3/- and Rs. 8/- more respectively than local for a "Pothi" of 280 lb of Kapas.

There are special seed multiplication schemes functioning in different parts of the State with the object of swelling the seed quantity from a small initial stock of pure pedigree seed of the concerned strains and when the quantity has increased sufficiently, arrange for distributing the seed to cotton growers in the State, utilising the services of Co-operative Societies wherever they exist. Such schemes are necessary to meet the increasing demand for seed of improved strains and to order an equitable distribution of this commodity to the cotton growing community in the State. Pure foundation stock seed of the improved strain available from Government Stations and State Seed Farms may not be sufficient to raise more than a few hundred acres. Seed from these sources cannot be distributed straightway to growers as only a very small number of growers will be benefitted. It is therefore necessary to swell the seed quantity by progressive stages of multiplication so that no cotton grower is deprived of his right to secure good seed. It takes above 5 or 6 years for this foundation stock to get multiplied to this level of supply. In all these stages the crop is supervised closely by trained technical men of the Madras Agricultural Department both in the field and off the field during the various processing stages culminating in bagging of seed for next sowing.

A cotton grower who gets his seed from a store sponsored by the agencies described above derives satisfaction from the crop raised with this seed. With the initial supply he can keep stocks of his own seed for subsequent years. But there are some practical difficulties. Except in the case of an exceptional few, many may not find it convenient to keep by the required quantity of seed for next sowings. Even if they manage to keep this with all due precautions for storage, they often find it difficult to disoblige other farmer friends or tenants who approach them for seed at the last moment, they themselves being obliged to replenish their deficit by fresh acquisitions from departmental stores or from other sources.

In spite of his success in keeping his own stock of seed and a sternness in refusing the needs of others, it is not advisable for the farmer to pursue this policy of utilising his own seed of one harvest to next sowings continuously for years. He cannot be independent of fresh stocks by way of periodic renewal for the following reasons.

First, the initial crop he raises from the departmental seed may contain a few 'off type' plants-what are known as 'rogues'. The number may be negligible and will not affect the reputation of the cotton for quality. But if these are not timely removed they increase and in course of time swell to a number big enough to tell upon the quality of the cotton. Very often most of the farmers do not see that importance of 'roguing' and as a result of continued neglect, a situation will arise in later years when the same farmer is chagrinned at being discounted off for quality by the cotton broker.

Secondly, granting that the farmer has time, patience, men and money enough to have the rogues removed systematically and timely, he has to face a fresh difficulty in getting his produce ginned for which normally he has to depend on a ginnery, as reliance on country wooden hand gins will not be feasible because of time and cost of labour. Even if his influence is great as to be assured of priority special treatment in machine ginning, he is helpless against inadvertant seed mixing, in the ginnery where different varieties of cotton are admitted for ginning.

It may be possible for the farmer to avoid danger of contamination, risk through natural crossing by timely roughing and it may even be possible to command adequate arrangements for securing seed from his own produce by special care in ginning, but he is powerless against a third insidious danger which comes from what are known as 'Mutations'. There are visible consequence of genic changes in the population propagated from an initial stock. In course of time certain types make their appearance which may not all have good attributes. A stage will be reached when the farmer will have to put up with carping comments on quality by a shrewd buyer and then it will be too late to throw up his hands in despair and grumble about poor quality of departmental seed.

All these defects can be got over by seeing that (1) at least once in three or four years, the farmer renews supply of initial seed and (2) raise the cotton utilising all the improved methods of cultivation recommended by the Department of Agriculture, of Madras. Cotton from such a farmer will always be assured of a preference in the market and its initial reputation for quality can be kept up for ever.

Therefore all cotton growers in the state are advised to renew their cotton seed from departmental stores or agencies approved by the Government like Co-operative Societies periodically say once in three or four years.

Fusariose wilt of brinjal — Effect of inoculum on plant growth and root development

The investigation of Fusariose wilts of Solanaceous hosts like brinjal *(Solanum melongena)* chilli *(Capsicum spp.)* and tomato *(Lycopersicon esculentum)* has been in progress in this laboratory for the past few years. A large number of isolates of *Fusarium* from brinjal have been obtained, and their identity and distribution in different districts of the Madras State have already been reported (Govindaswamy, 1960). Among the various items of investigations pathogenicity of the different isolates on their own host was an important one. In this note the effect of inoculum of various isolates of *Fusarium* spp. on brinjal is reported.

The pathogenicity test was conducted as described below: The various isolates to be tested for pathogenicity were multiplied by inoculating them on sand maize-meal medium (95 : 5) and the inoculated bottles were incubated at laboratory temperature (26–28° C) for a period of three weeks. At the end of this period the inoculum was transferred to glazed porcelain pots containing sterilized sand in the ratio of 1 : 9 (inoculum : sand). The inoculum was thoroughly mixed with top layer of the sand and one month old seedlings of brinjal were transplanted in the inoculated pots. The pots were watered with Hoagland's nutrient solution twice a week. Observations on the disease symptoms and the number of wilted plants under each isolate were recorded.

The results have revealed that out of 30 isolates of *Fusarium* spp. tested for pathogenicity only 15 were found to be pathogenic in varying degrees. The remaining isolates were found to be non pathogenic and no wilting of the plants could be noticed. But a careful examination of the surviving plants in pots inoculated with pathogenic isolates as well as plants inoculated with non pathogenic isolates revealed that the general growth was poor and marked stunting of the plants was noticed. Similar stunting of plants in artificial inoculations with various isolates of *Fusarium* spp. has been reported by Varma (1952) in the case of tomato.

The plants which exhibited poor growth and stunted appearance were removed from the pots with their root systems intact for further examination. A critical examination of the root system showed that in almost all cases the root system was poorly developed. The tap root was stubby and its growth was arrested to a marked extent from very early stages. The secondary roots were also very poorly developed in comparison with uninoculated control. It was further observed that the tip of the tap root had rotted badly in many cases and with slight pulling the entire cortex was coming off easily as a rotted mass, leaving the

central core of the root. There was also discolouration and rotting of the tips of secondary roots and these symptoms became intense after three weeks of inoculation.

These observations have clearly indicated that although the plants were not dead completely due to infection there was very poor development of root system together with rotting of cortex tissues. This has resulted in the stunted growth of the plants. Such infected plants may appear apparently healthy and remain alive. But they are not likely to yield normally and is, therefore, uneconomical to maintain them in the field.

Further studies on the etiology of the disease is in progress.

I wish to express my grateful thanks to Dr. K. Ramakrishnan, Professor of Plant Pathology, for suggestions in the preparation of this note.

C. V. GOVINDASWAMY.

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Manuring Cotton in the Rice Fallows

In the deltaic tracts of Tiruchirappally, Tanjavur and South Arcot districts, over 10 lakhs of acres of wet land are allowed to lie as fallows for a period of 5 to 7 months in a year between the harvest of a paddy crop in January–February and the succeeding crop in July–August. The trials conducted at Aduthurai, Pattukkottai Thoppuvattaram and Palur have established conclusively the possibility of cultivating cotton during the off-seasonal period with the aid of underground water tapped through filter-pumps or ordinary wells. However, as this crop is entirely new to this tract, everything connected with its cultivation requires careful investigation for formulating suitable recommendations. Thus a number of trials to find out the most suitable spacing, manuring, pesticides etc, was carried out and is being carried out at Aduthurai, Coimbatore and Palur.

