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Editorial

Though more than two years have elapsed since the cessation of hostilities, the country has not yet returned to normality in respect of food. The 'crisis', far from being a passing phase, threatens to become a permanent feature of our national economy. The various make-shift measures resorted to, during the past few years, to increase our food resources, will not, it is needless to say, be adequate to cope with this danger; continuous imports of food grains at exorbitant prices from foreign lands, will lead us to bankruptcy, controls and rationing are a means of ensuing equitable distribution of available material in short supply, but in no way help in increasing production. To some extent as past experience, shows they tend to act in the opposite direction.

Control discourages the producer from increased effort towards production. That this aspect is not lost sight of by the government is evidenced by various inducements offered to the cultivator from time to time by way of subsidies bonuses and increased prices. That the farmer should be guaranteed a fair return from his lands, is agreed on all hands. But food should also be made available, to all the people for this country at a price they can afford. The price of a commodity, whether agricultural or otherwise should be fixed in relation to the cost of production.

In order that the producer may have an inducement to grow more, and at the same time the consumer can get his essential food at a price he can afford, it is obvious that increased production without disproportionate increase in the cost of production should be aimed at. The limiting factors in crop production in our country are mainly three: (1) Water. (2) Manure and (3) lack of knowledge regarding modern methods of crop raising. As a long range solution, the highest priority in all national schemes for reconstruction should be given to irrigation projects which will help to extend our irrigated area.

Next in importance is provision for abundant supply of manure organic and inorganic to maintain and enrich the fertility of the soil. A judicious policy of afforestation, actively implemented, the growing of green manures, compost making are essential to supply the basic requirements of organic matter to the soil. Notwithstanding the contrary opinion expressed in several influential quarters, it is our firm conviction based on unimpeachable experimental evidence that, India will never be able to reach the level of production as obtains in other countries, without the aid of fertilizers.

The establishment of fertilizer factories to manufacture nitrogenous and phosphatic manures should therefore be not neglected, in the belief that these are harmful. Last but not least, among the factors which determine production is the man behind the plough. Owing to various causes, he is not keeping pace with the times, and he must be helped. The dissemination of modern scientific knowledge in relation to agriculture therefore devolves on the state. In order that wasteful methods, may be eliminated, better yielding strains can be grown and pests and diseases controlled, the ryot should be taught how and why? The agricultural departments have striving in this direction with a certain amount of success but considerable lee way has yet to be made to make their influence felt among the entire mass of agricultural population in this country. Unfortunately the steady progress made in this province received a set back during the war owing to the energies and attention of its agricultural department being diverted towards activities which however essential were not helpful to the dissemination of progressive agricultural knowledge among cultivators. We refer to the work imposed on the department in connection with the distribution of commodities like manures, iron etc

While we concede the necessity of organising the distribution of essential commodities required by the agriculturist for crop production, we demur to the trained agricultural graduate being diverted for this purpose. The Research and dissemination of knowledge, being the main concern of the department, the work of distribution may be left to other hands As it is, considerable amount of scientific talent is likely to run to seed, and lost to the country.

In the larger interest of the country we would urge that this aspect should receive the attention of government; and ways and means found to relieve the agricultural department from all commercial activities, in order that it may concentrate on the technical side of agricultural improvements alone.

Improving Crop Estimation to Combat the Food Crisis *

By

MULUKUTLA SATYANARAYANA, B. A., B. Sc. (Ag.)

(Special District Agricultural Officer, Cocanada.)

To combat the Food Crisis in the country, planning for production to the needs of its several regions has to be undertaken. Precise statistics of home supplies in this regard are a fundamental requirement. Past agricultural crises, in this and in other countries of the world have been the result of the paucity of agricultural statistics of production and requirement. Present position, in this line, made no appreciable improvement to warrant the avoidance of such crises, in the future. Since the period required for production in agriculture is longer than in other industries, farming is extremely sensitive and gets into a crisis sooner than other industries.

Crop Statistics of the Past Thirty Years. The subject of crop forecasts and crop estimation engaged the attention of the Board of Agriculture in India, for the first time in the year 1919 and later in 1924 and 1937. Estimation of production is based on three factors, viz., area, normal yield and seasonal factor. The main defect in the procedure thus adopted is the subjective element of the personnel operating under each of the factors mentioned above. In a great many areas only rough estimates are available for the areas under various crops. But even this degree of reliability does not obtain in the case of the normal yield and seasonal factor. The normal yield, a vague and indefinite term, is in use both in America and in this country and is understood as the average yield of a crop for a specific geographical unit relating to a number of years. The seasonal factor for a year in America is expressed as a percentage of the normal yield, in England as a percentage of the average yield of the decennium preceding. In the Province of Madras, the normal yields were fixed by Mr Stuart in the year 1919. The seasonal factor is worked out by the Board of Revenue, from the information furnished by the tahsildars. Based on these figures, districts are declared surplus or deficit, with respect to particular commodities. It may thus be seen what a great part personal bias plays, in forecasts and in estimations of yields. Methods to make the procedure fairly objective and the estimations more reliable are indicated below.

Forecasts for Industry and Trade and Estimation for Administration. Forecasts of yield and production much in advance of the actual harvest of a crop are required by the Industry and Trade, and estimation after harvest by the Administration, for purpose of taxation, limiting exports

* A paper contributed for the College Day and Conference, July, 1948.

and imports and for effecting distribution, for the needs of consumers in the Province. In America, in addition to the Agricultural Department, there are various independent organisations that are engaged in crop forecasting. These organisations are conversant with the bullish and the bearish markets of the world and their forecasts, with the interest in the country's Industry and Trade, are not expected to exhibit full freedom from bias. In such forecasting, Java alone, amidst the countries of the world has attained a high degree of objectivity, in regard to the sugarcane crop. With a mass of meteorological data and crop growth figures extending over several years, mathematical functions involving these data are worked out and fairly precise forecasts of cane tonnage and sugar returns are made in advance of the harvest. This is a line in which this Province has to go ahead, to improve forecasting of crop yields.

Crop-Cutting Experiments and the Stratified Random Sample Survey. To get at the yield per unit area of a tract and thereby estimate production, crop-cutting experiments can claim a high measure of objectivity, and amongst sampling methods for the distribution of the experiments and arriving at the average yields of crops for tracts, the stratified random sample survey has come to stay in the United Kingdom and America. It is utilised to assess the incidence of pests and diseases, to know the spread of agricultural improvements, in the solution of various social, industrial and economic problems and in enquiries relating to populations, cattle census and so forth.

Cost of enumeration is no consideration in the collection of Vital Statistics which are all-important and essential for the Administration. If the cost of the enquiry is limited, valid estimates within specific ranges of error may be made by employing the stratified random sample survey. This may be likened to a complex field experiment, under split-plot design. If the census of a city is to be estimated within limits of say $\pm$ 5 per cent, the enumeration in the several strata into which the city can be split up, as wards, streets and houses may be limited. With some exploratory work, a mathematical function may be built up, by which the number of wards to be enumerated in the city and the number of streets in each ward that gets selected; and the number of houses in each of the streets that get selected, to get within the 5% limit, are known. After knowing the strengths in each stratum, the particular numbers of the wards, in the city, streets within wards and houses within streets are selected from Tippett's Random Numbers of one, two, three, or four-digit tables, according as the strength of the wards, streets and houses to be enumerated, lies within one, two, three, or four-digit figures. Professor Mahalanobis derived functions bringing out the relationship between size of sampling unit, distribution and variance between the samples. Dr. Panse applied a similar method in 1942–43, in estimating the yield of cotton in Akola District, in the Central Provinces.

Crop-Cutting Survey on Paddy in the Madras Province, 1945—48. Dr. Sukhatme, employed, for certain exploratory studies carried out in the Tanjore delta during 1944—45, the function —

$$V(\bar{x}) = \frac{V}{m} + \frac{F}{mf}, \text{ where}$$

$V(\bar{x})$ is the sampling variance of the estimated average yield,
V is the estimated true variance between villages within taluks,
F is the true variance between fields within villages,
m is the total number of villages selected for the experiment and distributed in proportion to the area under paddy in the different taluks and
f is the number of fields selected for the experiment, in each selected village.

For crop-cutting experiments on paddy under the stratified random sample survey, the district, the taluk, the village, the survey number and the field ('thalai') are the several strata, on the analogy of the ward, street and house, in the example of the city referred to previously. Ninetyeight per cent of the paddy crop in the province, is contained in seventeen districts. To give the estimate of yield with a standard error of five per cent, four to eight villages per taluk, depending on the area and the number of paddy crops raised in it in one year, three survey numbers per village and a plot in one 'thalai' of the survey number are set as the strengths of sample distribution in the several strata.

To remove the subjective element, the individual sample in each stratum is selected with the help of Tippett's random numbers. For the location of the plot in the 'thalai', a pair of random numbers are selected, to mark out from the south-west corner of the 'thalai', the dimension along the length and from thence at right angles into the 'thalai', to get at the starting point of the plot. In the exploratory work done in the Tanjore delta, standard errors were determined from the harvests of plots, varying in size from a few square feet, to several cents, just as row yields are computed on Government Farms, to get at the proper size of a plot for an experiment. To have a low *border effect* of the plants, in the periphery of the plot, harvests of plots of different shapes, rectangles and squares in the Tanjore delta, and rectangles and circles and equilateral triangles of different sizes in the Kistna delta were conducted. To estimate the yield for a 5% standard error, a rectangular plot, 50 links by 20 links was found to be the best.

Ways to Improve Crop Estimation. To improve crop estimation, the conduct of crop-cutting experiments, under the stratified random sample survey, with dense and heavy sampling, to reduce the magnitude of the standard deviation, may have to be continued for a large number of years.

under a competent statistician. The survey of the un-surveyed areas may be completed by the levy of a suitable cess. The yields from the crop cutting surveys may be correlated with the estimates from the other agencies at work towards the same object. The karnam should make the crop estimate against each survey number in the 'adangal', in pounds per acre, instead of as anna-crop. In villages, in some parts of the province, the operations of the bagging to standard weight or standard measurement, are auctioned out and the proceeds therefrom are spent under a chalked-out programme, by a constituted Trust. Particular persons are employed by the Trust, for a moiety, to carry out the work in the field and at the threshing floor. Correct statistics may be obtained from this agency (known as 'kolagaram', in the Telugu Districts), if the Village Officers are made to utilise this body for the work. Estimations not merely by the geographical districts, but for deltas, distinct tracts and regions may be made to serve the interests of the Industry (which depends on raw materials) and the Trade.

Taxation in the intermediary stages of turnover, when replaced by the tax at the source, on the field, as in tobacco, will greatly improve the out-turn estimates.

The importance of statistics in tackling the food crisis cannot be too well emphasised. As Dr. A. B. Stewart pointed out, it is only in the past 10 to 15 years that the value of statistical science, in the study of agricultural problems in India has been adequately realised.

The Economic Price of Paddy

By

I. A. CHIDAMBARAM PILLAI, M. A.,
(Landlord, Elanji, Tinnevelly District)

The agricultural policy of the Government in the past, had been one of apathy to the agriculturists. Our country was suffering from a deficit supply of staple food. Imports of rice from Burma and Siam had been flowing into the country to meet our shortage. Even after a long period of dependency on foreign countries, it is regrettable that there has not been enough increase in output, even to the extent of making our country self-sufficient in the matter of her food requirements.

The reason is not far to seek. The prices of agricultural produce were not determined by the cost of production and other allied factors, but fluctuated depending on the foreign imports. The Indian agriculturists had to contend against the low cost of production of rice in the fertile Irrawady delta and against the inelastic production of an export surplus in Burma When representations were made to the Government to levy a protective duty on rice and to restrict imports, they were not given due consideration It is no wonder that the area under food crops decreased, as the agriculturists took to the cultivation of commercial crops, which brought them increased returns. Mr. C. R. Srinivasan, former Paddy Specialist, has said "People began to raise money crops in their fields resulting in a reduction of 13% in rice acreage."

The exigencies of War made us realise the necessity of producing sufficient food in our own country. It cannot be denied that the price fixed for food grains is very low. The Hon'ble Premier of Madras in his "Agrarian Reforms and Parity Economy" has truly observed, "At present, the remuneration from manufacture, commerce, and services far excels that for Agriculture". In his speech at the Agricultural Conference Mr. B. Ramachandra Reddy has said, "To keep the production continuing in a progressive ratio, prices of agricultural produce should be maintained, so as to make production economic and paying". One of the recommendations passed at the Conference is "Protect the producer from over-taxation, overprocurement and depressed prices and from the want of wherewithal for production". The Mail in its Editorial of 9th Oct. '48, "Extremely Grave", observes, "To eliminate one seriously disturbing influence, the Government should guarantee a fair, even generous price to producers, thus enabling them to be equally generous in their payments to the labour they employ".

The agriculturists do not demand any preferential treatment at the hands of the Government. They feel that the policy of stepmotherly treatment to agriculture should be given up and that a fair and just

treatment should be meted out to them. In pre-war days the prices for agricultural produce were low, but the agriculturists never grumbled. But in these days of exorbitant prices of all manufactured and finished goods, the prices of agricultural produce are fixed at a low level, without taking into consideration, the cost of cultivation or, margin of profit. The agriculturist expects a good price for his produce but he is sadly disappointed when he has to sell his produce at uneconomic prices. His cost of cultivation has increased manyfold, his standard of living raised, and he has to maintain himself at a greater cost with comparatively little income. Paddy cultivators do not derive the full benefit of the "increased" prices for their produce. Paddy which sold at Rs. 9/- per Kotta (280 lbs. or 112 M. M.) in 1939, is now sold at Rs. 24—3—0 per Kotta. But the prices of other agricultural products namely, gingelly, coconut, black gram, cotton, cotton seeds have risen 4 to 5 times the 1939 prices. The peasant is a consumer as well as a producer. He has got to purchase necessaries of life, like cloth, sugar and other amenities of civilised life.

The agriculturist is conscious of the services he is rendering to his country by producing more, and his demand is nothing more than bare justice. Only if the agricultural industry is made remunerative, can there be an incentive to produce more? Mr. M. Kantiraj, the Headquarters Dy. Director of Agriculture, Madras has dealt with this aspect of the problem in the Madras Agricultural Journal (September 1948) under the heading "The present Food Crisis and its solution". He says as follows:—

"It is the common practice with the ryots to increase or decrease the area under any crop depending on the prevailing market rate at the time of sowing. In England the prices of agricultural produce were fixed as an emergency measure sufficiently in advance of the sowing season to give an incentive to the ryots to increase the area under a particular crop. It was only by adopting such a procedure, the United Kingdom was in a position to reduce the quantity of foodstuffs imported from about 70 to 30% of their total requirements. This remarkable achievement should not be passed unnoticed".

Apart from the uneconomic price of paddy, there are other problems, which deserve attention, namely, Land tax, and the margin of profit allowed to the wholesale and retail dealers.

Land revenue is a heavy burden, even in periods of rising prices, it is oppressive in a period of falling prices and intolerable in years of drought. Land tax in Tinnevelly District is very high, the highest being Rs. 22—8—0 per acre, perhaps unique in the history of land tenures. On this subject, Mr. Ramdas Pantulu has observed, "No amount of economic planning can by itself increase the income of the agriculturist or create a

sufficient margin of profit from agriculture to give a decent living standard to the ryot, so long as the Land Revenue policy remains what it is". A revision of the Land Revenue Policy will go a long way to ameliorate the condition of the producers.

Another problem, namely, the margin of profit now appropriated by the wholesale and retail dealers deserves our attention. The margin between the dealer and producer is higher compared with Continental countries, and it has increased considerably after the war. The wholesale dealer and the retail dealer at present receive Rs. 2 each for one kotta of paddy. While the producer gets Rs. 24—3—0 for one kotta of paddy, the consumer at the other end pays Rs. 28—3—0 for it. The profit Rs. 4/- is equally shared by the wholesaler and retailer. Some other arrangement should be devised whereby a percentage of the profit goes to the producer, instead of to the middlemen.

The basis for the fixation of the price of paddy must be from the producer's standpoint. The cost of cultivation must be taken into account in determining the price of paddy. A statement regarding the cost of cultivation is given below

Basis for Determining the Economic price of Paddy per kotta.

of 280 lbs. or 112 M. M.

Interest on Capital invested on land @ 4½ % for Rs. 6000/- the price of one acre wet land	Rs.	270—0—0
Cultivation Expenses (2 Crops) as per separate statement	Rs.	366—8—0
Land Tax and Cess	Rs.	28—0—0
Depreciation, Cattle Insurance Fund	Rs.	25—0—0
Permanent improvements on land ...	Rs.	15—0—0
Set-off against bad and indifferent years @ 5 Kottas @ x Rs. per kotta ...		5 x.
Total expenditure ...	Rs.	704—8—0 plus 5 x.

Yield from the land will be 20 Kottas Paddy and 80 bundles of straw.

Cost of paddy at x Rs. per kotta will be 20 x.

Cost of straw at Rs. 1/8 per bundle will be Rs. 120/-

So $20x$ plus $120 = 704.5$ plus $5x$

$15x = 584{\cdot}5$

$\therefore x = 39.$

NOTE :— 1. The land that is taken into consideration is the A 1 land,

2. The return of 4½% on the outlay is not too much. When investments in other enterprises fetch 12 and even 24 %, in fairness, a producer who takes risks with the vagaries of the monsoon should not be denied 4½%.

3. The yield is the maximum that could be obtained from the land under very favourable conditions.

4. Set-off against bad and indifferent seasons is calculated for a 5 years period viz. 2 normal years, 2 indifferent years and 1 bad year. The maximum yield that could be got these 5 years will be 100 Kottas. Set-off against bad and indifferent years will be 25 Kottas and for each year a set-off of 5 Kottas has been allowed.

The above statement shows the price level at which paddy cultivation would be economic. For agricultue to be remunerative, the price should be fixed at Rs. 39/- per Kotta (280 lbs. or 112 M. M.)

Another aspect of the problem has been considered by Mr. K. P. Yagneswara Sarma. He says " Prices, if they are to be fixed at all, have to be fixed in relation to the world market or at least in terms of the agriculturists' other requirements. There was a traditional rule that a Kotta of paddy (112 M.M.), a pot of gingelly oil (11 M.M.) and a Kalanji of gold (2/3 sovereign) are interchangeable ". Now the prevailing prices of gingelly oil are Rs. 44/- per pot and Rs. 50/- per kalanji of gold. These justify that the price of paddy must be revised to that level. As has been pointed out above, the price of paddy should be fixed at Rs. 39/- or thereabouts per Kotta (112 M.M.)

The fixation of the price of paddy should be arrived at only after consultation with the agriculturists. Any other approach based on more economic theories or on the results of discussions with merchants and millers and traders, who are interested in exploiting the agriculturists to their own advantage can lead to no advantage to the producers. There are big and small land-owners, Agricultural Associations, Research Farms and Stations run by the Government. The reasonable price of paddy can be fixed on the basis of statistics obtained from them regarding cost of cultivation etc.

The Government would be doing the Agriculturists justice, if the prices of agricultural produce are revised and fixed at the above level. By adopting this liberal policy, agricultural production would receive an incentive and more would be produced, enabling the country to become self-sufficient as regards her food requirements.

Cost of Cultivation of one acre of wet land in Tenkasi Taluk, Tinnevelly District.

Kar Crop — I Crop.

Items		1939.	1944	1948
First 2 ploughings 5 ploughs	Rs.	2—8—0	10—0—0	15—0—0
Second 2 ploughings 4 ploughs	,,	2—0—0	8—0—0	12—0—0
Sowing 4 ploughs	,,	2—0—0	8—0—0	12—0—0
Levelling 2 ploughs	,,	1—0—0	4—0—0	6—0—0
Bund repair 2 Coolies	,,	0—8—0	1—8—0	3—0—0
Levelling 2 males & 4 female coolies	,,	1—0—0	3—0—0	4—8—0
Manure 24 cartloads	,,	6—0—0	24—0—0	36—0—0
Cart hire for above	,,	2—0—0	6—0—0	12—0—0
Spreading manure 4 females	,,	0—8—0	1—8—0	3—0—0
Paddy seed 140 lbs	,,	5—10—0	14—0—0	24—0—0
Watering charges	,,	1—4—0	3-12—0	7—8—0
Weeding 12 females	,,	1—0—0	3—0—0	9—0—0
Harvest expenses 280 lbs	,,	9—0—0	19—0—0	25—0—0
	Total	34—6—0	105-12—0	169—0—0

Pisanam — II Crop.

Nursery Lease	Rs.	3—0—0	9—0—0	18—0—0
Ploughing 2 ploughs	,,	1—0—0	4—0—0	8—0—0
Green manure (Nursery)	,,	1—0—0	4—0—0	6—0—0
Seed 35 lbs	,,	1—6—0	3—8—0	12—0—0
Sowing 2 Coolies	,,	0—8—0	1—8—0	3—0—0
Watering charges	,,	0—8—0	1—8—0	3—0—0
Field ploughing, 5 ploughs	,,	2—8—0	10—0—0	15—0—0
Next ploughing, 5 ploughs	,,	2—8—0	10—0—0	15—0—0
Levelling	,,	0—8—0	1—8—0	4—8—0
Bund repair 3 males	,,	0-12—0	2—4—0	4—8—0
Green manure 2 cartloads	,,	7—0—0	30—0—0	52—0—0
Spreading manure	,,	0—8—0	1—8—0	3—0—0
Transplanting, 16 females	,,	3—0—0	9—0—0	12—0—0
Watering charges	,,	1—4—0	3-12—0	7—8—0
Two weedings	,,	1—8—0	4—8—0	9—0—0
Harvest expenses 280 lbs.	,,	9—0—0	21—0—0	25—0—0
	Total	35—14—0	117—0—0	197—8—0

Raising Calves with Soyabeans Milk

By

Major T. MURARI, B. Sc., (Oxon)., F.L.S., F.R.S.A.,

Glycine max (Linn) Merr. usually known as Soyabean has been grown in this country for many centuries. It is known by various vernacular names in various parts of India. The following names are noted by Piper and Morse for varieties found in India :—

Name		*Locality*
An-ing, Tzuda, Kije	...	Naga Hills, Assam
Patani-jokra	...	Assam
Bhatwas, Bhutras	...	United Provinces
Patani	...	India
Bhatnas	...	Nepal
Bhetmas, Gari-kalai, Chlai	...	Bengal
Bhut	...	Punjab
Bunce	...	Ceylon
Khujoon	...	North west Frontier Province
Disomhorac	...	Santhal
Silliangdum	...	Sikkim

In spite of the extensive area under cultivation of this crop in this country the full value of the crop is not well known in this country and is not so well exploited as in China and Japan. Of late many experiments have been conducted in the country, for example, the work conducted by Dr. Subramaniam at Bangalore for human consumption is note-worthy.

While it is agreed that soyabean milk is a useful substitute for milk there are experiments by Basu of Dacca University which indicate that calcium deficiency has to be made up. Again work in Dacca and Lahore Universities and Coonoor Nutrition Institute indicate that soyabeans is not superior to any of the pulses grown on a large scale in India.

The object of the experiments at Hosur and Lam Farms was to find a suitable milk substitute for ration to calves. To raise a calf not less than 400 lbs. of milk will be required. If we can successfully raise calves with less of cows milk, the milk saved would be available for human consumption. It would mean more milk available per cow for sale and may just turn the profit and loss account in favour of the dairy industry. It must be borne in mind that in addition to the soyabean milk various

products can be made from the residue, but in animal husbandry it can be used for feeding adult stock of all varieties with advantage. While the soyabean milk can be fed to calves the residue is rich enough to replace cake in the ration.

Feeding trials with Soyabean milk were conducted at the Livestock Research Station, Hosur and Livestock Research Station, Lam, Guntur. The method of preparation of soyabean milk is as follows.—

> Finely ground flour is soaked in water over night. Seven or eight times the quantity of water is boiled and the soaked flour gradually added. It is cooked for 7 to 10 minutes and strained through cheese cloth. The residue should be washed through a little hot water. The liquid portion is the milk; the colour depending on the variety of seeds used. As the milk is deficient in fat and vitamins upto ½ oz. shark liver oil is added.

When feeding soyabean milk, it must be gradually introduced to the calf. At first ½ lb. of soyabean milk should replace ½ lb. of cows milk and gradually the soyabean milk is increased each week replacing an equal quantity of cows milk. In case a calf shows any intestinal disorders soyabeen milk may be reduced for some time.

The soyabean milk and its residue were analysed by the Agricultural Chemist at Coimbatore and the results are given below —

Heads of analysis		Lab. No. 335/46–47. Soyabean seed %	Lab. No. 340/46–47. Soyabean flour %	Lab. No. 341/46–47. Soyabean milk %
Moisture	...	10·59	10·39	93·74
Ash	...	6·29	6·61	0·63
Crude proteins	...	38·90	38·54	3·04
Ether Extractions	...	14·22	14·29	0·82
Crude fibre	...	4·87	5·53	0·05
Carbo-hydrates	...	25·13	24·64	1·72
Total	...	100·00	100·00	100·00
Insolubles	...	0·63	1·00	0·012
P_2O_5	...	1·75	1·76	0·162
CaO	...	0·54	0.48	0·040
Acid value	...	6·84 mgms. of KOH per gm. of fat. 3·39 mgms. of KOH per gm. of fat.		

Calves about 4 weeks old were selected as far as possible of similar ages in each of the breeds. They were divided into four groups —

Group I.	*Group II.*	*Group III.*	*Group IV.*
Soyabean milk less milk with Shark liver oil.	Soyabean milk less milk with Shark liver oil (milk to be reduced gradually).	Milk alone.	Control on feed in the Dairy.

The preliminary experiments were conducted for a period of eight weeks. They could not be either prolonged or repeated as there was not sufficient quantities of soyabeans available, but soyabeans is being grown on the farm for feeding calves in future.

The result of the experiments conducted at Livestock Research Stations, Hosur and Lam Farm Guntur are given below:—

Statement showing the comparative weights of calves fed on Soyabeans Milk

Part I.

I Group — Soyabean milk and Shark liver oil.							*II Group* — Soyabean milk as required and Shark liver oil.						
Breed.	Sex of calves	Calf number.	Date of birth.	Weight at commencement of the experiment.	Weight at the termination of the experiment	Difference, increase in weight.	Breed.	Sex.	Calf number	Date of birth.	Weight at commencement.	Weight at the termination.	Difference, increase in weight.
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Calves 5 to 8 weeks.													
Kanga-yam	Heifer	589	10-9-'46	74	108	34 lbs.	Kanga-yam	Heifer	591	12-9-'46	70	91	21 lbs.
Hallikar	Heifer	391	12-9-'46	80	111	31 lbs.	Kanga-yam	Heifer	590	10-9-'46	49	61	12 lbs.
Calves 8 to 12 weeks—No calves were available.													
Calves 12 to 16 weeks.													
Kanga-yam	Heifer	578	19-6-'46	143	182	39 lbs.	Kanga-yam	Bull	579	19-6-'46	137	177	40 lbs.
Sindhi	Heifer	876	22-6-'46	105	140	35 lbs.	Sindhi	Bull	878	26-6-'46	110	140	30 lbs.
Calves above 16 weeks.													
Sindhi	Bull	860	20-5-'46	142	174	32 lbs.	Sindhi	Bull	862	23-5-'46	165	208	43 lbs.
Kanga-yam	Bull	576	15-6-'46	133	168	35 lbs.	Kanga-yam	Heifer	577	17-6-'46	167	205	38 lbs.

* This had a swelling on the dewlap.

Part II.

III Group Milk as required.							*IV Group* Controls.						
Breed.	Sex.	Calf number	Date of birth.	Weight at commencement.	Weight at termination	Difference, increase in weight.	Breed.	Sex	Calf number	Date of birth.	Weight at commencement.	Weight at termination.	Difference, increase in weight.
15	16	17	18	19	20	21	22	23	24	25	26	27	28
Calves 5 to 8 weeks.													
Kanga-yam	Bull	592	14-9-'46	65	85	20 lbs.	Kanga-yam	Bull	594	17-9-'46	80	105	25 lbs
Kanga-yam	Heifer	593	16-9-'46	75	105	30 lbs.	Kanga-yam	Bull	595	21-9-'46	68	102	34 lbs.
Calves 8 to 12 weeks—No calves were available.													
Calves 12 to 16 weeks.													
Hallikar	Heifer	377	24-6-'46	167	215	48 lbs.	Hallikar	Heifer	378	29-6-'46	141	173	32 lbs.
Kanga-yam	Heifer	580	27-6-'46	105	140	35 lbs	Kanga-yam	Heifer	581	30-6-'46	129	165	36 lbs
Calves above 16 weeks.													
Sindhi	Bull	871	13-6-'46	138	175	37 lbs	Hallikar	Heifer	376	10-6-'46	130	145	15 lbs
Hallikar	Heifer	375	8-6-'46	195	235	40 lbs.	Kanga-yam	Bull	574	11-6-'46	155	198	43 lbs

Though the Lam figures look attractive they are not to be taken as entirely reliable because the animals were not actually weighed. Nevertheless the results are valuable as a whole in that the animals did not suffer adversely. The Hosur figures are more valuable because they show certain difficulties in the experiment.

These feeding trials have shown that where calves are looked after carefully soyabean milk can be used as a substitute for milk for calves above one month old, thus soyabean milk can thus be considered as a desirable substitute. It would mean that almost 200 lbs. more milk per cow can be made available to human consumption without the growth of calves being adversely affected.

N. B.— This paper has been released with the express desire of Dairymen who wish to know if there are any suitable substitute for milk in calf rearing. Work is in progress and further communications will follow in due course The experiment at Hosur was conducted by Sri P. Ananthan Nayar, Dairy Manager and Mr. K. Thomas Benjamin, Dairy Manager, Livestock Research Station, Hosur and at Lam by Sri G. S. Srinivasan, Veterinary Assistant Surgeon.