The results of the manurial trials conducted during 1957 and 1958 summer seasons at Aduthurai and Coimbatore are very encouraging and hence it is considered that a short note in this regard will be of use to the ryots. Since the trend of the results obtained in both the years were essentially similar, the data obtained during 1958 season alone are reviewed here.

These data are presented below. It may be seen from the data that the yield obtained from the cotton raised without the application of ammonium sulphate has given 1030 lb. of kapas per acre. In general the yield has increased with the increase in the quantity of ammonium sulphate applied and a spectacular increase of 536 lb. of kapas per acre has resulted through the application of 375 lb. of ammonium sulphate per acre.

At present one hundred weight of ammonium sulphate costs nearly Rs. 20/-. Therefore 375 lb. of the fertilizer costs Rs. 67/-. The average price of kapas is Rs. 150/- per pothy of 336 lb. The value of additional produce of 536 lb. is therefore Rs. 239/- leaving to the cultivator a net profit of Rs. 172/-.

Half the quantity of the fertilizer should be applied when the crop is 20–25 days old and the remaining half when the crop is 60 days old. The fertilizers are to be applied as close to the root zone as possible without the fertilizers coming into direct contact with the plants. The crop should be irrigated immediately after the application of the fertilizer.

It is earnestly hoped that the ryots would profit by these results.

K. KANNAIYAN.

Economics of Manuring with Ammonium Sulphate

S. No.	Level of ammonium sulphate (lb.)	Yield of Kapas (lb./acre)	Extra yield over the control (lb.)	Rate of increase per lb. of Ammonium Sulphate (lb.)	Value of extra produce at Rs. 150/- per pothy of 336 lb. or Rs. 0.446 per lb. of Kapas	Cost of ammonium sulphate at Rs. 20/- per cwt. Rs. 0·179 per lb. of ammonium sulphate	Profit
					Rs.	Rs.	Rs.
1	0	1030	...	...	...	...	...
2	150	1343	313	2·1	138·60	26·85	111·75
3	225	1432	402	1·8	179·29	40·28	139·01
4	300	1440	410	1·4	182·86	53·70	129·16
5	375	1566	536	1·4	239·06	67·13	171·93

Development of Spikelets - A new Mendelian Character in the Italian Millet (*Setaria italica* Beauv.)

Development of spikelets as a mendelian character has not been come across in the Italian millet (*Setaria italica* Beauv.) so far, although bristles bearing spikelets as a monogenic recessive to the normal, have been recorded (Ayyangar G. N. R. *et al* 1933a). In the course of field studies during the summer season, 1959, an interesting variation was observed in the panicle.

In the Italian millet the panicle is terminal and is cylindrical in shape. It is composed of small branches, the spikes disposed of in 3 to 5 spiral whorls along the rachis. Each spike has upto about 60 spikelets, the floral units. The spikelets are borne on thin, short pedicels. Each spikelet (or two) is surrounded at the base by a number of thin and stiff (slightly flexuose) bristles which have minute upward pointing barbs along the edges. Morphologically the bristles represent barren floral branches (Ayyangar G. N. R. *et al* 1933b). Spikelets have been noted to be borne at the tips of the bristles also in some races. The condition where spikelets are borne by most of the bristles in a panicle at their tips has been found to be a monogenic recessive to the normal (Ayyangar G. N. R. *et al* 1933a). Incomplete dominance has also been met with in some families.

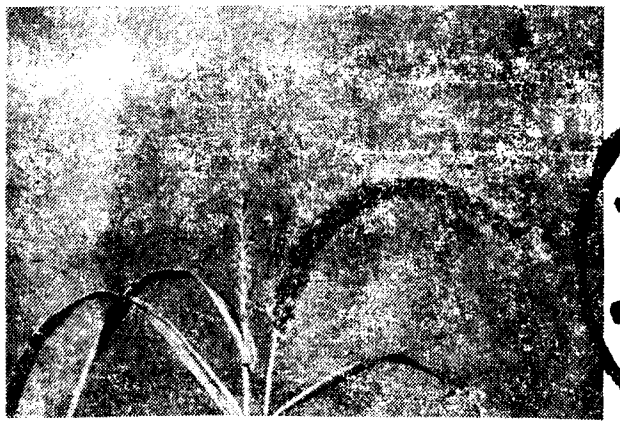

FIG. 1
The abnormal panicle compared with the normal.

Among the selections under study at the Millets Breeding Station, Coimbatore a few plants in the culture A. 109/1-1 isolated from a Japanese variety of the Italian millet produced panicles completely devoid of spikelets. Each spike had only bristles of varying length in the place of normal spikelets (Figs. 1 & 2). These plants did not show any other

morphological variation from the normal ones. Since the population under study was the progeny of a single plant the counts for the normal and abnormal plants were made in three different plots. The data observed are furnished below in Table I.

TABLE I.

Segregation observed in the progeny of the selfed plants.

Plots	Number of plants	
	Normal	Abnormal
1	131	8
2	199	13
3	151	10
Total	481	31
Expected (15 : 1)	480	32

It will be seen from the data presented that in a total population of 512 plants, there were 481 normal plants and 31 abnormal plants approximating closely to the theoretical ratio of 15: 1. It is the first time that the genic influence on the spikelet development in the Italian millet has been noticed and further studies are in progress to confirm the indication observed.

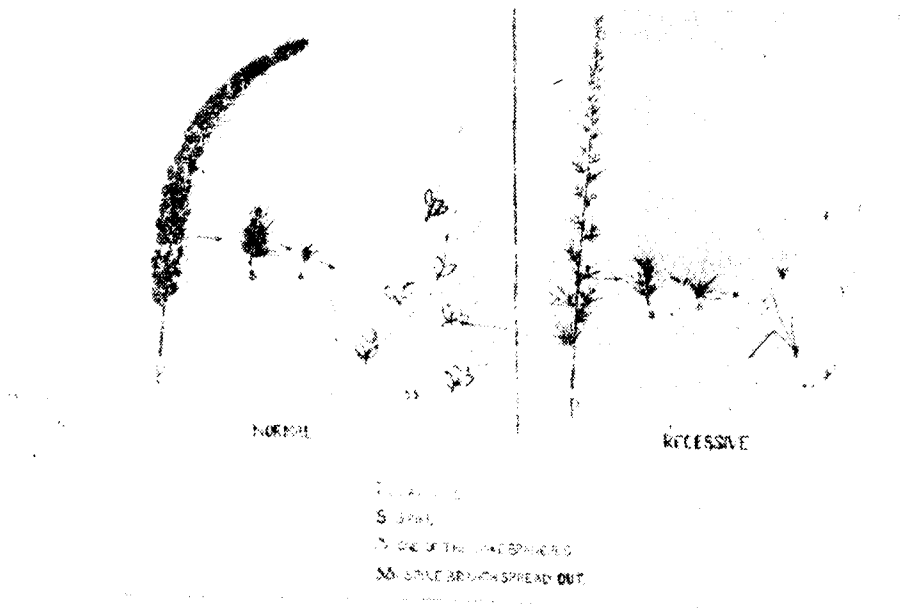

FIG. 2

Diagrammatical representation of the bristles and the spikelets of each panicle to show the difference.