Statement showing the rate of growth of calves fed on soyabean milk, at Guntur.

Experiment commenced on 6—11—1947.

Group.	Number of calf.	Sex.	Date of birth.	Sire.	Dam.	Weight before experiment.	Weight at the end of first week.	second week.	third week.	fourth week.	fifth week.	sixth week.	seventh week.	eighth week	Remarks.
Group I	784	Bull	23—9—1947	298	329	83 lb.	90 lb.	93 lb	97 lb	101 lb.	105 lb.	111 lb.	116 lb.	120 lb.	Weights are calculated from measurements only, for want of a weighbridge.
„	776	Bull	9—8—1947	298	300	115 „	120 „	124 „	128 „	134 „	139 „	143 „	148 „	154 „	
„	771	Heifer	1—7—1947	315	290	130 „	138 „	141 „	145 „	150 „	154 „	159 „	164 „	170 „	
Group II	785	Bull	24—9—1947	249	324	82 „	88 „	93 „	97 „	101 „	106 „	112 „	117 „	122 „	
„	777	Bull	16—8—1947	315	342	112 „	115 „	119 „	123 „	128 „	134 „	142 „	148 „	154 „	
„	772	Bull	6—7—1947	315	310	133 „	140 „	143 „	147 „	155 „	162 „	166 „	174 „	180 „	
Group III	786	Heifer	4—10—1947	298	292	83 „	89 „	93 „	97 „	104 „	110 „	116 „	122 „	129 „	
„	774	Heifer	20—7—1947	315	307	125 „	130 „	131 „	134 „	141 „	148 „	154 „	160 „	167 „	
„	780	Bull	7—9—1947	249	321	86 „	90 „	96 „	100 „	108 „	115 „	121 „	126 „	133 „	
Group IV	787	Bull	11—10—1947	298	337	77 „	81 „	84 „	88 „	94 „	99 „	105 „	110 „	116 „	
„	783	Heifer	23—9—1947	298	309	77 „	83 „	87 „	90 „	96 „	102 „	108 „	115 „	123 „	
„	775	Heifer	9—8—1947	315	353	90 „	96 „	99 „	103 „	107 „	115 „	121 „	126 „	132 „	

Calf numbers 784, 771 777 and 774 showed digestive troubles in the beginning. These responded to treatment and were all right in two days except calf No. 771 which took nearly four days to become normal.

Fodder Grasses of Madras

By

S. N. CHANDRASEKHARA IYER, M.A.,
(Government Lecturing and Systematic Botanist)

&

S. V. PARTHASARATHY, B. Sc. (Ag.), M. Sc.,
D. DANIEL SUNDARARAJ, B. Sc. (Ag.)
(Assistants in Botany)

Introduction. The present position of fodder for cattle in Madras is far from satisfactory. In most places the cattle are dependent on the straw of cereal crops. The total estimated fodder production is only about 24·53 million tons for the Presidency whereas the total requirement of fodder works out to nearly 58·91 million tons.

In most parts of the Presidency, ryots maintain too large a number of cattle, either, for the production of farmyard manure or merely because they do not wish to slaughter them. These animals, unlike the work bullocks and milch cattle are not stall-fed but may be driven out to graze in waste lands. In the case of cattle-breeding or cattle-rearing centres, pastures are maintained or fodder crops are raised to feed the animals. In the Circars, *Crotolaria juncea* (sunnhemp), in Nellore *Phaseolus trilobus* (pillipesara) and in Ramnad and Tinnevelly *Sorghum dochna* var. *Irungu* (Irungu cholam) are cultivated as fodder crops. In other areas, cattle are allowed to graze on waste lands, current follows and in forests. No systematic grazing principles are adopted and as such the fodder out-put is very poor.

There are in our Presidency, 14,277,581 acres 'not available for cultivation' and 11,433,633 acres "other unculturable areas excluding current follows". The natural grass flora in these 25 and odd million acres is dominated by poor types Since the deficiency in fodder requirement cannot be made up from cereal straws and fodder crops from cultivated areas, these 25 million acres require to be studied for their fodder-producing capacity. There are 388 species of grasses listed in the Madras flora including the cereals which are under cultivation. Out of the natural grass flora, only 82 species are recorded as of fodder value. Some are relished by cattle and others are grazed only when they are young. They may also differ in their nutritive value. From 100 species that were under observation, 18 species were selected and put under yield trials at Coimbatore. Some points regarding these grasses are furnished in this note.

Indigenous types. (1) *Chionachne semiteres:* Fisher—At Coimbatore under rainfed conditions it yields 15,000 lbs. per acre in one or two cuttings per year. Relished by cattle only when young. When old it is coarse and cattle do not relish them at that stage.

(2) *C. Koenigii* Thw. (K. Suku dabha.) At Coimbatore under rainfed conditions this species yields about 15,000 lb. in one or two cuttings. This also is relished by cattle and is cultivated on a small scale by ryots in Tanuku in Godavari District.

(3) *Ischaemum pilosum.* Hack. (T. Kundara gaddi, Urranki.) This grass thrives well in the black cotton soils of Hagari, Bellary, Narasaraopet and Guntur.

(4) *Sehima nervosum.* Stapf. (H) Chota sadai ghans (Tamil): Kura itti, (Telugu) Nendra gaddi, (Kanarese) Sinna shadai hullu, Nalai hullu). Under rainfed conditions at Coimbatore this grass yields about 10,000 lb. per acre in 2 cuttings. Rhizome formation is weak in this and in summer months the clumps dry up but with the receipt of showers they readily regenerate. The grass shows a habit of growing into thick short clumps and prefers shady areas. This species is very good as fodder. It is present in all districts except the West Coast and it is particularly noted in Chittoor, Coimbatore, Guntur, Kistna and Nellore.

(5) *Amphilophis pertusa,* Stapf. (Telugu): Janu gaddi; (Tamil). Chinnakarai pul, (Kanarese): Karaikanda hullu. At Coimbatore under rainfed conditions it yields about 8,000 lb. per acre in one cutting per year. It comes up well in semi-dry conditions and spreads to form a mattress. It is a good pasture grass readily grazed by cattle.

(6) *Chrysopogon montanus,* Trin.: (Kanarese): Chello san kanni; (Telugu): Gurra batto kelu. It is a species which thrives well in dry situations, especially in gravelly and laterite soils of hilly and forest areas. It is a good fodder grass before flowering, but forage out-put is very low.

(7) *Dichanthium caricosum.* A. Camus. (Kanarese): Urukkun hullu. It thrives well in moist places only. It is good as a fodder grass. It is fairly, commonly distributed along with *Iseilema laxum.* Hack in the Guntur District.

(8) *D. annulatum,* Stapf. Under rainfed conditions at Coimbatore, this grass has yielded about 6,000 lb. per acre in one cutting per annum and prefers moist conditions as the former species.

(9) *Heteropogon contortus,* Beauv. (Hind.) Kher, (Telugu): Eddigaddi; (Tamil): Oosi pullu, (Kanarese): Sunkari hullu. It is good

as a fodder grass and makes good hay. It forms an important species cultivated in Hosur Cattle Farm for hay making. The hygroscopic spear-like awns which twist about each other are the drawbacks for this very useful fodder grass. It comes up well in dry situations.

(10) *Iseilema prostratum* And (Telugu): Yerra kala kasuvu. It is a rare type coming up well at low elevations but not in dry situations. It is good as a fodder grass.

(11) *I. laxum.* Hack. (Telugu): Erra chengali gaddi, (Tamil) Tenga nari pullu. At Coimbatore under rainfed conditions this yields about 5,000 lb. per acre in one cutting per year. This is an important fodder grass in the Circars where the Nellore breed of cattle are bred.

(12) *Iseilema anthephoroides.* Hack. This is inferior to the previous one. Under Coimbatore conditions it does not perennate through rhizomes but through self-sown seeds.

(13) *Apluda aristata* L. H. Gururna, (Tamil): Manda pillu, Mungil pillu, (Kanarese): Akku hullu. This is not very good as fodder, especially after flowering, though it thrives in dry localities and grows up to five feet in height.

(14) *Eremopogon foveolatus.* Stapf. Under rainfed conditions in Coimbatore it yields about 12,000 lb. per acre in 2 cuttings per year. It comes up well in dry situations but requires a fairly good soil.

(15) *Andropogon pumilus.* Roxb. This grows in large clumps in semi-dry situations, especially in black cotton soils. It is a good fodder grass but does not seem to be cultivated anywhere.

(16) *Digitaria marginata* Link. (Hind.). Takvi, Takva, (Tamil): Arisi pillu; (Kanarese): Hennu akkibu hullu. This grass comes up well in semi-dry situations. Cattle graze this grass readily. Seed rate 10—15 lb. per acre. In Americas it is reported to yield 2 ton of hay per acre.

(17) *D. Uallichiana,* Stapf. This also is a good fodder grass coming up well in cool elevations like Kodaikanal, Pulneys and the Nilgiris.

(18) *Eriochloa procera.* Hubbard. (Tamil): Mathanga pillu. This grass comes up often on the bunds of rice fields. Culms tufted and varying in height. It comes up well in wet situations only. It is an annual grass and is a good fodder.

(19) *Brachiaria eruciformis* Griseb. (Telugu): Dommkkalu gaddi; Edira kasuvu. It comes up well in black cotton soils and is readily grazed by animals.

(20) *Paspalum scrobiculatum*, L. (Telugu): Arika; (Tamil): Varagu; (Kanarese) · Arikal. The straw of the cultivated type makes a good fodder. The wild type is a slender grass and comes up in moist situations in all the districts. It is safer to feed the cattle without the grains, as otherwise, the hydrocyanic acid in them are reported to kill even elephants.

(21) *Paspalidium flavidum*, Camus. (H.) Sanka; (Telugu): Uda gaddi, (Tamil): Arisi pillu. This is a prostrate grass coming up well in moist places.

(22) *Urochloa panicoides*, Beauv. (Telugu): Salla undu; (Kanarese): Kadu billi samai hullu. This grass is a robust annual, much liked by cattle but it does not grow well in dry situations.

(23) *Urochloa reptans*, Stapf. (Tamil) · Shani pillu. This is similar to the above, coming up well only in moist situations.

(24) *Echinochloa colona*. Link. (H.) Sawank. (Telugu): Otha Gaddi; (Tamil): Karum pul. This is also an annual grass coming up in moist situations.

(25) *Panicum repens*. Linn. (Telugu): Ladda gaddi; (Tamil): Inji pillu; (Kanarese): Soni hullu. The ginger grass. This is somewhat cosmopolitan in its habit, coming up well in sandy or water-stagnant areas. It is believed to stimulate milk yields.

(26) *Setaria verticillata*. Beauv. (Telugu): Chik lenta; (Kanarese). Sanna anta purlai hullu. This grass does not come up well in dry situations. It is liked by cattle before it flowers.

(27) *Setaria pallidifusca*, Stapf. & Hubb. (Hindi). Bandra; (Telugu): Nakka toka gaddi; (Tamil): Narival pillu. This is an annual grass, readily grazed by cattle before it flowers. It does not come up well in dry places.

(28) *Cenchrus ciliaris*, L. (Tamil): Kolukattai pillu. This is a rhizomatous perennial grass. The aerial shoots may dry up during severe summer-months. It comes up well in dry situations, but can make a luxuriant growth only during the monsoon period. It is the chief fodder grass in the Kangayam tract. Seed rate 10–15 lb. per acre. Under rainfed conditions at Coimbatore this grass yields about 21,000 lb. per acre in two cuttings. Under more favourable conditions it yields up to 40,000 lb. in 3–4 cuttings. It is worth trying this grass in roadsides, waste places and pastures.

(29) *C. Setigerus*. Vahl. This is more drought-resistant than the former, but the out-put of fodder is less.

(30) *Leptochloa obtusiflora.* Hochst. Does not thrive under dry conditions. At Coimbatore it thrives under moist situations only. Contains 0·011 to 0·0082 % of hydrocyanic acid, but this dose, is not considered harmful to cattle.

(31) *Eragrostis* sp. There are about 9 species which are reported to be grazed by animals. Most of them are slender and hence of little forage value. They come up from dry to moist situations.

(32) *Enteropogon monostachyos* Schum. (Tamil) Kanni pillu. The culms are densely tufted. Under rainfed conditions at Coimbatore it yields about 13,000 lb. in two cuttings per year.

(33) *Cynodon Dactylon,* Pers. H. Dub. (Telugu): Garika gaddi, (Tamil). Arugam pillu; Harıali grass. It is an excellent fodder for cattle and horses and highly nutritious. It comes up well in all soils and especially well in black soils. It spreads and perennates through underground stems. Once established it is difficult to eradicate it

(34) *Chloris* sp. Out of the 8 indigenous species, 4 are of fodder value. They thrive well in semi-dry situations and tolerates alkalinity *Chloris Bournei,* Rang et Tad., thrives best in black cotton soils. Seed rate 10 lb. per acre. At Coimbatore this species is recorded to have yielded 56,400 lb. per acre in 3–4 cuttings a year. All the four species are relished by cattle before flowering.

Exotic types. (35) *Panicum maximum,* Jacq. Guinea grass This is a tropical African grass widely cultivated. It is generally raised as an irrigated crop in cattle and Dairy Farms. 3,000 to 3,500 slips are planted per acre. On a modest estimate it yields 50 to 75,000 pounds of green fodder per acre in 6 to 8 cuttings per year. Under rainfed conditions at Coimbatore, it yields about 21,000 lb. in two cuttings per year.

(36) *Panicum antidotale,* Retz. (Tamil). Nassiam pillu. The type received from Australia is a good drought-resistant grass, whereas the indigenous one is a more mesophytic type. Under rainfed conditions at Coimbatore, it yields about 15,000 lb. per acre in 2 cuttings per year. The plants when young are valuable but when allowed to stand long, the culms become too woody.

(37) *Pennisetum purpureum,* Schum. (Napier grass). It is raised as an irrigated fodder crop. It is cultivated in military farms and at Hosur Cattle Farm. 2,500 slips are planted per acre. It may yield over 80 tons of fodder in 5 cuttings per year. The dry strain of this species thrives well in areas with moderate rainfall as in Bangalore.

(38) *Sorghum sudanense*. Stapf. (Sudan grass). It comes up well in semi-arid regions. It is cultivated in the U. S. A. Seed rate 15—20 lb. per acre. It yields up to 2½ tons of hay in 2 cuttings per year. It is a good fodder grass.

(39) *Cynodon plectostachyum*. Pilger. (Giant Star Grass). This is an African grass recently introduced into this country. It spreads rapidly. A single plant was noted to put forth spreading shoots each more than 20 ft. within 75 days. It spreads rapidly and as such is useful as a soil binder. Under rainfed conditions at Coimbatore it yields 30 to 60 thousand pounds per acre in 3 to 4 cuttings per year.

(40) *Pennisetum clandestinum*. Hochst. (The Kikuyu grass). This has been introduced in the hill stations of Nilgiris, Kodaikanals and Anamalais and has now got well established in these areas. Cattle relish it very much and the grass is becoming an important fodder grass on the hills replacing the existing types.

(41) *Chloris Gayana*, Kunth. (Rhodes grass). This also is raised as an irrigated crop, but not so popular as the first mentioned two of the exotic types. Seed rate 10—12 lb. per acre. It yields about 5 tons of hay per acre.

The Groundnut and the Food Crisis

By

M. M. KRISHNA MARAR, B. Sc. (Ag.)

Oil Seeds Section.

Among the many causes that have contributed to the present food crisis, the insidious encroachment of commercial crops, on the acreage of food crops, is undoubtedly one of the most important. Though the encroachment has been going on for more than three decades its effect in food production was felt acutely only during the war, when imports of rice from Burmah and other countries were cut off. Active Government propaganda had to be done to curtail the acreage under money crops, and sometimes even by temporary Government enactments. It remains to be seen, how far the temporary success attained by these measures will endure, when favourable conditions for imports of food grains return.

Introduction and spread of groundnut. Among the commercial crops which had made in-roads into the acreage of the food crops, the groundnut is by far the most important. It is now established as one of the foremost cash crops of India and particularly of the Madras Province. The groundnut crop is not indigenous to India. There are no wild or allied species growing and there is no reference to it in any of the Puranic or ancient Literature. The names by which groundnut is known in the different languages of India are only suggestive of its habit of forming pods underground and do not indicate any ancient knowledge of the crop. Brazil in South America is now accepted as the original home of the plant The credit for the first introduction of groundnut into India is said to belong to the Portuguese Jesuit Fathers who followed Vas-Co-Da-Gama shortly after he landed on the west coast of India towards the end of the 15th century. Thereafter for well over three centuries it remained as an unimportant crop, its cultivation being practically confined to back yards of houses in stray parts of the country. With the increased demand for vegetable oils in European countries in the early part of the 19th century the demand for groundnuts rose steadily and in its wake its cultivation began to expand The first reference to its cultivation in Madras was in the year 1850, when about 4,000 acres were recorded as being under groundnut in South Arcot. It then began to spread to other districts and by the beginning of the twentieth century the acreage under groundnuts in the Madras Province stood in the neighbourhood of 2 lakhs of acres. The pace of expansion quickened afterwards, with occasional slowing down during war years reaching the peak acreage of 4·7 million acres in 1937-38. Thus in the course of three decades and a half, the acreage had increased by nearly 25 times. No other commercial crop had recorded such

tremendous expansion during such a short period. The chief attributes which endeared the crop to the dry land ryots are the following. 1. The crop comes up well in almost all types of soils including soils considered to be sub-marginal for other crops. 2. The crop lends itself to easy cultivation and can be raised without much capital outlay. 3. The crop always assures a good margin of profit. Marketing is never a problem as traders and itinerant merchants seek after the produce even in the remotest villages.

Displacement of millets by groundnut. The phenomenal expansion of the area under the groundnut crop could have taken place only at the expense of other crops. Consideration of the soil and climatic requirements and the season of its cultivation viz., between July-August and November and December immediately suggests that millets are the crops displaced by the groundnut. It is important to remember that next to rice, millets constitute the staple food of a good portion of the population of the Province. A perusal of the acreage figures of the past 25 years shows that during the period from 1920 to 1944 the area under millets in the Province had gone down by about 2 million acres, while that under groundnuts had increased by 2·7 millions. Comparing the position as it existed about 10 years ago and as it stands to-day it may be seen that consequent on the decrease in acreage, the production of millets in the Province has gone down by as much as 19 per cent. What this means in actual practice can be realised when it is seen that the quantity involved viz., 7 lakhs of tons is sufficient to feed about 2½ million adults in normal times and over 6 millions at the present scale of rationing in force in statutory rationed areas. This falling off in the production of millets would have necessarily driven people accustomed to it, to take to a rice diet, thus increasing the pressure on the already deficient supplies of rice. It cannot be denied that these changes are the natural consequences of the encroachment of groundnut on areas previously under food crops.

Groundnut crop as a soil improver. So far only the evil consequences arising from the wide spread introduction of groundnut have been dealt with. The crop has not been without its good points also. In a number of ways groundnut has played a significant role in alleviating the food crisis to some extent, though it is not possible to substantiate the same by facts and figures. This may be contrasted with purely commercial crops like tobacco which has not contributed anything to lessen the effect of the food crisis, but has only aggravated the situation.

The groundnut crop has indirectly helped to increase the production of food crops by not depleting the fertility of the land on which it is raised to the same extent as is done by some of the other crops. This factor is of very great significance particularly in the case of dry lands which only very seldom receive adequate manuring. The conservation of soil fertility

is brought about in two ways. One is by preventing soil erosion and the other is by increasing the fertility status of the soil by the addition of root and leaf residues which the crop leaves behind in the soil. Soil erosion especially sheet erosion caused by water occurs in many parts of the Province and there is no denying the fact that it is gradually reducing the productivity of the land.

Among the biological measures of erosion control, the cultivation of a suitable cover crop occupies an important place. The habit of growth of the groundnut plant, particularly of the spreading variety, is well adapted to protect the soil against erosion. The crop completely covers the land in about 2 month's time after sowing and thus protects the soil against the direct beating action of the rain and also offers mechanical obstruction to the flow of water. A study of the comparative erosive efficiency of a number of dryland crops carried out at the Agricultural Research Station, Hagari has shown that the spreading variety of groundnut has the maximum anti-erosive value particularly in the top 1" layer of soil, which is most susceptible to erosion. It was also revealed in another experiment that the losses of water and soil are reduced by as much as 50 per cent by raising a groundnut crop

The root residues of the groundnut which are left in the soil after the plants are removed have a manurial value because of the numerous bacterial nodules which are present in the root system. The aggregate effect of the two factors mentioned above is that groundnut crop leaves the land more fertile than would have been the case if other crops were raised. This is reflected in the higher yields of the cereal crops that follow groundnut. This has been observed to be the case by a number of workers in India. At the Agricultural Research Station, Tindivanam, cereals following a groundnut crop have yielded even cent per cent more than cereals following cereals. At the Hebbal Farm in Mysore State, *Ragi* following groundnut is reported to have registered a 30 per cent increase. In view of these findings it is certain that the groundnut crop would have indirectly helped to increase the production of millets from the existing area, though no exact figures can be adduced in support of the contention.

The widespread practice of growing groundnut mixed with other food crops like *Cholam, Cumbu, Varagu, Thenai*, read gram etc., would have also resulted in increased production of food grains from the area occupied by the groundnut. Such cropping has been proved to be more remunerative than growing a crop of groundnut alone and the ryots should be advised to adopt this practice universally in times of food crisis in order to augment the production of food grains.

Groundnut cake as manure. Coming next to the consideration of increased production of food grains for which groundnut has been directly

responsible reference may be made to the part played by groundnut cake. This has made good to a considerable extent the deficiency of artificial nitrogenous manures like ammonium sulphate which became scarce during war-time. Among oil cakes groundnut cake is the richest organic nitrogenous manure containing as much as 8 per cent nitrogen and is always the cheapest available on the market. Considerable data had already been accumulated on the response of different crops, especially of paddy, to manuring with groundnut cake and it was a comparatively simple matter to persuade the ryots to take to it. Thanks to the measures taken by the Government like prohibiting the export of groundnut kernels and cake from the Province to outside areas, monopoly procurement of the whole production of the cake in the Province and arranging for its distribution to the ryots at controlled prices through Departmental agency, it was possible to get the maximum benefit out of the available quantity. The annual production of groundnut cake in the Province is estimated at nearly 2½ lakhs of tons and even if it is assumed that only about 2 lakhs of tons would have been used for manuring paddy, the increased production resulted would have been, at a conservative estimate, of the order of 2 lakhs of tons of paddy. This calculation is based on the increased yields obtained on the Agricultural Research Stations by the application of groundnut cake as manure. The increased yield of vegetables which are also usually manured with groundnut cake would also have been substantial. In the absence of this rich and cheap source of nitrogenous manure the Grow More Food Campaign would not have been able to make any appreciable headway.

Food value of groundnut kernels. During the war-period—it is true to *some extent even at the present time*—besides the inadequacy of food materials which people are accustomed to take in bulk, there was also an acute shortage of fats, Dhall and other protective foods either through short supply or because of high prices which placed them beyond the purchasing power of the masses. When the chief culinary fats in the Province viz., gingelly and coconut oils were scarce and were very costly, the poor people were able to take to groundnut oil which was available at comparatively cheaper rates. Thus the fat requirements of that class of the population which is most susceptible to malnutrition during times of food crisis, were met by groundnut oil. Further in times of food scarcity poor people naturally turned to groundnut, not so much for satisfying their requirements of bulk food, but to avoid starvation. One important factor to note here is that no persuasion whatsoever was required to make people take to it, because they were already accustomed to its use, it was only necessary to make it readily available to them. Government realised the intrinsic food value of groundnut kernels in times of food crisis and arranged for its distribution through ration shops. This to a certain extent helped towards reducing malnutrition among the people. Groundnut kernel is recognised as a rich and cheap source of vegetable protein.

It contains from 25 to 33 per cent of protein, 10 to 20 per cent of carbohydrates and 40 to 50 per cent of fats. Based on protein content alone 1 oz. of roasted groundnuts contains nearly as much protein as that of 1 $\frac{1}{3}$ oz of dhall, 1$\frac{2}{3}$ oz. of mutton, 2$\frac{1}{2}$ oz. of eggs or 8 oz. of milk. The protein is easily digestible, has a high nutritive value approaching nearly that of milk, meat and eggs, and contains most of the basic amino acids which are considered biologically essential like arginine, histidine, lysine and cystine. Besides, groundnut kernels contain vitamins A, B-1 (thiamine) and some important members of the B-2 group like riboflavin, nicotinic acid and pyridoxine. The kernel is also a good source of phosphorus and a fair source of iron. For these reasons, groundnut has proved beneficial in protecting the health of the people particularly of the lower classes who do not possess the wherewithal to go in for costly protective foods like milk, eggs etc.

Place of groundnut in Provincial Economy. Considering the *pros* and *cons* regarding the cultivation of the crop, the question whether the widespread introduction of groundnut was a blessing or otherwise, cannot be answered straight-away. The answer will most probably depend upon the particular circumstances under which the question is asked. In times such as the present, when an acute scarcity for food grains is felt, there is ample justification for the all round clamouring for the reduction in the area of commercial crops and for increasing the area under food crops. In times of prosperity and abundance of food materials, the need for cash will be the more important factor and the majority opinion will be in favour of allowing its unrestricted cultivation. At all times a proper and balanced view of the whole situation is quite essential

In 1938-39 the year prior to the outbreak of World War II when the export of groundnuts was allowed without any sort of governmental restrictions the value of groundnut and groundnut products exported from Madras Province reached the all-time-high figure of 10 crores of rupees. Moreover in recent years many important industries depend upon groundnut and groundnut products for raw materials. The Vanaspathi Industry in particular which has shown a phenomenal expansion in the course of a decade and half is the most important single consumer of groundnut oil. In 1945 the industry had consumed as much as 1,63,000 tons of oil and it is very likely that the consumption might have gone up still further at the present time. Manufacture of glue for plywood factories from groundnut cake has been proved to be an economic feasibility and progress in this direction is sure to take place in the near future. Satisfactory methods for the manufacture of wool-like synthetic fibre, from groundnut protein have been worked out both in England and the United States of America, and it is only a question of time when the production of this artificial fibre will be started on an industrial scale in India as well.

Future lines of action. The question one will ask justifiably under these recircumstances is "how then are we going to reconcile the claims of groundnut with vast future potentialities and those of food crops on the resources of our cultivated area which do not admit of any considerable expansion in future". The answer is that in view of the over-riding necessity to augment the production of food, the time has come when the *laissez faire* policy so far adopted towards the expansion of money crops should be given up and some sort of restriction should be enforced. For meeting the increased demand for groundnuts that is likely to arise in future, attempts can and should be made to increase the production from the existing acreage by the evolution and the spread of improved varieties. It is in this sphere that the plant-breeder can play his part in preventing the occurrence of food crisis in future. The Oilseeds section which is actively pursuing breeding work on groundnuts, has already to its credit three improved strains which have given on an average about 25 per cent increase in yields over the local varieties. If these strains were to completely replace local varieties the production of groundnuts from the existing acreage itself could be increased considerably. Another way of increasing the production of groundnuts is to extend the area in places where it would not compete with food crops.

A recent survey has shown that there is considerable scope for introducing the groundnut in the *modan* lands of Malabar and in the single and double crop wet lands of Tanjore, Kistna and other districts. The extension of the area can be so programmed that it will not materially affect the existing area under food crops, especially paddy, while it will fit into the usual calendar of cropping adopted by the ryots. An increased production of paddy can also be expected as paddy rotated with groundnut yields more and appreciable quantity of green haulms that will become available, can be used with advantage as green manure for increasing the yield of the succeeding crop of paddy. These possibilities have actually been demonstrated at the Agricultural Research Station, Pattukottai, in Tanjore District. When the above sources are tapped the production of groundnut can be increased considerably without in any way affecting the production of food grains.

With the twin objective viz., industrial progress of the country and self sufficiency in food, the Oilseeds section will never rest content until it is able to produce as an old adage puts it, two groundnuts where only one was produced before, by evolving still higher yielding strains with better quality of produce and suited for growing under different climatic and soil conditions. When by such methods it becomes possible to increase the production of groundnuts sufficiently to cater to the demands likely to arise in future without further extension of acreage we can claim to have solved one at least of the many factors that gave rise to the present food crisis and which would again be a source of anxiety in any future emergency, if not tackled in time.

Conclusion. The Gronudnut though primarily an oilseed and a money crop, is also a food crop enriching the soil. Its role in the present food crisis is more on the beneficial side. This unique position may not, however, be shared by other money crops; hence encouragement tempered with caution should be our watchword in dealing with the money crops. As Sir. S. V. Ramamurthi, erstwhile Advisor and one time Director of Agriculture, Madras in his preface to the 'Monograph on Rural Problems of Madras' by Sri S. Y. Krishnaswamy has rightly pointed out, "the first lien on the land and water of the province, as indeed of all India is to provide food for the people, then work for them and last only trade".

Gleanings

Rice may be sown from Aircraft. The use of aircraft for sowing seed seems likely to be widely adopted in Australia since experiments have shown how much time can be saved when large areas have to be sown. Both in Queensland and Western Australia, aircraft have been used to sow pastures, and the method has also been used near Tamworth, in New South Wales, for sowing wheat. In this experiment the aircraft flew 40 feet above the ground, and the seed was distributed at the rate of 4 acres to the minute. It is proposed to test the method for sowing rice. Aerial sowing offers several advantages Many Australian grain farms are very large If sowing has been delayed through seasonal conditions, it becomes important for the work to be carried out as quickly as possible, and aerial sowing is a practicable method to use in such cases when the amount of labour and equipment to do the work by other means in a short time may not be available. It is also possible to complete sowing from the air on land that is too water-logged for mechanical equipment to be used. In fact, it was the sodden condition of an area in Queensland after heavy rains that led to the first experiment there in aerial sowing, and which indicated the possible value of the method to rice-growers, Rice-growing in Australia is highly mechanised, and the use of heavy machines on land recently irrigated has long been a problem that aerial sowing may help to solve.