These plants which are normal in all other respects except for their failure to produce spikelets, will be useful for investigation on the nutritional requirement that may be needed exclusively for the production of grains besides vegetative growth from a comparative study with that of the normal plants. In a previous study on the fundamental aspect of tillering habit in the Italian millet (Charles Ratnaswamy, 1959) the possibility of increasing the crop yield in the tillering varieties by way of increasing the production of secondary tillers by judicious manuring was indicated. Investigation along this line will facilitate the economic use of fertilisers.

The author is thankful to Shri S. G. Aiyadurai B. Sc. (Ag.), Millets and Pulses Specialist for his guidance in the preparation of this note.

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Protective Irrigation Increases Yield of Monsoon Sorghums

With the advent of the South West Monsoon, Sorghum (Cholam) is raised in the Coimbatore district mostly as a rainfed crop from July to January, in anticipation of sufficient precipitation to bring the crop to maturity. Failures of unexpected rainfall are, however, not uncommon resulting in very poor yield or whole crop failure. After sowing the crop in garden lands, sprout irrigation is usually given if sufficient rainfall is not received for germination. Subsequent irrigations are rare and the crop comes up mostly with rains received subsequently. In the dry lands, the cholam crop is entirely dependent upon rains for germination and growth.

Such uncertainties of crop production cannot be guarded against in dry lands while in the garden lands, where irrigation facilities exist, it is possible to stabilise crop yields in sorghum. Where anticipated rains do not fall, one round of protective irrigation could be given for the crop raised in garden lands just after giving one hoeing and weeding on or

about the 30-40 day period after sowing, as a protection against crop failures. This one round of irrigation given at the critical period between 30-40 days after sowing has been found to be highly useful and remunerative.

Experience at the Cotton Breeding Station, Coimbatore, has revealed that this practice of giving one protective irrigation to the south west monsoon sown, Co 1 (Periamanjal) cholam has doubled the grain yields. From the year 1955—'56 Co 1 cholam has been multiplied at the above station in about 10-12 acres on an average. From 1957—'58 onwards, this method of ensuring against crop losses with one protective irrigation has paid handsome dividends by increasing the yield two-fold over the whole cholam crop raised without protective irrigation.

Much emphasis has been laid upon the use of improved seeds. Along with improved seeds if protective irrigation is adopted an increase in the yield of improved seeds would result. Not only does this method enhance the yields but also goes a long way to solve the ryots' problem of good returns for the capital invested. Therefore the ryots may well be advised to give just one round of irrigation at the critical 30-40 day period after sowing (during Aug. Sept. period) where sufficient rains do not fall, as a measure of insuring against crop failure.

The results are given in Table I below:

TABLE I.

Strain Co 1 Particulars	Yield of grains (LB/ac)					
	1955–56	1956–57	1957–58	1958–59	1959–60	Mean
Gardenland:						
With one protective irrigation	...	...	1505	1300	1453	1419
Without protective irrigation	828	597	...	...	673	699
Dryland:						
Rainfed crop	312	276	296	82	426	278

From Table I it could be seen that almost double yields have been obtained with one round of protective irrigation. During 1955-56 and 1956-57 only sprout irrigation was given and the crop came up with subsequent rains. During 1957-58, the crop was sown in the second week of July and one sprout irrigation was given. Besides this, one protective irrigation was also given 35 days after sowing. During 1958-59, taking advantage of early south-west monsoon rains, cholam was sown with sufficient moisture in the soil. Only one round of protective irrigation

was given during both the seasons. Finally during 1959-60, one portion of garden land was allowed to come up without the protective irrigation and this has recorded a grain yield of 673 LB/ac as against 1453 lb/ac with protective irrigation (Table I). The mean yields show an increase of 720 LB grain per acre over the crop without protective irrigation in garden lands and 1141 LB grain per acre over the mean yield of dry land crop.

The advisability of ensuring against crop losses with protective irrigation is further substantiated by the lack of adequate rain-fall during the critical 30-40 day period after sowing though sufficient precipations have been received afterwards. The rainfall data for the past five years (recorded at the Cotton Breeding Station) given in Table II, amply brings out the above point by indicating the improper distribution of rainfall. A generally low rainfall from Aug. 15th to Sept. 10th usually corresponds with the said critical period of 30-40 days, since sorghum sowings are usually taken up during the third week of July known as "Adipattam".

TABLE II.

Rainfall data from 1955-'56 to 1959-'60 (five years) showing rainfall received during the critical period.

Year	Date of sowing Co 1 cholam in garden lands	Rainfall received during 30-40 days period after sowing	Total rainfall during crop period (July to January)
1	2	3	4
1955—56	15—9—1955	1·01″	9·50″
1956—57	4—7—1956	—	22·47″
1957—58	11—7—1957	—	32·00″
1958—59	16—7—1958	0·38″	17·65″
1959—60	26—7—1959	0·06″	31·25″

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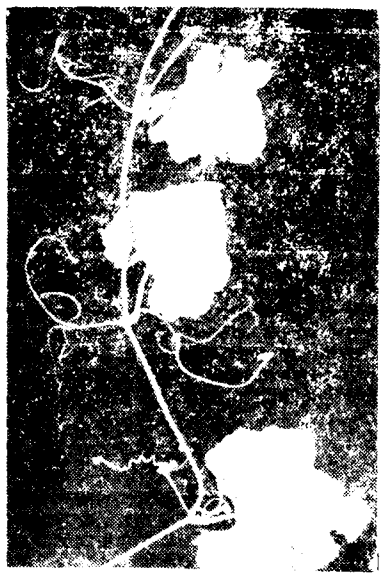
An additional evidence for the Prophyllar Nature of Cucurbitaceous Tendrils

As summarised by Lawrence (1955) the tendril of Cucurbitaceae is considered as modified bracteole that had dropped in position from the peduncle or pedicel to the side of the leaf (Braun, 1876), or modified stipule (Engler, 1904), or a combination of a branch and a highly modified foliage leaf (Muller, 1887 & Hagerup, 1930).



PLATE

The lower two nodes with a pair of tendrils in each and the upper node showing normal condition in in *Luffa acutangula*.

The occurrence of two tendrils, one on anodic side and the other on the cathodic side of the leaf axil at each node in *Pilogyne suavis*, led Goebel (1905) to believe that the tendrils of Cucurbitaceae are modified prophylls of the axillary shoot, where both prophylls have developed into tendrils. This view is supported by Chavan & Bhatt (1960) who encountered the presence of "paired tendrils" in *Coccinia indica* Wight & Arn.