Tree-planting Encouraged Former servicemen who have undergone special training courses before setting on the land in Victoria are being encouraged to do everything possible to convert their holdings into model farms. One form of this encouragement has come from a movement known as the "Save the Forests Campaign", which promotes and assists tree-planting both for practical and aesthetic reasons This year the movement has supplied 20,000 trees to servicemen farmers to plant on their properties, and hopes to make 50,000 available next year. The farmers have responded enthusiastically to the idea, and applications for trees greatly exceed the number that could be supplied, The seedling trees are delivered to the farmers in tubes ready for planting out, and are supplied free of cost. The only conditions are that the young plantations will be fenced during the early growing period, that the land will be ploughed before planting, and that planting and after-care will be carried out in accordance with advice supplied to ensure that the plantations prosper Tests have shown that the trees grow much more rapidly on land that has been ploughed than when they are planted in holes on land that has not been prepared [Agricultura Newsletter · No. AGN/207].

How Best the Botanist Can Help in Solving The Food Crisis ?

By

SRI S. N. CHANDRASEKHARA AYYAR, M. A.,

Government Lecturing and Systematic Botanist.

The Botanist can do a great deal to help in solving the food crisis. For bringing more lands under cultivation, systematic ecological surveys have to be made. Such surveys would throw light on what could be brought under cultivation and what not. When a survey of Dharapuram was made in 1946 it was found that there is plenty of land that could be brought under the plough, the greatest handicap for the cultivator in those parts being *soil erosion* by wind. Erosion of any kind either by wind or by water can be intelligently solved by tree-planting. Judicious planting of suitable trees helps in breaking the velocity of the wind in areas subjected to high winds and thereby preventing the loss of the fertile top soil by wind erosion and in mitigating the severity of the water erosion in tracts where torrential rains are prevalent. An example of this is found in the Tennessee Valley in America where desert lands have been converted into the most luxuriant cultivated garden lands. In our country, tree-planting has been neglected—criminally neglected—for a number of years now. The two World Wars, though they were not fought in our soil, have depleted all the trees that were growing on our soil. A cruel felling of trees in all the forest areas took place to meet the urgent needs of two World Wars and even saplings of trees like the Teak, Jack, Vateria and a host of others were removed. Consequently there have been tremendous changes in climatic conditions and we are now experiencing a series of droughts. Atleast now let us wake up and plant trees wherever we can. There should be no place where a tree could possibly be planted left barren. Everyone must take up tree planting as a sacred duty. Trees, which are quick growing, and when grown would serve a useful purpose as for example trees which would yield timber, leaves for green manure, fruits and flowers which will serve as famine reserves (*Bassia latifolia* and *B. longifolia*) or oil seeds (*Vateria indica* — edible, *Bassia Spp.* — lubricant) should be planted. A list of trees, shrubs and herbs which will serve such purposes is given at the end of this paper. Thus a Botanist can help in not only finding out new areas for plantation by his ecological surveys but also by suggesting suitable trees for protecting cultivated areas and enriching them with organic green leaf manure, besides helping the farmer incidentally to produce other valuable products.

In helping to solve the erosion problem, it is not enough if trees alone are grown. There are also some quick growing herbacious plants which cover up the earth so well that they not only keep the soil well

bound and knit up but also enrich it with nitrogenous matter, if they are legumes *Glycine javanica* a wild ally of *Soyabeen* is very promising, the Tropical Kudzu, *Pueraria phaseoloides* in some places, the Giant Star, *Cynodon plectostachyum* in a good many places. Luckily for us these plants can also serve as fodder and so the surplus growth can be fed to animals in all these cases.

There is yet another direction in which the Botanist can help towards increasing food production. If one enters a forest and pauses to think "what is it that is responsible for the magnificient growth of the various trees, shrubs and herbs that constitute a forest" the answer is that Nature herself furnishes fertilizers in the form of humus thus becoming self-supporting in regard to manures.

Humus is the richest of manures as devised by mother Nature. There might be controversies with regard to the advisability or otherwise of using artificials but there are no two opinions on the usefulness or otherwise of organic green leaf manure. All green leaves are good but more so the legumes. A list of plants likely to be useful as green manure is given in Appendix II. There are several wild plants whose leaves could be used as vegetables (vide " A few important cultivated and wild leafy vegetables of South India " in the Madras Agricultural Journal, Vol. XXIX, No. 4, April 1941, pages 137-143.) There are several wild fruits which come in handy in days of food scarcity and regular propaganda should be done to teach the public to collect and utilise such fruits. For example the arils of *Pithecolobium dulce* are sold regularly in the Madras, Tanjore and Coimbatore markets. The fruits of Bilva, wood apple *Cicca distyda*, *Emblica officinalis*, Ayini-pala, bread-fruit spardias etc., a host of them deserve our consideration.

Last but certainly not the least of the ways in which the Botanist plays his part is in helping to produce more fodder crops. Several of our green manure plants have a double value. They serve to feed our cattle and also add fertility to the soil. Grasses form a very rich source of cattle food It is not enough if we feed our cattle with the straw of paddy and cholam, it is also necessary to utilise green grass which gives them nourishment and strength and for increasing the milk yields. The Botanist can suggest grasses suited for different tracts and a list of them is given for the information of our readers in Appendix I.

APPENDIX I.

The following species are recommended for extensive trials :—

1. Chionachne semiteres, Fischer 2 Chionachne Koenigii, Thw, 3 Sehima nervosum, Stapf. 4. Amphilophis pertusa, Stapf. 5. Chrysopogon montanus, Trin. 6. Dichanthium caricosum, A. Camus 7. Dichanthium annulatum, Stapf. 8. Heteropogon contortus, Beauv. 9. Iseilema laxum, Hack. 10. Iseilema anthephoroides, Hack.

11. Eremopogon foveolatus, Stapf. 12. Andropogon pumilus, Roxb. 13. Panicum antidotale, Retz. 14. Cenchrus ciliaris, L. 15. Cenchrus setigerus, Vahl. 16. Enteropogon monostachyos, Schum. 17. Cynodon Dactylon, Pers. 18. Cynodon plectostachyum, Pilger 19. Chloris Bournei, Rang & Tad. 20. Panicum maximum, Jacq. 21. Pennisetum purpureum, Schum. 22. Pennisetum clandestinum, Hochst. 23. Sorghum sudanense, Stapf. 24. Chloris Gayana, Kunth.

These grasses may be tried in waste lands, pastures and in reserve forests. By such trials, the fodder output from waste lands, pastures and grazing areas can be increased.

APPENDIX II.

(1) Economic Plants (Leguminous group.) 1. Glyricidia maculata. 2. Delonix elata. 3. Delonix regia. 4. Enterolobium saman. 5. Pongamia glabra. 6 Peltophorum ferrugineum. 7. Cassia siamea. 8. Cassia auriculata. 9 Leucaena glauca. 10 Erythrina indica. 11. Adenanthera pavonina. 12. Prosopis juliflora. 13. Albizzia Leboeek, 14. Albizzia amara. 15. A. moluccanna, 16. A. stipulata, 17. Butea frondosa 18. Tephrosia vogelli. 19. T. candida. 20. T. purpurea - Kolinji. 21. Crotalaria striata. 22. Crotalaria veru cosa. 23. Crotlaaria juncea. 24. Sesbania speciosa. 25. Sesbania grandiflora. 26. Sesbania bispinosa

(2) Economic Plants (*Non-leguminous group*) 1. Hibiscus tiliaceus. 2. Kydia calycina. 3. Thespesia populnea. 4. Guazuma tomentosa. 5. Chloroxylon Swietenia 6. Azadirachta indica. 7. Cendrela Toona. 8. Swietenia Mahagoni. 9, Terminalia Catappa 10. Anogeissus latifolia. 11. Spathodea campanulata. 12. Polvalthia longifolia 13. Filicium decipiens. 14. Pisonio alba. 15. Stenolobium stans. 16. Holoptelea integrifolia. 17. Calophyllum Inophyllum. 18. Odina Wodier. 19. Tithonia diversifolia. 20. Ipomea hispida. 21. Ipomea carnea. 22. Macaranga pilpita.

(3) For Erosion Control and Fodder purposes. 1. Pueraria phaseoloides (Tropica Kudzu). 2. Glycine javanica. 3. Phaseolus trilobus. 4. Ipomoea Pes-Caprae.

The Food Crisis: A Plea for Intensive Survey of Resources for Maximising Production

By

S. V. DORAISWAMY IYER, B. A., B. Sc., (Ag.)

Under the extraordinary stress and emergency requirements of war, the 'grow more food' campaign was started. Even after the cessation of hostilities the same unfavourable and acute conditions prevailed and the campaign had to be continued in the manner of a five year plan of food production drive by the Department. It is necessary therefore, to take up a detailed investigation of the various resources that exist in every locality or unit area, in order to see how far these have been utilised till now and then push on with a better and bigger plan in the immediate future for increasing of food production exploiting every resource to the utmost extent. We already have some knowledge of the resources in each tract or region, but it may not be full or complete in every detail. Particularly we know very little of the human material which is often elusive, though highly potent in its influences. The attitude, psychology, idiosyncrasies and capabilities of the class or community directly in charge of production, are well worth a detailed study as only then we can at once improve the socio-economic conditions in such a way as to ensure perfect co-operation from them. Our drive for production has also to be adjusted according to basic conditions existing in every unit of locality so that time and money may not be wasted on unproductive efforts.

Details of resources for survey. A detailed and thorough investigation is to be made of the following important resources keeping the Taluk as the unit area of study and future development.

1. Maximum area that could be brought under improved strains.
2. Best combination of manures, natural and artificial that could be adopted.
3. Maximum new area that could be brought under cultivation.
4. Scope for stepping up production of green manure or supply of leaf from forests or natural agencies.
5. Scope for introduction of new crops including vegetables and fruits.
6. Scope for savings of seed by improved methods.
7. Chief pests and diseases that reduce yields and their control measures, equipment and facilities required.
8. Improvement in irrigation scope for sinking new wells, deepening of tanks, construction of new canals etc.
9. The cultivating class; their attitude, receptiveness, abilities etc., for active co-operation.

10. Any impediment, economic or social disability or indebtedness which may impede progress.
11. Scope for co-operative farming to increase production.
12. Results achieved in connection with the present five year plan of grow more food campaign.

Any other kind of resource which may be found to exist in any locality may also be added to this list. A suggested form of questionnaire covering the above has been prepared and reproduced in Appendix A. This is also subject to improvement in the light of experience gained by actual investigations.

Execution of survey and personnel. A special staff is necessary to be employed for taking up this survey under the guidance of two experienced officers of the department, one for the Telugu area and the other for Tamil and Malabar. This special staff should be drawn from experienced demonstrators of fairly uniform type and experience, selected for ability to investigate, elicit information and report properly with the aid of the questionnaire. About a dozen of them will start in each of the areas taking up one district each and they may take about four months to complete the survey. The guiding officer will tour round the districts guiding the staff at work and see that the investigation is as complete as possible. After the survey is over they can meet at a central place with the reports which should be scrutinised by the officer and discussion initiated. If it is found that some information is lacking or any aspect is not complete, instructions are given for further survey. The survey work may be expected to be over in about six months and the guiding officer may then take about three months to consolidate and present the 'history sheet' of each unit in such shape and form that each would show at once the existing potentialities and the possible lines in which they can be tapped for increasing the production of food crops. These sheets can then form the basis for an intensive plan of development for a ten year period in two five year stages, with targets of achievement fixed for each kind of food crop in the unit. By the working of such a plan launched on the structure of this survey we may surely expect to double the yields at the end of the ten year period. The demonstrators now working in the taluks are having heavy responsibilities themselves and are not of uniform experience, qualification or abilities. Hence the survey work has to be carried out with a specially selected staff.

Conclusion. The Sub-Committee on planning in England has said, "A complete scheme of planned economy is a vast undertaking requiring full information and data, and willing co-operation of technical experts, industrialists, administrators and the public at large". Without 'full information and data' a proper plan for maximum production cannot be worked with any certainty of success. Sir. M. Visweswarayya in his

'Planned Economy for India', has said "A survey of existing conditions is made first and then a plan of development and recommendation is drawn up envisaging the main purpose and objectives aimed at". In his book he has discussed at length under 'Economic survey', the existing conditions in the country in all its economic aspects and then suggests a ten year plan of development. Professor Radhakamal Mukerjee who was entrusted with the task of preparing a plan of economic development for the State of Gwalior, first made a detailed survey of the existing conditions and resources in the State before preparing the scheme of development.

It may be appropriate at this juncture to support the special recommendation made by Sir. Manilal B Nanavati in his speech at Nagpur some time ago that it is worthwhile for us to study the working of the United States Department of Agriculture, particularly its rehabilitation and development activities, before we reorganise our Departments and work plans of development. In the words of Sir. M Visweswarayya, "The organisation and activities of the U. S. A. Department of Agriculture seems to be a model for India to follow. The department is described as a thoroughly businesslike institution and it has an army of over twenty thousand able workers of every kind". The survey of resources suggested in this paper may not solve the food crisis in the near future, but it will serve as an excellent foundation to build the edifice of self-sufficiency in food for our Province.

APPENDIX A.

Questionnaire for Survey of Resources.

District. TALUK.

Topography, nature of soil, systems of cultivation.

No. and names of firkas, No. of villages, centres of departmental work. Population, nature of agricultural community.

Names of food crops and area in each. Average yields of previous five years. Peculiarities in practices or rotation, etc.

Approximate number of owner cultivators, tenants. Number of small, medium and large holders in each firka.

Irrigation resources. Number of wells, tanks. Scope for sinking new wells, deepening of tanks, construction of new canals etc. No. of pumps working, scope for introduction of more.

Seeds. Strains used, areas in each, scope for further increase in area; maximum, scope for economising seed.

Manures. Kind and quantity used, scope for using heavier dose; facilities for getting cake and other natural and artificial manures, growing of green manures, supply from forests or other regions; methods of increasing supply to the maximum.

Pests and diseases. Percentage loss during last five years; remedial measures; what facilities required; scope for quick action and co-operation of ryots.

New areas. How much available; nature of soil and condition, scope and method of improving it for production; utilisation of tractor etc., scope for colonisation.

Scope for introduction of *new food crops* or fruits or vegetables.

The cultivators. Their attitudes, communist influences etc., relations between landlords and tenants and labourers; receptiveness, enthusiasm or eagerness for improvements; economic and social disabilities; methods of improvement; indebtedness; if it is acting as a brake on better production.

Special problems to be solved or special facilities to be created for better living conditions and better attention to cropping.

Co-operative farming. Scope; are there chances of better production by this means; scope for consolidation of holdings even in limited areas.

Results achieved by the present grow more food campaign; give details, defects in working, improvements necessary.

SUMMARY.