The authors noticed the rare occurrence of a pair of tendrils one on either side of the leaf axil at two consecutive nodes in *Luffa acutangula* Roxb. (Plate). This appears to be the first record of this kind in this genus. Both the tendrils were normal and functional with equal size and vigour. This teratological phenomenon may purport to be an additional evidence for the prophyllar nature of Cucurbitaceous tendrils.

Agricultural College and Research Institute. Coimbatore-3, 5—11—1960.

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B. VASANTHARAJ DAVID.

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Floral Abnormalities in an Autotetraploid Sorghum

Polyembryony is common in the Gramineae. In this paper is described the occurrence of floral abnormalities in an autotetraploid Sorghum sample received from Amani, East Africa.

Duthie and Fuller (1882) have referred to the double seeded variety common in the North West provinces. The presence of double and triple seeded spikelets in *durras* imported from India is reported by Cron (1916). Ayyangar and Ayyar (1929) studied the occurrence of double seeds in *Sorghnm roxburghii*. Ayyangar and Rao (1936) recorded the incidence of doubleness and multiple seededness in *Sorghum durra* resultlng in the formation of twins, triplets, quadruplets, and of five and six grains. In crosses between double and single seeded varieties, the hybrids were reported to be double seeded. Thangam (1959) described the occurrence of fused seeds in *Sorghum roxburghii*, the different stages of fasciation of the carpels ranging from complete separation to complete fusion.

The two outer glumes of the grain bearing spikelet are leathery. The two inner glumes are hyaline. The innermost hyaline glume bears the awn and has a palea and it is between these two, the seed is formed. When doubling occurs, the third glume which is also hyaline bears a grain in its axil and is subtended by a palea which develops to enclose the grain. Several abnormalities were observed as a result of the activation of the flower in the third glume. Normally there is present in a grainbearing spikelet, a single ovary, three stamens, two lodicules, and a bifid stigma. When the third glume is activated into fertility there results a disturbance in this proportion with the result that each spikelet may bear an additional palea, two pairs of lodicules, a pair of ovaries, six stigmatic branches and 6 to 8 anthers. (Fig. 1) and Fig. 1-(a). In the spikelet bearing double grain, occasionally in one of the flowers, two ovaries were borne and they remained distinct while in others, fusion was so complete, the doubleness being expressed only by the furrow running down the centre of the ovary. The number of the stigmatic branches ranged from the normal bifid condition to three or four. In some cases, the feathery stigma was prominent in one of the branches while in the other the stigmatic feathers were absent. (Fig. 2).

Occasionally, in the spikelet bearing double grains, one of the flowers bears four anthers and very rarely five with the result that the spikelet consists not of the usual three anthers but of 7 to 8 anthers, a condition which tends to throw light on the trimerousness of the grass flower. In the anthers also, several abnormalities were met with from the normal anther to the condition in which two anthers are fused into one. Appendages were also observed on the anthers. (Fig. 3). The differences seen in the ovary became apparent in the seed with the result that single

FIG. 1

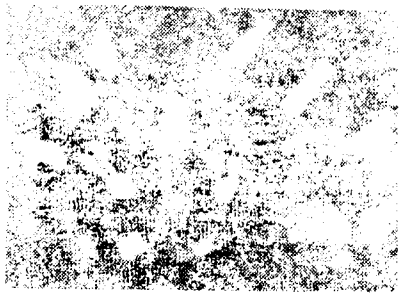

FIG. 1 (a)

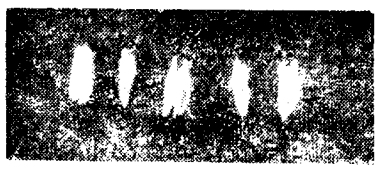

FIG. 3

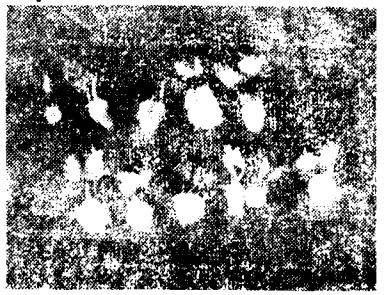

FIG. 2

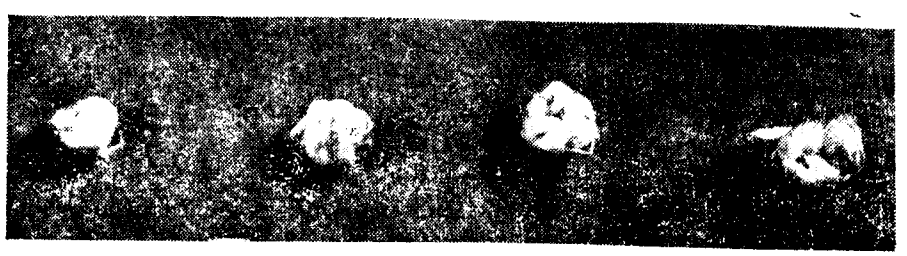

FIG. 4

seeded spikelets, double seeded spikelets, and triple seeded spikelets and double spikelets with one seed normal and the other consisting of two seeds fused into one were formed. (Fig. 4).

Acknowledgment: The authors thank Sri S. G. Aiyadurai, Millet & Pulses Specialist, for the help and suggestions given in the preparation of this note.

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K. MEENAKSHI,
L. SIVAGNANAM.

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Thangam, M. S. 1959 Twin seedlings in Sorghum. *Madras Agric. J.* **46:** 93-6.

Manurial Trials in irrigated Millets - Cumbu (Pennisetum Typhoides S & H)

Millets respond well to manuring but the extent of response depends on several factors like the availability of moisture in soil, the season in which the crop is grown and the inherent capacity of the variety to utilise the manures efficiently. Experience has shown that a combination of all these factors results in enormous increase in yields in crops like Cholam with record yields as high as 6280 lb. of grain per acre. In the case of Cumbu, however, information on the response to manure is lacking. With a view to obtain reliable data on yield of the irrigated Cumbu crop under different levels of manuring, an experiment was conducted in the Millet Breeding Station, Coimbatore for a period of three years from 1955 to 1957. The results of the trials are presented in this note.

Materials and methods: Improved strain Co. 3 of the variety 'Kottapuli Cumbu' which is suited for both rainfed and irrigated conditions was grown. The experimental plots were laid out in the form of a comparative yield trial, replicated and randomised with the following treatments.

A. Compost at 5 tons per acre.
B. do. + 30 lb. N + 30 lb. P_2O_5
C. do. + 60 lb. N + 45 lb. P_2O_5 + 50 lb. K_2O
D. do. + 90 lb. N + 60 lb. P_2O_5 + 50 lb. K_2O

Prior to final ploughing, compost at the rate of five tons per acre was applied as a basal dose and super phosphate at the levels proposed was incorporated in the soil 10 to 15 days prior to sowings. Ammonium sulphate was applied in two doses, one half applied as basal dressing and the other half as top dressing when the crop was a month old. The crop was sown in April in lines two links apart using a seed rate of 6 lb. per acre and was thinned three weeks after sowing giving a spacing of one link plant to plant within row. The crop was given one hand hoeing immediately after thinning. Irrigations were given as and when necessary.

The results of the trials for the three year period are presented below.

Treatments	1955	1956	1957	Average	Value of the yield of grain & straw	Cost of cultivation Rs.	Profit or loss Rs. +or−
	(Acre yield in pounds)						
A. Grain ...	973	1212	1250	1145	200·53	156·00	+ 44·53
Straw ...	2343	2630	3346	2773			
B. Grain ...	1057	1609	1407	1358	237·37	196·00	+ 41·37
Straw ...	2679	3250	3714	3214			
C. Grain ...	1189	1643	1530	1454	253·80	246·00	+ 7·80
Straw ...	2446	3730	3982	3386			
D. Grain ...	1171	1968	1800	1646	285·96	278·00	+ 7·96
Straw ...	2611	3773	4464	3616			
Standard error. Grain	44·1	52·9	36·8	—	—	—	—
Straw ...	101·8	141·1	85·0				
Whether Significant or not. grain	Yes	Yes	Yes				
Straw ...	No	Yes	Yes				
Critical difference. Grain	130·4	155·4	108·2	—	—	—	—
Straw ...	—	292·9	250·0				

Ranking: Grain: C D B A; D C B A; D C B A
Straw: D B C A; D C B A; D C B A

A. Compost at 5 tons per acre.
B. do. 30 lb. N + 30 lb. P_2O_5
C. do. 60 lb. N + 45 lb. P_2O_5 + 50 lb. K_2O
D. do. 90 lb. N + 60 lb. P_2O_5 + 50 lb. K_2O

Compost value at Rs. 6/- per ton.
Ammonium sulphate at 15 nP. per lb.
Superphosphate at 10 nP. per lb.
Muriate of Potash at 19 nP. per lb.
Grain at 16 nP. per lb.
Straw at 160 lb. per Rupee.

Discussion of results and conclusion: The data presented above show that application of a heavy dose of 90 lb. N + 60 lb. P_2O_5 + 50 lb. K_2O over five tons of compost has resulted only in an average increased yield of 501 lb. of grain which when expressed as a percentage, represents an increase of 43·7 percent over the control. In judging the comparative merits of the treatments, it is necessary to take into account the additional expenditure involved in bringing about such an increase. On this basis, the application of five tons of compost alone has given the highest economic return. In the case of the three fertiliser treatments, it is seen that there has not been any phenominal increase in yields. The extra yields range from 18·6 to 43·7 percent and in all the three levels the profit per acre is lower than the control. Hence it may be concluded that application of fertilisers at the doses specified in this experiment cannot be recommended for adoption to the formers.

These results indicate the need for further research to study the effect of compost in higher doses either alone or in different combinations with fertilisers. The differential response of varieties to various levels of manuring well also have to be taken into consideration while fixing the optimum dose of manure with reference to strains that are under spread.

Acknowledgement: The authors are thankful to Dr. B. W. X. Ponnaiya, PH. D., Professor of Plant Breeding and Genetics and to Sri S. G. Ayyadurai, B. SC. (Ag.), Millets and Pulses Specialist, for the help and guidance given in conducting the trials and in the preparation of this note.

L. ANAVARADHAM,
A. SUBRAMANIAM.

A Note on the Regulation of Cropping Pattern in Chingleput District with Reference to Paddy.

In Chingleput district, Paddy is cultivated in three distinct seasons viz. Swarnawari (April–May, August–September) Samba (September–October–February–March) and Navarai (In January–February–April–May). In the Swarnawari and Navarai seasons, short duration varieties are grown usually under lift irrigation supplemented with irrigation from spring channels or tanks, whereas in the Samba season, both medium and long duration varieties are grown under dry, semi-dry or wet conditions. Thus the paddy crop is raised under varying conditions of soil moisture. Hence a large number of varieties of paddy suited to the different seasons and types of cultivation are in vogue in this district. But due to the vagaries of the monsoons, failure of crop in one season or the other is often a common occurrence and evolving a suitable pattern of cropping to ensure the maximum benefit to the cultivation was a long felt need. With this end in view, a comprehensive trial was laid out at the Rice Research Station, Tirurkuppam during 1955–'56 to 1957–'58 seasons and the results obtained are broadly outlined in this note.

A. **Paddy Strains Suitable for the Tract:**

(i) Swarnawari and Navarai seasons: Among the short term rice strains tried viz. TKM. 6, Co. 13, SLO. 16 and Co. 18, TKM. 6 recorded the highest yield in the Swarnawari season whereas in the Navarai season, both TKM. 6 and Co. 18 gave equally good yields. It was also noted that planting before the middle of June in the Swarnawari season and before middle of February in the case of Navarai planting recorded higher yields than late plantings.

(ii) Samba season: (A) TKM. 1 (Pisini) and TKM. 2 (Sembalai) were found to record higher yields than the other varieties tried. Besides it was also noticed that the sowings before the end of August were the ones that gave normal yields.

(B) *Semi Dry:* ADT. 22 (Vadan Samba) and RAM. 3 (Bayahunda) were found to be the most suitable strains for the semi dry conditions. To get the maximum yields, the sowing should be completed by the middle of September, although late setting-in of the monsoon may delay the sowings to some extent.

(C) *Wet or Swamp Paddy:* BAM. 3 and GEB. 24 did well in the early sowings while ASD. 5 and ASD. 11 performed better than the others under late planted conditions. Co. 25 was found to be better than the other long duration strains because of its high yield and resistance to blast.

B. **Fertilizer Applications:**

For the dry and semi-dry conditions, application of 5 tons of compost or farm yard manure per acre at the beginning of the cultivation was found to be sufficient to ensure high yields. Sowing of quick growing green manures like sunnhemp in the main field in lines 2' apart and incorporating the plants after 4 to 6 weeks growth where tank water is available is the other method by which semi-dry crop of rice can be manured. Top dressing of ammonium sulphate at 50 lb. per acre where the crop is about 10 weeks old served as a pick up and gave uniformity of growth.

For the wet paddy, it was found that applying green leaf at the rate of 10,000 lb. per acre to the nursery and at 5,000 lb. per acre for the transplant field to be optimum. Besides, the transplant fields are to be manured with 30 lb. of P_2O_5 per acre just before transplanting and with 30 lb. N application being done in one or two doses after the transplanting operation.

C. **Crop Rotation:**

The plan of crop rotation envisaged in these trials consisted in growing alternate crops in the third season in the place of the Navarai paddy in order that the soil fertility may not be depleted. It is also kept in view that the crop rotation is to be so regulated that a certain percentage of the available land comes under Navarai paddy. From the observations made, it was found that though it would be difficult to fix the exact proportion in which Navarai paddy and other alternate crops are to be grown in the third season, it may be generally concluded, that a fourth of the area available after the harvest of the early and normal samba crop may be cropped with Navarai paddy, another quarter of the area with green manures and the remaining area cropped with ragi, groundnut, chillies and cotton.

Agricultural Research Station, Tirurkuppam.