TALUK POTENTIAL.

TALUK TARGETS. End of five year period.

End of ten year period.

Spacing Trials on Chillies, *(Capsicum Annum)*

I

Introduction. Guntur was originally a very important centre for the successful production of dry chillies having good colour and pungency. The cultivation of the crop suffered a decline during the past quarter of the century due to heavy thrip attack. Thrips are a severe menace for chillies. Efforts made at the Agricultural Research Station, Lam, since 1931—32 to evolve thrip-resistant varieties by selection and hybridisation methods resulted in the release of "G. 1" Strain (popularly known as "Farm or 398" chillies) in the year 1937—38. This variety is fairly tolerant to thrips as against the highly susceptible local types and yields 38% more than the locals. It is noted for its pungent, long, thin and red fruits with cup-shaped persistent calyx and commands a very good price in the market. The popularity of the strain is increasing year by year and there is a great demand for its seed supply.

Other problems confronting the chilli grower are the heavy seedling rot in the nurseries and the high seedling mortality in the fields by the attack of cockchafer grubs. The latter are mostly found in un-rotten cattle manure and play considerable havoc in the field, gnawing away at the collar of the chilli plants. Possibly this could be avoided if well rotten cattle manure is applied. The seedling rot is a severe disease devastating entire nurseries in certain years but which could be saved by timely sprays with Bordeaux mixture. The local method of transplanting the seedlings in the main fields is in bunches of 4 to 8 plants in a hole spaced 22" in either direction. This requires a large number of seedlings per acre and thus the availability of seedlings was a problem in years of heavy seedling rot. Besides, the local spacing was defective in that (a) the cockchafer had a tendency to cut all the plants in the bunch (b) all plants in the hole suffered in years of severe thrip incidence and (c) the growth of individual plants was suppressed due to inter-plant competition. Hence to determine the optimum spacing for chillies, trials were started at this Station from 1944—45 under the guidance of the Cotton Specialist, Coimbatore, and the results obtained are detailed below:

Spacing cum Varietal Trials 1944—45. Nine varieties were compared with G. 1 Strain (398 Chillies) in a complex experiment, with four different spacings. The normal spacing in the tract viz, 22" x 22" (in between the rows and plants in the rows) planted in bunches was compared with other spacings. The comparison of four spacings and the varieties was arranged in a split plot design of 4 x 10 x 4.

TABLE 1.

F. No. 2-A.

Area of Main plot. 1·5 cents.
„ Sub-plot. 0·15 cents.

Sub—Treatments—Varieties 10.

G. 1. (Control), 1,402, 1,406, 1,410, 1,457, 1,825, I. P. 34, I. P. 41, I. P. 46 and I. P. 51.

Main Treatments—Spacings 4.

A. 22" x 22" in bunches (Control).
B. 22" x 11" in singles.
C. 22" x 22" in singles.
D. 22" x 22" in doubles.

Summary of Results.

Mean Yields of Ripe Chillies in Pounds.

Particulars.	A.	B.	C.	D	Standard error.	Critical difference.	Remarks.
Yield per plot.	1·86	2·40	1·89	2·05	0·158	0·39	Significant
„ acre.	1,240	1,600	1,260	1,367	105·85	258	P<0·05.
Yield expressed as % over control	100	129	102	110	8·5	20·8	

Conclusion. B. D. C. A.

The differences in yields were significant both between spacings and varieties. Among the spacings, 22" x 11" singles was the best.

These trials were continued in the year 1945—46 and 1946—47 with four spacings and only one variety, the local spacings of 22" x 22" in bunches serving as the control. The results obtained are furnished below:

TABLE 2.

Layout: Randomised replicated blocks 4 x 6.
Variety: G. 1. Chillies.

Treatments—Spacings 4
As in the year 1944—45.

Summary of Results.

Year.	Particulars.	A.	B.	C.	D.	Standard Error.	Critical difference.	Remarks.
1945—46.	Yield per Plot (0·30 cents)	3·85	5·59	4·62	5·42	0·43	0·92	Significant P. < 0·05.
1945—46.	Yield per acre.	1,283	1,863	1,540	1,807	143	307	
	% over control.	100	145	120	141	11·2	23·9	B D C A

Year.	Particulars.	A	B	C	D	Standard Error	Critical difference.	Remarks.
1946—47.	Yield per plot (0·224 Cents).	1·08	1·68	1·07	1·17	2·85	6·7	
	Yield per acre.	480	750	477	521	79·5	169·4	Significant P < 0 05.
	% over control.	100	156	99	108	16·9	35·8	B D A C

The difference in yields between various treatments was significant in both the years and the spacings of 22" x 11" in singles recorded the maximum yields consistently in all the three years of trial. There was no marked difference between the various treatments either in the attack of thrips or cockchafer grubs or in the period of flowering. These trials have clearly indicated the superiority of 22" x 11" singles. It was inferred that the increased yields recorded in the case of treatment B, continuously for three years are due to the robust growth of plants which had a wider scope for development.

At the instance of the Cotton Specialist, Coimbatore, the above trials were further modified and continued during the year 1947—48, spacing them still closer in order to determine whether any more increase in population per unit area will be advantageous with regard to yields, earliness and thrip-resistance. The treatments with yield are given in the Table below. Thrip attack was more or less similar in all the treatments but flowering was recorded to be slightly earlier in the case of treatment D.

TABLE 3.

1947—48.

F. D. No. 2-E.

Layout:	Randomised replicated blocks 4 x 6.	**Treatments Spacings 4.**
Area of each plot.	Gross 0·21 cents.	A. 22" x 22" in bunches (Control)
	Nett. 0·10 ,,	B. 22" x 11" in singles.
Variety:	No. 1,402 Chillies.	C. 22" x 7⅓" do.
		D. 22" x 5½" do.

Summary of Results.

Mean Yield of Ripe Chillies in Pounds.

Treatments	1st picking		2nd picking.		3rd picking.		Total per plot.		Yield per acre.	Yield as % over control.	Standard error.
	lb.	oz.	lb	oz.	lb.	oz.	lb	oz.	lb.		
A. 22" x 22" bunches.	0	— 4	0	—2·7	0	—3	0	—10	625	100	188·8
B. 22" x 11" singles.	0	— 5·9	0	—4·3	0	—3·8	0	—14	875	140	
C. 22" x 7⅓" do.	0	— 9·9	0	—4·1	0	—3	1	—00	1,013	162·1	
D. 22" x 5½" do	0	—10 50	0	—5·3	0	—3·2	1	—3	1,187	189·1	

Differences not Significant. P < 0·05.

Though the yield differences are not significant, the last two treatments viz., D. and C. have recorded numerically higher yields. This season being characterised by heavy thrip incidence, the increased yields are probably due to the induced earliness in the crowded treatments. In normal years, the closer spacings may not give profitable yields as the scope for development of individual plants will be very limited when the spacing between plant to plant is $5\frac{1}{2}$ or $7\frac{1}{3}$". But the nature of thrip attack cannot be foreseen at the beginning of an year so as to determine the suitable spacing to be adopted for the economic returns to the grower. It will be therefore safer to adopt the closer spacing of 22" x $7\frac{1}{3}$ or 22" x $5\frac{1}{2}$" if they prove to be as good as 22" x 11" singles in heavy thrip seasons and thrip-free years. These trials are being continued.

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Agricultural Research Station,
Lam P. O., Guntur.

M. Lakshmi Reddy,
Cotton Assistant.

A Note on the Banana Variety, "Moongil"

II

A number of banana varieties are grown in South India, some on a commercial scale, a few are limited to certain regional use and home gardening, while there are yet a few others confined to one or two gardens or experimental areas only. To this last category belongs, the banana variety 'Moongil' or 'Ottamukil', which is of some interest to the lay man as well as the scientific worker.

This banana variety bears the name 'Moongil' in Jacob's (1942) list of the bananas of the Travancore State, while it is referred to as 'Ottamukil' in the Government Farm at Ollukara (Cochin State, S. India) from where the writer obtained a few suckers for his study at the Agricultural Research Institute, Coimbatore, during the years 1942—1945. The information kindly furnished by the Manager, Government Farm, Ollukara, reveals that this variety was first grown in that farm from suckers obtained from the Travancore State in 1926. It is reported that the plant grows wild in the Travancore forests and it is not known to be cultivated on any appreciable scale anywhere in India. Jacob (1942) mentions that it is one of the rarest varieties and it is grown in new clearings in hilly places near Neyyattinkara (Travancore).

This variety is akin to some S. Indian banana varieties such as the 'Nendran', differing in some respects from the plants of the Nendran group (Jacob 1934, 1942; Venkataramani 1946). Though this variety is not grown on a large scale it merits attention from the scientific worker because of certain interesting characters. A brief description of the variety is given below.

Plant. Tall, height about 12 feet; girth of trunk (pseudostem) at base about 27 inches, pseudostem pinkish in colour, tapers from base to crown, leaf, green, about 7 feet in length and about 24 inches in width, margins of the petiole and mid-rib of the lamina coloured pink; number of leaves about 36; suckers freely; duration late maturing

Inflorescence & Bunch. Inflorescence short and few-flowered, flowers all fertile, staminate (male) flowers not being produced. Bunch is semi-erect or drooping, peduncle green, glabrous and thick, number of hands one or two and rarely more than two, with about 15 fruits. A medium bunch weighs about 20 lb According to the information furnished by the Manager, Ollukara Farm, an instance of a bunch having only one fruit is also reported the fruit being 18 inches long with proportionate thickness.

Fig 1 The Banana Variety, "Moongil" (Note the curved fruits & the axis marked 'a')

Fruit. Large, about 13 inches in length, about 6 inches in girth in the middle, almost cylindrical, curved and horn-shaped; pedicel, long and slightly twisted; irregularly five-sided, angle ridges distinct, sides almost inflated. base narrowing, apex tapering with a prominent beak skin or rind thick with little spongy fibre on the inner surface, tough and leathery. yellow when ripe, peels off from the pulp with some difficulty; pulp firm, seedless core distinct, rather pink in colour, flavour mildly pleasant, taste medium sweet, keeping quality good, good for culinary purpose but medium as a desert fruit. Taste of fruit almost same as the Malabar Nendran.

Trials to grow this variety at Madras were not very successful.

The variety described above is similar to the Nendran group of bananas of S. India [*Musa sp* ? (*Musa paradisiaca* Linn.)] with persistent

bracts and sterile flowers, except that in this case no sterile flowers are formed and only one or two clusters of fertile flowers are produced, the fruiting axis ending abruptly as a naked and short stump. (Text-fig. 1). From the other morphological characters it is not possible to separate this variety as a distinct species. The species *Musa corniculata* as described by Kurz (1878) and Fawcett (1913) appears to be similar to this variety. Lou reiro's original description of *Musa corniculata* (kindly furnished by Prof. Cheesman) is very brief, and from the available meagre literature it is rather difficult to assign a definite rank to this seemingly distinct "Horn plantain". Prof. Cheesman, in a private communication, states that he is of the opinion that *Musa corniculata* of Loureiro was meant to apply to the common type of banana (plantain) which has large horn-shaped fruits and no male flowers, and that he is also satisfied that it is no more than a variety of the banana with male flowers and persistent bracts, described by Linneus as *Musa paradisiaca*.

Concerning the classification of the cultivated and edible bananas there appears to be considerable contradiction between from different authorities and this has been already well emphasized (Cheesman 1934; Venkataramani 1946). The classification of the cultivated varieties is a separate problem from the general taxonomy of the genus *Musa* and this needs a different technique for its solution. As long as confusion exists regarding varietal names and as long as there is the existing bewildering synonymy there can be neither true classification nor description The object of classification is only to bring together those varieties which have several important characters in common, and this means that a descriptive study of every variety is a necessity. The present study was undertaken with this latter point in view, the question of classification being only secondary. It has also now been shown that an edible banana variety could be bred from a cross between two species and the origin of an edible diploid and the significance of interspecific hybridization in 'the banana complex' has been recently discussed by Dodds and Simmonds (1948). With the wealth of material available in this country it is believed that a detailed descriptive study of all the Indian varieties, both wild and cultivated, will furnish valuable information useful in the banana breeding programme.

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K. S. VENKATARAMANI, M. Sc.

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MONTHLY LIST OF ADDITIONS, NOVEMBER, 1948.

(1)	BAVER (L D.)	Soil Physics. Edn 2. 1948.	1948
(2)	COWIE (Alfred T.)	Pregnancy diagnosis tests—a review.	1948
(3)	FISHER (R. A.) and YATES (F.)	Statistical tables for Biological, Agricultural and Medical Research Edn 3	1948
(4)	FLSVRE (H. J) etc.	Geography, the world and its peoples.	1948
(5)	PALMGREN (Arvid)	Ball and roller bearing Engineering Edn. 2.	1946
(6)	ROSAVEARE (G. M.)	Grasslands of Latin America (Imperial Bureau Pastures and Field Crops Bull 36).	1948
(7)	SHAH (K. T.) Ed.	Labour — Report of Sub-committee, National Planning Committee Edn. 1	1947
(8)	,,	Manufacturing Industries. Edn. 1.	1947
(9)	,,	National Housing Edn. 1.	1948
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(11)	,,	Rural Marketing Edn. 1.	1947
(12)	,,	Womans role in planned economy Edn. 1.	1947
(13)	TYSSER (H. F.) Ed.	Fruit Annual 1947—48.	1948
(14)	LABOUR in India.	A Souvenir book issued on the occasion of the Preparatory Asian Regional Conference of the I. L. O.	1947

HINTS TO FARMERS

I. Control of paddy Jassids: The recent outbreak of paddy jasside in the Central District is a remarkable instance of a minor pest assuming the role of a major pest. It has done considerable damage to paddy crops especially in tracts where paddy is grown under well irrigation in isolated areas. The infested fields appear blighted due to the sucking of plant juice by the hoppers in large numbers.

Control Measures: (1) Thorough hand netting in early stages and killing, will prevent the hoppers from laying eggs to repeat the life cycle which is only about 23-25 days (2) Since the hoppers are very much attracted towards light, as we see them swarming in thousands round house lights, light traps can be set up in different parts of the field till about 10 P. M. (3) Spraying with D. D. T. 550 at the rate of 100 gls. per acre, the strength being 0·1% i. e. two lbs of the insecticide dissolved in 100 gls. of water. This will cost about Rs. 6 to 8/- per acre (4) As the jassids feed on succulent grasses adjoining paddy fields in the off-season, the ryots will be well to adopt strict field sanitation.

II. Hints for the preparation of Bordeaux mixture:

One per cent mixture (5–5–50).

Copper sulphate	5 pounds.
Quick lime	5 pounds.
Water	50 gallons.

Dissolve the copper sulphate in 25 gallons of water in a wooden earthen-ware, or copper vessel. The quickest way of doing this is to tie the copper sulphate crystals loosely in a piece of gunny and suspending it at the top of the water column in the vessel. Slake the quick lime by sprinkling some water over it; add more water till a creamy paste free from lumps is formed. Add the remaining water to this paste and stir well. Strain 'the milk of lime' into a third vessel. Now *add the copper sulphate solution to the 'milk of lime'* stirring the mixture well all the time. To test the mixture, dip a shining knife blade or any other piece of polished iron into the mixture for about a minute. If the blade shows a reddish deposit of copper, add more 'milk of lime' till the clear blade is not stained when dipped afresh in the mixture.

Bordeaux mixture, deteriorates on keeping. Care should be taken to prepare only just the quantity required for immediate use. It sometimes happens that unforeseen rains upset a day's programme and a portion of the mixture has to be left over for the next day. The mixture left overnight can be preserved by the addition of sugar or jaggery to it at the rate of half a pound per 50 gallons of the mixture.

Agricultural News Letter December, 1948

1. Agriculture in Secondary Education:

In the re-organised secondary education 'Agriculture and Gardening' has been prescribed as one of the subjects for vocational courses of study from forms IV to VI. One of the schools that has adopted Agriculture both as a craft and as a vocational course of study is the Sivaswami Ayyar High School, Tirukattupalli, Tanjore. At present 40 pupils are taking instruction in Agriculture. This is good news indeed, compared with the earlier attempts in imparting Agriculture in Schools. If this popularity continues, in the course of three years there will be 120 pupils studying Agriculture in that School The School has a 30 acre farm to serve the needs of practical instruction in Agriculture and also as a source for growing the necessary food material for the hostel attached to the school. The Hon'ble Minister for Agriculture recently declared the farm open. About 30 acres of *poromboke* was alienated by the Government. It was made fit for cropping by the school authorities with the help of modern mechanical equipment. About 20 acres have been planted with paddy and 7 acres have been reserved for horticulture. Provision has also been made for a fish pond, a threshing floor and other appurtenances. It is the aim of the school to start a dairy farm also so that the students would get training in modern methods of handling dairy produce, not to speak of its usefulness in providing milk and other products to the school hostel. It is hoped that the enthusiasm of the school authorities would become infectious to the farmers in that locality.

2. Manuring Necessary with Irrigation:

On the black clay soils of the Bellary District which forms part of the Madras Deccan, Sorghum *(Cholam* or *jonna* or *jowar)* and cotton are the main crops that are grown. As water supply was the prime limiting factor for the successful growth of the crops, it was considered that if they were irrigated, by the help of the waters of Tungabhadra, when the project is complete, their yields would be increased. In the rain-fed conditions the normal acre yields have been 450 lbs. of sorghum. By irrigation alone the yield was increased to about 900 lbs., but when irrigation was combined with adequate manuring the results were still better. Sorghum manured at 60 lbs. nitrogen per acre and irrigated gave an acre yield of 2244 lbs. of grain and cotton manured at 80 lbs nitrogen gave a return of 672 lbs. per acre of unginned cotton. Further work is in progress. The indications are that where crops are irrigated, there is need to manure the land as well, in order to get the full worth of irrigation.

3 Good Yields from Summer Paddy Crop:

It is common knowledge that the average yield of paddy in this country is far lower than those of China, Japan, Spain and Italy. In the countries where very high yields of paddy are reported, paddy is grown at a time when there is bright sunshine and very high humidity. The majority of paddy grown in this Province is after summer when water supply is assured after the monsoon rains. But to a small extent paddy is grown in the seasons known as *Kar* and also in the season 'Kuruvai'. In tracts where the percentage of the area of *Kar* or *Kuruvai* crop could be large, the yield of paddy in that tract also is high. By way of example the Tambaraparani Valley in the Tinnevelly District and lands fed by the Kalingarayan Channel of the Bhavani area might be quoted, not to speak of the *Kuruvai* crop of the Tanjore District In this season the following have been some of the outstanding yield records obtained from the harvest conducted in September last.. The paddy strains known as Ambasamudram 1, 2 and 7 have recorded yields of 3550, 3310 and 3610 lbs. per acre. The strain ADT. 3 has given an area yield of 3300 lbs. which may be said to be the record so far at the Pattukottai Station. Therefore one of the means to enhance the yields of paddy in this Province would be to increase the area that could be grown with either *Kar* or *Kuruvai* paddy varieties.

4 Timely Advice to Tanjore Farmers to Improve their Standing 'Thaladi' Paddy Crops.

In very many fields, the standing young *Thaladi* crop, especially those transplanted late in the season, remain stunted in growth and some cultivators have been of the view that it was due to 'soorai' caused by mealy bugs. But a closer examination would reveal that the central shoots of the infested plants or tillers are dried up which is due to the attack of the paddy stem borer A top dressing of Ammonium Sulphate at the rate of about 100 lbs. per acre would considerably improve the situation. Fortunately one or two tillers invariably survive in each clump, even after a severe infestation of the pest and such surviving plants could be invigorated to tiller profusely by the application of Ammonium Sulphate. No time should, however, be lost hereafter for the application of the fertilizer. As the borer moths are attracted in large numbers to bright light at night, light traps would prove to be a useful remedial weapon, if all the ryots of a locality would adopt it in their common interest Moths are attracted to light in larger numbers during dark nights than during moonlight nights. Local Agricultural Demonstrators may be consulted, if necessary for the setting up of the light traps.

Samba and *Thaladi* nurseries of paddy in the Tanjore District are frequently subject to a heavy attack of thrips The seedlings grow thin and run out in vitality, resulting in the shortage of seedlings as well as reduction of yield of the planted crop. A timely spraying of the affected nursery with tobacco decoction accompanied by a dressing of Ammonium Sulphate at 100 lb. per acre considerably helps to put down this pest. The common belief, that application of Ammonium Sulphate in the early stage makes pulling out of seedlings at the time of transplanation difficult, has been found baseless from the experience at the Agricultural Research Station at Aduturai. The cost of spraying a 10 cent nursery to plant an acre will be Rs. 1—8—0.

5. Two More Piricularia Resistant Paddy Strains:

From the variety of paddy known as *Mologolukulu* two cultures No. 2555 and No 2202 have been found to be highly resistant to the blast disease known in Telugu as 'Medavirupu' and in Tamil as 'Kollai Noi'. These two cultures are suitable for the District of Nellore and for the adjoining areas. In 1947—48 when this disease was severe in Nellore the two cultures displayed a very high resistance to the disease and yielded 20 to 40 per cent over the local variety *Mologolukulu*. They have been named as BCP. 1 and BCP. 2 respectively and are being multiplied in an area of about 10,000 acres in this season. The farmers of the Nellore District hereafter need not suffer any loss by the incidence of the fungus, *Piricularia*, on paddy.

6. Scotch the Insect Foes:

The control of insect pests was not a very easy problem, as it had been more a question of fighting against Nature. The recent experience of the two wonder insecticides, D. D T. and Gammexane, have practically rung the death-knell to most of the insect forms. They kill the insects by contact by paralysing their nerve centres. They are also stomach poisons and fumigants too. Both the chemicals have a somewhat delayed action, but of the two Gammexane has a quicker knock-down effect, while D. D. T. is slower but more sure. Conservation of the enormous stock of food grains against the insect hordes has ceased to be a problem by a judicious use of the two chemicals. In the field, Gammexane D. 025 literally decimates serious insect pests like grasshoppers on paddy and sugarcane, the rice bug, the cholam earhead bug, the sugarcane fly, flea beetles, termites and a host of other insects. The dust was extensively used recently in the Kistna District against the paddy grasshopper, where the farmers under the Agricultural Department purchased over 100 cwt. of Gammexane and dusted their fields with Spectacular results. D. D. T. appears to have a more or less specific action against leaf-eating grubs, termites and a variety of household and livestock pests. Another remarkable instance of the high potency

of D. D. T, as an insecticide has since been brought to light in the case of the paddy jassid, which has suddenly shot up into prominence recently. Two pounds of D. D T 550 wettable powder mixed in 100 gallons of water will be enough to spray an acre. The action of the insecticide is somewhat slow, but the annihilation of the pest is sure in the course of three days The cost works at about Rs. 6/- per acre.

7. New Method to Combat the Sorghum Ear-Head Bug:

The Sorghum Ear-Head Bug (Calocris angustatus) is a very serious pest on Sorghum. It is common in the early season (*Punasa*) crop of the Guntur District and in the summer irrigated Sorghums of the Coimbatore District. There have been instances of almost wholesale loss of the Sorghum grain by the effects of this insect in certain years in the Bellary District. The insect sucks the plant-sap when the grain is about to be formed, with the result that the ear-head is filled with ill-formed, shrivelled and almost chaffy grain.

The experience at the Agricultural Research Station, Siruguppa, shows that if D. D. T. wettable powder is mixed with water and sprayed at 1 per cent strength when the crop is in short blade stage the ill effects of the insect are got over. The cost of spraying which includes the price of the insecticide and the labour has been at about Rs 10/- per acre. Spraying was done with the aid of an ex-A. R P. stirrup pump fitted with a nozzle suitable for spraying. The labour employed was one adult and a boy. If the spraying had been done with a more efficient sprayer, the cost would have been still less.

8 Sweet Lupin — Pulse Crop of the Hill Stations

Red gram dhall is an everyday requirement of any Indian home. At present this commodity is in short supply. Being essentially a tropical plant it does not thrive at elevations above 4,000 ft. A substitute for Red gram which will come up in higher, elevations and milder climate is under cultivation at the Agricultural Research Station Nanjanad. This is known as 'sweet lupin' (Lupinus angustifelius) It is a seven month crop that is sown in April and harvested in October–November for seed purposes. The seeds can be used in the place of peas while green and in place of *dhall* when dry. It can also replace horse gram as a cattle feed. This is in addition a suitable green manure crop for the hills and produces remarkably large nodules of nitrogen fixing bacteria which enrich the soil. A green manure crop sown with 100 lbs seed per acre would give 10,000 lbs. of green material as manure when harvested prior to the flowering stage It is a boon to Nilgiris District where the soil is poor in plant food and organic matter, so essential to support good plant growth. Small quantities of seeds of this dhall purpose crop can be obtained from Superintendent, Agricultural Research Station, Nanjanad.

9 A New-high Yielding Karunganni Cotton for the Tinnevelly Tract

By way of further improvement over the earlier strain a new one called 'K. 2 cotton' has been evolved for general distribution It is vigorous and quick growing giving about 15 per cent more yield than the local mixture and about 3 per cent over the earlier strain K. 1. It is suitable both for the Karunganni and Uppam areas thereby making it possible to replace the low grade and unprofitable Uppam cotton by this new strain Unlike the local cotton or K. 1 strain the new strain K. 2 is able to withstand the ill effects of untimely rains in January and February which cause heavy shedding of flowers and immature bolls. The new strain K 2 bears big bolls which open well making it easy for quick and clean harvests The new strain K. 2 has a good staple length capable of spinning upto 28's standard warp counts; whereas K 1 spins only upto 22's and the local cotton still coarser yarns upto 16's. Where K. 1 was capable of yielding Rs. 6 or 7 extra income over that of the local cotton, this strain K 2 would give still higher income upto Rs. 20 per acre over the return of the local cotton. There is a scheme for the rapid multiplication and distribution of this improved cotton. The cotton growers of the Tinnevelly tract should take full advantage of the scheme.

10. Prospects of Long Staple Cotton in the West Coast:

The need for more long-staple cotton is greater now than ever before due to increasing spindleage and the partition of the country Ways and means of producing all the country's requirements are underway. One such programme is the trial of Sea Island Cotton in the Malabar Coast. Sea Island cotton grown by a gentleman farmer of Udipi in his backyard was sown early July 1947 in the Agricultural Research Station at Pattambi and Taliparamba in Malabar and Nileshwar and Kankanadi in the South Kanara District. The harvests were completed by October-November and the plants were ratooned in May 1948 leaving a stump of 9" from the ground. These ratooned plants put forth quick vigorous shoots, grew to a height of 2½' to 3½' and bore on an average 25 bolls per plant yielding 2½ to 3½ oz. of kapas per plant. The opening of the bolls was very satisfactory and the quality of cotton was fine, strong, with a staple length of 1·56 inch. The performance of ratoon cotton in modan paddy lands, coconut gardens, and vacant lands in that tract opens up great possibilities of growing cottons of Egyptian standard on an area of six lakhs of acres as mixed and subsidiary crops without in any way affecting the existing food production of that tract.

11. When to Harvest Sugarcane:

The formation of sugar in the sugarcane is enhanced as the growth slows down. After reaching a peak when the cane is said to mature, the sugar content in the cane gets gradually reduced by the crystalline sugar getting inverted into non-crystalline sugar which cannot be recovered in the sugar factories. Therefore, it is very necessary to know when the crop is mature so that it may be harvested at the period when it has a very high recoverable quantity of sugar in it. The sugar factory would be eager to buy mature cane as it would be getting out of the cane crushed as high a sugar quantity as possible. If the grower would make jaggery instead of sugar, it is only when he crushes mature canes that he would get the largest quantity of jaggery and of the best quality too.

The determination of total solids in the sugarcane juice by a simple "Brixometer" giving an index of sucrose per cent in the juice can be done by any sugar grower. In the case of a variety like Co. 419 the maximum Brix' reading would vary from 20 to 22 per cent depending on the season and soil conditions. If mature cane is to be tested by trial boiling of the cane juice Co 419 may be considered to be mature when the recovery of the jaggery is 12 per cent of the cane weight. Ordinarily the age of the crop would give a reliable index of the maturity of cane. Co. 419 which is largely cultivated in this province would be mature if harvested when it is 11½ months from the date of planting, if the planting was between February and April; but in a crop planted *in June its maturity is* attained in 10½ months.

12. 'Plio Film'—Preserver of Fresh Fruits·

'Pho Film' is a synthetic plastic product looking like glassine paper. It possesses two important physical properties desirable in a fruit wrapper, namely to be proof against moisture and a high permeability to carbon-di-oxide gas. Trials with this new wrapper in the preservation of limes, lemons, kumquats and grapes at the Fruit Research Station, Kodur, have given very promising indications that the 'Pho Film' wrapper assists the fruits to remain in a better state of preservation than that left untreated for periods ranging from 2 to 3 weeks. For prolonging the storage life of fruits, this is therefore an easy means within the reach of all.

Poultry Production· A scheme for the protection of Poultry against a common disease, known as Ranikhet fowl disease, has been started in the Madras Veterinary College. Under this scheme, all healthy birds in the locality are vaccinated. 2,31,500 doses of Ranikhet disease vaccine were produced and distributed from April 1948. A mass protection scheme has recently been launched over the entire Province.

Dairy-cum-Breeding: The Government have recently sanctioned a scheme for starting a Dairy-cum-Breeding Farm at Waltair, Vizagapatam, where the Military Dairy Farm was taken over by the Department of Animal Husbandry with effect from February 16, 1948. The scheme will be worked on commercial lines and work has already started in regard to stocking the animals and getting equipments etc.

Livestock Improvement: 133 new breeding bulls have been included in the Government premium scheme during the period between 1st April 1948 to 31st August 1948. On August 31, 1948, there were 1134 bulls under this scheme. A premium of Rs. 200 or Rs. 220, as the case may be, depending on the breed, is payable every year to the owner of each of these bulls towards the cost of their up-keep for the period they are in the scheme.