M. K. VENKATASUBRAMANIAM,
V. KRISHNASWAMY,
L. DHANARAJ.

Weather Review — for December, 1960.

RAINFALL DATA (IN INCHES)

Region	Station	Total rainfall for the month	Departure from normal	Total since 1st January
North	Madras (Meenambakkam) ...	4·6	+ 3·2	65·6
	Tirurkuppam*	1·6	— 2·8	53·9
	Vellore	0·6	— 0·9	37·3
	Gudiyatham*	0·3	— 2·2	38·6
East Coast	Palur*	0·4	— 4·4	57·6
	Tindivanam*	0·7	— 2·4	42·2
	Cuddalore	1·2	— 1·1	65·8
	Nagapattinam	2·5	— 0·3	96·6
	Aduthurai*	2·1	— 3·3	48·7
	Pattukkottai*	1·8	— 4·6	44·9
Central	Salem	0·1	— 0·2	36·3
	Coimbatore (A. M. O.)* ...	£	— 1·2	31·4
	Coimbatore	0·4	— 0·2	25·0
	Tiruchirapalli	0·4	— 0·5	27·6
South	Madurai	0·3	— 0·5	36·0
	Pamban	5·0	+ 2·4	39·3
	Koilpatti*	0·2	— 2·0	34·4
	Palayamcottai	0·8	— 0·9	39·4
	Ambasamudram*	1·4	— 4·0	52·1
	Nagercoil*	0·3	— 1·8	57·4
	Capecomorin*	0·2	— 1·4	52·2
Hills	Kodaikanal	0·8	— 2·4	72·8
	Coonoor*	2·0	— 3·5	83·8
	Ootacamund* ...	0·1	— 2·2	46·3
	Nanjanad*	0·4	— 1·3	54·2

1. * Meteorological Stations of the Madras Agricultural Department.
2. £ = actual Value = 0·04″

On the first day of the month a depression, formed in the Bay of Bengal, caused a cyclonic storm, centred about 435 miles east of Madras, the effect of which was felt as dry weather only in Madras State for the first four days of the month. On 5—12—1960 scattered showers were received throughout the State. Again the weather became dry on 6—12—1960. For seven days from 7—12—1960 to 13—12—1960 either scattered or localised thundershowers were received in Madras State. From 14—12—1960 to 28—12—1960 dry weather prevailed throughout the State, except on 28—12—1960 when isolated light rain occurred at Vedaraniyam in South Madras State. On 29—12—1960 a shallow depression formed in the Bay of Bengal, centred 435 miles south-east of Nagapattinam giving only scattered showers in Madras State for three days from 29—12—1960.

In regard to the fluctuations of day temperatures there were no large changes. In fact they were practically normal throughout the State. The night temperatures were above normal on (5, 7, 13, 29, 30 and 31)—12—1960 and below normal on 18—12—1960.

In regard to noteworthy rainfalls it is to be stated that except perhaps Pamban with 1·18″ of rain on 10—12—1960, there is no other place worth mentioning. As regards the zonal rainfalls the following are the details.

Zonal rainfall (in inches)

Name of the Zone	Rainfall for November 1960	Departure from normal	Remarks
North	1·8″	— 0·7	Far below normal
East Coast	1·5″	— 2·7	,,
Central	0·3″	— 0·4	,,
South	1·2″	— 1·2	,,
Hills	0·9″	— 2·4	,,

Agricultural Meteorology Section,
Lawley Road Post, Coimbatore-3.
10th January, 1961.

C. B. M., & K. P. N.

Letter to the Editor

New Specific Name for the Edible Banana Clones.

The author of this article has given the name *Musa sapidisiaca* Jacob for the edible banana clones of the world in his book, *Madras Bananas - a Monograph. There was correspondence on this and other matters concerning the taxonomy of bananas published by N. W. Simmonds and K. Shepherd of the Banana Research Scheme, Trinidad in the Journal of the Linnean Society of London - Botany - Vol. LV. No. 359 Pp. 302-312 between Dr. E. E. Cheesman and S. W. Simmonds on the one hand and the author on the other. He had published an article in the September 1960 issue of the Madras Agricultural Journal, under research notes, regarding the points of difference between them and himself and advocating the validity of the specific name, *Musa sapidisiaca* Jacob for the edible banana clones instead of *M. paradisiaca* and *M. sapientum*. There was a good deal of controversy regarding these two Linnean species as to the specific names for the edible banana clones.

Dr. N. L. Bor, Assistant Director, Kew Herbarium informed the author in a letter dated 22—12—1960 (Kew) that the name *Musa sapidisiaca* Jacob is to be found in the last supplement to the Index Kewensis.

The name *Musa sapidisiaca* Jacob may, therefore, be used as the valid specific name for the edible banana clones of the world.

"Syrian villa"
Cherian Road,
Coimbatore,
12—1—1961.

K. CHERIAN JACOB,
Life Fellow of the Linnean Society of London.

* Madras Bananas, a Monograph, by K. Cherian Jacob; Pp. ix—228; 84 plates Government Press, Madras, 1952, Price Rs. 7 annas 6.

Departmental Notifications

Gazetted Officers — Madras Agricultural Department
Postings and Transfers during the Month of January, 1961

Name and Designation	Posted or Transferred to
Sri V. Srinivasan, Superintendent Agricultural Research Station, Aduthurai	Millet and Pulses Specialist Coimbatore.
,, E. G. Sivaswamy, Dy. Director of Agriculture, Coimbatore	State Compost Development Officer, Madras
,, S. Muthuswamy Iyer, Chief Inspector of Fertilizers, Madras	Dy. Director of Agriculture, Coimbatore
,, S. Muthuswamy, Assistant Extension Specialist, Coimbatore	District Agricultural Officer, Vellore
,, A. Radhakrishna Reddy, District Agriculture Officer, Vellore	Chief Inspector of Fertilizers, Madras
,, K. Divakaran, Assistant in Millets	Assistant Millet and Pulses Specialist, Koilpatti
Kumari K. Meenakshi, Assistant in Millet, Coimbatore	Assistant Millet and Pulses Specialist, Coimbatore
Sri G. Venkataramana,	Lecturer in Agriculture, Coimbatore
,, J. Vaidyanathan, Assistant Agronomist, Cuddalore	Earned Leave for two months

Upper Subordinates — Agricultural Department
Postings and Transfers during the month of January, 1961

Name and Designation	Transfer and Postings
Sri A. Rajamani, Millet Assistant Koilpatti	Cotton Assistant, Srivilliputhur
,, S. Yegnanarayanan, Fieldman	Millet Assistant, Agricultural Research Station, Koilpatti

Review of market conditions of commercial crops of the notified area of Madras State for the month of December, 1960.

Cotton:

COIMBATORE DISTRICT: *Season:* There was no rain during the month under report. Tiruppur received a very scanty rainfall of 2.79 m. m. The weather was dry. Harvesting of cotton has commenced in respect of early sown crop in Coimbatore taluk and in places of Palladam taluk. Some more rains are needed for the growth of early sown cotton crop. In places where there are irrigation facilities, the crop is being irrigated.

Arrivals and Transactions: Kapas: The kapas market started with an opening balance of 3850 quintals of Cambodia and 2218 quintals of Karunganni kapas in Tiruppur market. The total arrivals into Trippur during the month were 8181 quintals of Cambodia and 8 quintals of Karunganni kapas. The disposals during the month were 9431 quintals of Cambodia and 1197 quintals of Karunganni kapas. At the end of the month the market was left with a stock of 2600 quintals of Cambodia and 1029 quintals of Karunganni Kapas.

Lint: The lint market started with an opening balance of 27099 quintals of Cambodia lint in Tiruppur market. The total arrivals into Tiruppur were 23440 quintals of Cambodia and 1293 quintals of Karunganni lint which included 1387 quintals of Cambodia and 793 quintals of Karunganni lint locally ginned. Despatches from Tiruppur were 40778 quintals of Cambodia and 1293 quintals of Karunganni lint. At the end of the month the market closed with a stock of 9761 quintals of Cambodia lint.

Prices: During the month under report, the cotton market remained firm:

Lint:	Prices in Rs./nP. per Quintal
Cambodia Superior quality	331·81
Cambodia Average quality	276 — 305·10

Kapas:

Cambodia Superior quality	129·61
Cambodia Average quality	100 — 110

RAMANATHAPURAM DISTRICT: *Kapas:* Scanty and insufficient rains were recorded during the month. The condition of the standing crop of Karunganni was satisfactory.

Arrivals and Transactions: Kapas: (pothi of 280 lbs. or 127 kilos)

Name of Market	Opening Stock	Receipts	Disposals	Closing Stock
Virudhunagar ...	500	300	800	Nil.
Rajapalayam ...	1,500	2,000	3,500	...
Sattur ...	...	...	...	...
Total ...	1,370	2,300	4,300	...

Lint: (candy of 784 lb. or 355·6 kilos)

Name of Market	Opening Stock	Receipts	Disposals	Closing Stock
Virudhunagar ...	70	80	100	50
Sattur ...	100	...	50	50
Rajapalayam ...	1,200	400	600	1,000
Total ...	1,370	480	750	1,100

Prices:

Kapas:	*December, 1960* Rs.	*November, 1960* Rs.
Karunganni	...	125—133
Tinny - Karunganni	90—123	87—121
Tinny	103—118	93—118
Uganda I quality	...	142—156
Uganda II quality	125—138	119—138
Uganda III quality	100—118	75—112
Lint:		
Karunganni	900—00	901—980
Tinny-Karunganni	850—870	860—890
Tinny	740—832	800—851
Uganda certified	...	1240—1306 (seed fan)
Uganda uncertified	1080·00	1080
Inferior	986·00	

TIRUNELVELI DISTRICT: *Season:* Slight drizzles were received during the month in this district and the same was reported to be more beneficial for the standing crop.

Arrivals and Transactions: (Figures in candys or 355·6 kilos)

Market	Crop	Opening balance	Receipts	Disposals	Closing balance
Koilpatti	Karunganni	2250	200	1250	1200
Koilpatti	Uganda	320	40	240	120
Sankarankoil	Uganda	1600	800	1500	900

Prices: The price of Karunganni cotton first sort was Rs. 110–115 per pothi of 127 kilo-grams, second sort was Rs. 100—105 per kilo-gram. The price of Uganda cotton at Sankarankoil was reported to be around Rs. 142/- per pothi of 127 kilo-grams.

SOUTH ARCOT DISTRICT: *Season:* Meagre rains were received during the month in the district under report.

Arrivals and Transactions: Villupuram and Panrutti markets together received 803 candys. Despatches from these two markets amounted to 802 candys. A stock of 221 candys was left with the trade at the end of the month.

The average prices worked out to Rs. 240/- at Panrutti and Rs. 290/- at Villupuram per candy of 360 kilograms.

Groundnut:

SOUTH ARCOT DISTRICT: The arrivals of winter groundnuts were large and heavy at Tindivanam, Virudhachalam, Villupuram and Tirukoilur markets. The total arrivals of kernels amounted to 9700 tonnes from districts produce 2053 tonnes from other districts like North Arcot and Tiruchi. Despatches to Madras, Ramnad, Tirunelveli etc. came to 3782 tonnes and export to Pondicherry state amounted 146 tonnes. Consumption by Mills and chekkus totalled 2593 tonnes and 464 tonnes respectively. Wastages were calculated at 490 tonnes. The stock with the trade at the end of the month was 6350 tonnes.

Prices increased in spite of improved arrivals and the average prices paid at the several markets ranged from Rs. 55·90 to 68·86 per bag of 80 kilograms according to quality.

NORTH ARCOT DISTRICT: *Season:* There was a strong and occasional showers in certain parts of the districts and the weather all over the district was dry during the month.

Arrivals and Transactions: (Quantity in metric tons)

	Opening Stock	Arrivals	Disposals	Closing Stock
Groundnut pods	1648	5455	5493	1610
Groundnut kernel	846	10924	9998	1752

Prices: Ranged in all the markets of the distring during December, 1960.

	Prices in Rs./nP.
Groundnut pods (bag of 40 kilograms)	16 to 22
Groundnut Kernels (candy of 240 kilos)	170 to 221
Groundnut oil (candy of 226 kilograms)	400 to 437

RAMANATHAPURAM DISTRICT: *Arrivals and Transactions: Virudhunagar:*

Name of Variety	Opening Stock	Arrivals	Disposals	Closing Stock
Groundnut pods (in tons)	200 (203·209 tonnes)	2800 (2844·939 tonnes)	2700 (2743·329 tonnes)	300 (304·816 tonnes)
Groundnut kernels (candy of 531 lbs. or 240·36 kgs.)	500	12600	9000	4100

Prices:

		Prices in Rs./Rs./nP.
Groundnut pods per bags of 40 kgs.		17 to 23·50
Groundnut kernel candy of 531 lbs. (240·9 kss.)	(pucca)	200 to 230·00
Groundnut oil (per tin of 35 lbs. 15·9 kgs.)		28 to 29·50
Groundnut oil cake (per Md. of 82 2/7 lbs. 137 kgs.)		13·05 to 15·38

TIRUCHIRAPALLI DISTRICT: *Season:* Except some light scattered in the district the weather was mainly dry during the month under report.

Arrivals and Transactions: The new winter groundnut has started arriving in all the important markets of the district in large quantites. Jayankondan regulated market, received 8664 bags of 24 bags during the month and Ariyalur Regulated market has received 298 bags of 69 kilograms.

Gingelly:

SOUTH ARCOT DISTRICT: Arrivals declined due to slack season and totalled 1636 bags from district produce and 680 bags in addition thereto from other districts. Despatches to Salem, Trichy, Thanjavur etc. came to 2836 bags. A quantity of 214 bags was crushed in the country chekkus. The trade had a stock of 945 bags at the close of the month. Prices touched unpresented levels and the average price was upto Rs. 113·26 per bag 80 kilograms. Transaction were mostly at Virudhachalam market.