Woolly Sheep of the Nilgiris: There is a breed of sheep in the Nilgiris, which has a very fine wool, reported to be the best available in India. This breed, being small in number, is fast disappearing, owing to the animals being sold for slaughter year by year. The Government have sanctioned a scheme for the salvage of the available number of this breed of sheep—about 50—so that they may be reared on the Nilgiris and selective breeding carried on. Under this scheme, the woolly ewes and rams will be purchased very soon. (Issued by the Director of Information and Publicity in Charge).

Crop and Trade Reports

Statistics — Crop — Groundnut—1948—49 — Intermediate Condition — Report. The winter crop of groundnut has been affected by insect pests in parts of Bellary and Anantapur Districts and by want of timely rains in West Godavari, Anantapur, Cuddapah, North Arcot, Salem, Tiruchirapalli, Madurai and Ramnad Districts. The condition of the crop is generally satisfactory in the other districts of the Province.

2 The wholesale price of groundnut (machine shelled) per imperial maund of 82.2/7 lbs. are reported from important market centres on 6—11—1948 was Rs. 23—10—0 in Coimbatore, Rs 23—4—0 in Salem, Rs. 22—9—0 in Erode, Rs 22—5—0 in Vizianagaram, Guntur and Vellore, Rs. 21—14—0 in Cuddalore, Rs. 21—11—0 in Tadpatri, Rs. 21—4—0 in Adoni, Rs. 20—15—0 in Nandyal, Rs. 20—0—0 in Bellary and Rs. 18—0—0 in Cuddapah When compared with the prices published in the last report i. e., those which prevailed on 13—10—1948 these prices reveal an increase of 4 per cent in Adoni, 3 per cent in Coimbatore, 2 per cent in Nandyal and Cuddalore and a decrease of 11 per cent in Cuddapah and 2 per cent in Erode, the prices remaining stationary in Guntur, Tapdatri and Salem. (From the Economic Adviser)

Raw Cotton in the Madras Province. The receipts of loose cotton at presses and spinning mills in the Madras Presidency from 1st February, 1948, to 3rd December, 1948, amounted to 3,45,799 bales of lot 400 lb. unt as against an estimate of 2,83,700 bales of the total crop of 1947—48. The receipts in the corresponding period of the previous year were 3,80,264 bales. 457, 151 bales mainly of pressed cotton were received at spinning mills and 32,976 bales were exported by sea while 1,00,977 bales were imported by sea mainly from Karachi and Bombay. (From Director of Agriculture).

Weather Review—For November 1948.

RAINFALL DATA.

Division	Station	Actual for month in inches	Departure from normal in inches	Total since January 1st in inches	Division	Station	Actual for month in inches	Departure from normal in inches	Total since January 1st in inches
Orissa & Circars.	Gopalpore	3·4	—0·5	36·0	South.	Negapatam	17·4	—0·1	35·6
	Calingapatam	5·8	2·4	33·1		Adutural*	8·9	—3·1	21·1
	Vizagapatnam	7·3	2·6	29·1		Pattukottai*	8·6	—1·1	25·0
	Anakapalle*	6·4	3·3	35·5		Madura	7·0	1·3	21·6
	Samalkot*	14·8	10·2	40·3		Pamban	15·0	3·5	22·5
	Cocanada	15·1	9·5	49·1		Koilpatti*	13·0	5·4	35·9
	Maruteru*	6·4	1·8	33·4		Palamcottah	13·5	6·1	29·7
	Masulipatnam	13·0	7·3	37·0		Amba-samudram*	15·4	4·2	39·6
	Guntur*	...	...	..					
	Agri College, Bapatla	8·9	4·9	32·4	West Coast.				
	Veeravanam College Farm	8·9	..	32·9		Trivandrum	21·0	15·0	82·2
						Cochin	3·6	—3·1	108·4
						Calicut	7·9	0·5	119·3
Ceded Dists.						Pattambi*	6·2	1·0	95·8
	Kurnool	2·9	1·7	22·4		Taliparamba*	4·5	2·5	138·9
	Nandyal*	2·8	1·5	27·8		Nileshwar*	4·8	—1·8	140·1
	Hagari*	4·3	3·1	22·5		Pilicode*	6·3	0·2	143·2
	Siruguppa*	2·3	0·9‡	21·6		Mangalore	6·9	3·0	120·6
	Bellary	4·6	2·6	22·8		Kankanady*	4·5	0·6	117·9
	Rentichintala	1·8	..	26·6					
	Cuddapah	4·9	1·4	22·8	Mysore & Coorg.				
	Anantharajpet*	6·0	—4·4	23·4		Chitaldrug	4·6	2·2	32·1
						Bangalore	1·5	—1·2	39·2
Carnatic.	Nellore	14·4	2·7	33·3		Mysore	1·2	—1·5	29·3
	Buchireddi-palem*	11·4	—2·5	28·2					
	Madras	8·5	—5·5	32·4	Hills.	Mercara	6·3	3·3	143·0
	Tirurkuppam*	14·1	3·3§	37·7		Kodaikanal	18·0	7·8	70·1
	Palur*	20·5	5·5	58·7		Coonoor*	29·1	17·7	68·7
	Tindivanam*	11·2	2·5	29·9		Ootacamund*	11·2	3·5	50·6
	Cuddalore	15·4	—0·1	40·2		Nanjanad*	11·6	5·6	71·9
Central.	Vellore	9·5	1·9	30·0					
	Gudiyattam*	5·6	0·2	27·6					
	Salem	4·9	1·1	31·4					
	Coimbatore (A.C.R.I.)*	4·5	—1·6	19·3					
	Coimbatore (C.B.S.)*	4·7	—0·2	22·5					
	Coimbatore	5·3	1·3	18·4					
	Tiruchirapalli	7·8	0·8	28·9					

Note.— (1) * Meteorological Stations of the Madras Agricultural Department.

(2) Average of ten years data is taken as the normal.

(3) ‡ Average of six years in Tirurkuppam, and seven years in Pilicode.

(4) § Taluk office rainfall being 2·2".

(5) ... Figures not available.

Weather Review for November 1948

The depression in the Bay of Bengal moved rapidly and developed into a cyclonic storm by the evening of 31—10—48 and moved northwestwards and crossed the Andhra Coast between Kakinada and Calingapatam on 1—11—48. On 2—11—48, there was widespread rain in Andhradesa. This storm caused a gale along and near the South Circars Coast and then became weak and unimportant on 3—11—48.

During the early hours of 7—11—48 a well-marked trough of low pressure was found to exist over the southwest Bay of Bengal and the adjoining parts of the West Central Bay. Under its influence, the North-East monsoon strengthened in Tamilnad and South Andhradesa. On the third day, this trough became unimportant.

In the Arabian Sea between Lat. 33°N and 3°N. and Longitude 72°E. and 60°E. conditions were unsettled on 12—11—48.

The unsettled conditions in the southwest Bay of Bengal noted on 15—11—48 moved the next day into the Comorin and Maldives region and became more marked with the result that the North-East monsoon was vigorous along the south Coromandal Coast and active elsewhere in southeast Madras. After two days, they concentrated into a depression in which stage they moved for another two days, finally resulting in a deep depression centered within two degrees of Lat 16° N. Long. 65° E. This depression persisted for two days and ultimately crossed the Konkan Coast on 23—11—48 between Bombay and Dahanu and then became weak.

The unsteady conditions in the southeast Arabian Sea in the Maldives region and off-south Malabar noticed on 29—11—48, moved westwards the very next day across the southeast Arabian Sea south of Lat. 10° N. as a low pressure wave.

Practically throughout the month the night temperatures were appreciably above normal over the major portion of the country. On the last but one day of the month, a general decsease was noted over the country outside the Madras Deccan and southeast Madras.

The North-East Monsoon was fairly active in the Madras Province. The noteworthy rainfalls are as detailed below :—

S. No.	Place.	Date.	Rainfall in inches.
1.	Anantapur	5—11—48	3·9
2.	Nellore	8—11—48	6 1
3.	Masulipatam	,,	5·6
4.	Kakinada	9—11—48	6·6
5.	Periayakulam (Madura Dt.)	,,	5·2
6.	Calicut	10—11—48	3·4
7.	Pamban	15—11—48	3·6
8.	Negapatam	16—11—48	5 0
9.	Cuddalore	16—11—48	4 8
10.	Trivandrum	17—11—48	6·4
11.	Kallakurichi	,,	4 9
12.	Nagercoil	,,	4·6
13.	Kodaikanal	,,	7·8
14.	Ambasamudram	,,	5·7
15.	Pachipara (Malabar Dt.)	,,	5 1
16.	Ootacamund	20—11—48	2·9

M. B. V. N. & C. B. M.

Departmental Notifications

GAZETTED NOTIFICATIONS — RETIREMENTS.

Sri A. Gopalan Nair, Dy. Director of Agriculture, Vellore, leave from 14—12—48 preparatory to retirement.

Sri T. G Anantha Rama Ayyar, District Agricultural Officer, Tinnevelly, retirement from service from 23—12—48.

POSTINGS AND TRANSFERS.

Name of officers	From	To
Sri Appala Naidu, B.	Gazetted Asst. in Botany, Bapatla,	Lecturer in Botany, Bapatla.
,, Ananthapadmanabha Pillai, R.	A. D. Srivaikuntam,	D. A. O., Chittoor.
,, Dhakshanamurthi, C. (Dr.)		Soil Physicist, Coimbatore.
,, Muthiah Nattar. A. M.	On leave,	D. A. O., Madura.
,, Ramasubba Ayyar, A. K.	D. A. O., Madura,	D. A. O., Tinnevelly.
,, Chinnaswami Naidu, M.	On leave,	Dy., D. A., Siruguppa.
,, Kasinath, S	Dy. Director of Agriculture,	Asst. Agricultural Chemist, Coimbatore,

SUBORDINATE SERVICE — APPOINTMENTS.

Sri K. Srinivasa Rao, an Agricultural Graduate is appointed as Assistant in Mycology Coimbatore.

Sri P. Papa Rao, B. Sc. (Ag.) is appointed as Dairy Manager, Agricultural College, Bapatla.

The following candidates are appointed to the posts shown against each.

Names	To
Sri Krishnamurthi, B.	Asst. in Chemistry Coimbatore.
,, Krishnamurthi Raju, K.	Asst. in Mycology Elluru.
,, Kondiah, B. (Kurnool)	Asst. Cardamom Scheme, Singampatti Group.
,, Krishna Prasad, V. S. (Krishna)	Asst in Mycology, Coimbatore.
,, Vasudeva Rao, S. (Vizagapatam)	A. D, Vellore.
,, Krishnamurthi, G. (W. Godavari)	A. D, Vegetables, Madras
,, Narasimha Rao, T. L (W. Godavari)	Asst. in Chemistry, Coimbatore
,, Nageswara Rao, S.	A. D., Pollachi.
,, Ramalinga Reddi, K. (Kurnool)	A. D., Thirupathur.

SUBORDINATE SERVICE — POSTINGS AND TRANSFERS.

Names	From	To
,, Alagiamanavalan, R.	A. D., Nannilam,	P. A., to D. A. O., Tanjore.
,, Anjaneyalu Naidu, N.	Fruit Asst. Kodur,	Botany Asst. Agricultural College, Bapatla.
,, Bapayya, D.	Teaching Asst in Agricultural Economic, Agri College, Bapatla	Special A. D., Guntur.

Names	From	To
,, Durghaprasad,	F. M , A. R S., Palur,	Cotton Asst. Narasaraopet.
,, Daniel Sundararaj,	On leave,	Asst. in Botany, Coimbatore.
,, Gopala Shetty, M.	On leave,	F. M., A. R. S., Palur.
,, Gavurangamurthi, K. V.	On leave,	A. D., Ramachandrapur.
Miss. Girija Lakshman,	Asst. In Entomology, Coimbatore.	Asst. in Botany, Coimbatore.
Sri Janardhana Rao, K.	On leave,	A. D., Anantapur.
,, Janardhana Rao, P.	—	A. D , Jammalamadugu.
,, Jagannatha Rao, V. V	P. A., to D. A. O., Chicacole,	A. D , Anakapalle.
,, Krishnamarajau, K.	—	Mycology Asst. Elluru.
,, Krishnamurthi, A R.	On leave,	Asst. A. D., Madukulathur.
,, Karuppaiah, K.	A. D., Sulur,	A. D., Sattur
,, Lakshmipathi Rao, T.	On leave,	P. A., to D. A. O., Vellore.
,, Lakshmireddy, M.	Cotton Asst. Narasaraopet,	Cotton Asst Gurzala
,, Meenakshisundaram, K.	Teaching Asst. in Agriculture, Coimbatore.	Teaching Asst. in Agricultural Economics, Coimbatore.
,, Meenakshisundaram, D.	Asst. in Botany, Coimbatore,	Asst. in Entomology, Coimbatore.
,, Muthukrishnan, C. R.	—	A. D., Nannilam.
,, Mahadeva Iyer, S.	On leave,	Special A D., Tanjore.
,, Parthasarathi, I. V.	Teaching Asst. in Agricultural Economics, Coimbatore,	Teaching Asst. in Agricultural Economics, Bapatla.
,, Ram Mohan Rao, S.	On leave,	A. D., Chengara.
,, Rajagopalan, K.	Paddy Asst. A. R. S., Aduthurai,	Chemistry Asst. Coimbatore.
,, Radhakrishnamurthi, P.	A. D., Anakapalle,	A. D., Cuddapah.
Janab Syed Ahmadullah,	On leave,	A. D., Kurnool.
Sri Sangiva Rao, K.	A. D., Kurnool,	F. M., Arakuvally.
,, Subramania Ayyar, D. S.	Agricultural Instructor Kallupathi,	A. D , Periakulam.
Janab Syed Ebrahim,	On leave,	Asst. Pady A. R. S., Buchireddipalayam.
Sri Seshagiri Rao, M.	A. D. Ramachandrapuram,	Fruit Asst. Kodur.
,, Somayajulu, P	Special A. D. Guntur	P. A., to D.A.O., Chicacole.
,, Shanmugasundaram, R.	A. D , Tirupathur,	A D., Kancheepuram.
,, Sitarama Iyer, K.	On leave	A. D., Peravurni.
,, Srinivasan. K	A. D. Cuddapah,	F. M. Central Farm, Coimbatore.
,, Sitaram Rao, K.	F. M., Central Farm,	A. D , Cotton Scheme, Sulur.
,, Subba Rao, A.	A. D Anantapur,	Asst. in Botany, Sidout.
,, Shanmuganainar, T. P.	A. D. Mannargudi,	A. D., Tanjore.
,, Somalingam, R.	A D., Tanjore,	A. D., Mannargudi.
,, Thomas, N K.	On leave	Speccial A. D., Palladam.
,, Vaidyanathan, M.	P. A , to D. A. O., Vellore,	Teaching Asst in Agriculture, Coimbatore.
Janab Zainulabudeen Md.	P. A., to D. A. O , Anakapalle,	A. D., Anakapalle.