Tobacco:

COIMBATORE DISTRICT: *Arrivals and Transcations:* At the end of the month under report, there was a stock of 22136 quintals of chewing and 280 quintals of cheroot tobacco were exported to Kerala, Mysore and Bombay States and Salem, Thanjavur, Trichiraplli, and South Arcot districts in Madras State.

Prices: The prices in tobacco market maintained the level of the previous month i. e. Rs. 245/- per quintals for Meenampalayam variety.

Variety	Ist Grade	IInd Grade	IIIrd Grade
	(per quintal)		
	Rs /nP.	Rs./nP.	Rs./nP.
1. *Chewing tobacco-sun cured:*			
(a) Meenampalayam	198—245	133—198	115—176
(b) Other varieties	154—225	132—176	110—133
2. *Cheroot varieties-sun cured:*			
Grown in Erode and Bhavani taluks	176—198	132—176	110—132
3. *Chewing tobacco-pit cured:*			
Grown in Palladam and Sulur areas	167—220·40	128—132	66— 99

Cardamom:

MADURAI DISTRICT: During December, 1960, the rainfall was poor to fair in the Cardamom plantation areas in Madurai District and in Kerala hills. The condition of the standing crop was good. Agricultural operations like spraying, picking of fruits and curing were going on. Arrivals were comparatively poor in all assembling centres in Madurai district except Pattiveeranpatti and in Kerala hills. About 75% of the estimated crop of the season has been harvested.

Estimated arrivals and despatches during the month and stock position at the end of the month :

Name of the Assembling Centre	Opening Stock	Arrivals	Despatches	Closing stock
	in lbs. (0·454 kg.)	in lbs. (0·454 kg.)	in lbs. (0·454 kg.)	in lbs. (0·454 kg.)
Bodinaickanoor	1,000	90,500	90,000	1,500
Thevaram	1,000	32,000	32,000	1,000
Pannaipuram	Nil	Nil	Nil	Nil
Kombai	Nil	5,000	5,000	...
Uthamapalayam	1,500	8,000	8,500	1,000
Cumbum	8,000	Nil	Nil	8,000
Gudalur	Nil	Nil	Nil	Nil
Pattiveeranpatti	1,000	1,01,000	1,01,000	1,000
Total	12,500	2,36,500	2,36,500	12,500
Virudhunagar	50,000	1,10,000	1,40,000	20,000

Prices :

		Rate per lb. or 0·454 kg.
1.	*Bodinaickanoor :*	
(1)	Extra-green	Rs. ...
(2)	Superior quality	,, 8·39 to 9·44
(3)	Medium quality	,, 7·90 to 8·90
(4)	Inferior quality	,, 6·75 to 8·95
(5)	Lights	,, 3·68 to 7·50
(6)	Splits	,, 5·50 to 7·21
(7)	Seeds	,, 9·65 to 11·02
2.	*Pattiveeranpatti :*	
(a)	Superior - Bold	,, 9·14 to 9·24
	Medium - Bulk	,, 8·00 to 8·67
	Inferior and small	,, 6·46 to 7·99
(b)	Store - green :	
	Superior and Bold	,, 8·80 to 10·22
	Medium and bulk	,, 8·16 to 9·04
	Inferior and small	,, 7·00 to 8·24
(c)	Splits	,, 6·87 to 7·78
(d)	Lights	,, 4·25 to 6·85
(e)	Seeds	,, 9·93 to 10·83
3.	*Virudunagar :*	
	Bold Quality	,, 9·25
	Small	,, 7·50 to 7·75
	Bulk	,, 8·25
	Seeds	,, 11·00 to 11·25

Review of administrative activities of Market Committees in the State during the month of December 1960

The Market Committees of South Arcot, North Arcot, Coimbatore, Trichy, Tirunelveli and Ramanathapuram are functioning briskly during the month :

Enforcement :

Name of the Market Committee	Section 5 (1) A	Section 5 (1) B	Section 5 (3) A	Section 5 (3) B	Weighmen A	Weighmen B
South Arcot Market Committee	781	3195	705	2395	668	2255
North Arcot Market Committee	945	4335	958	4227	117	1058
Coimbatore Market Committee	121	2467	41	1575	5	671
Tiruchirapalli Market Committee	368	2482	351	2142	314	1722
Ramanathapuram Market Committee	14	379	11	304	8	235
Tirunelveli Market Committee	24	142	9	107	28	126

A = Licences issued during the month.

B = Licences issued upto this month.

Meetings : No Meetings were held by any Market Committees except North Arcot Market Committee. The Committee Meeting was held on 24—12—1960 to choose members for reconstituting the committee. The District Revenue Officer, North Arcot took the chair.

Quality Analysis : Nil.

Quality Competition : Nil.

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College and Estate News

Republic Day Celebrations : The Republic Day was celebrated in the College Campus with Dr. S. Krishnamurthy, the Dean, Agricultural College and Research Institute hoisting the National Flag and inaugurating the celebrations by the N.C.C. Officers and Cadets of the Agricultural College. It was a gay occasion, in which the students, Staff and residents of the Agricultural College Estate participated. A free film show in the evening brought the celebrations to a close.

Foundation Lectures : Dr. Girdhari Lal, Retired Assistant Director, Central Food Technology Research Institute, Mysore, delivered two interesting lectures on "Dehydration of Foods" on 30—1—1961, and "Commercial Pectins" on 31—1—1961.

Social : A meeting of the Upper Subordinates' Association was convened and an "at home" to the Extension Officers from the Districts, who were undergoing refresher course at Agricultral College and Research Institute was arranged.

College Students : The final year B. Sc. (Ag.), students have started on their study tour for 14 days from 19—1—1961 visiting, Kangayam, Madras, Mysore, Bangalore and Hosur.

The students are busy with interclass and interward matches prior to celebrations of the Students' Club day which is scheduled to take place in February 1961.

Director of Agriculture, Madras : Sri Karthikeyan, our new Director of Agriculture visited the Agricultural College and Research Institute on 27—1—1961 in connection with the inspection of the offices and work of the Institute.

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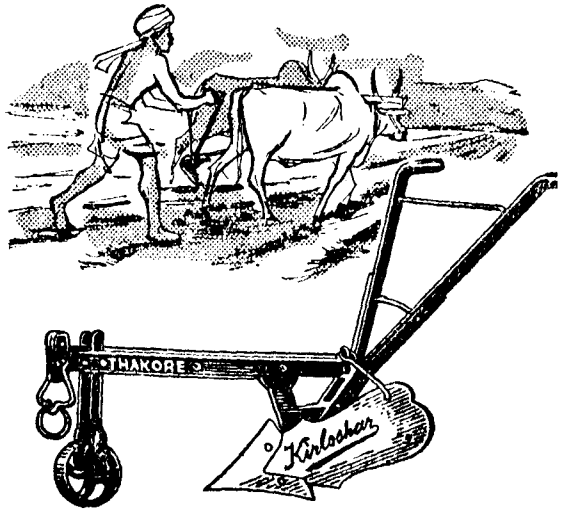

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