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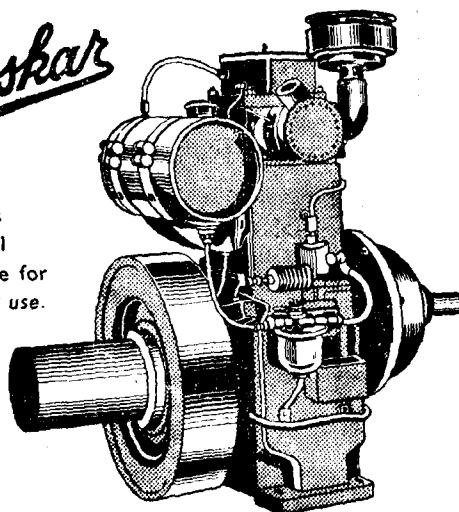
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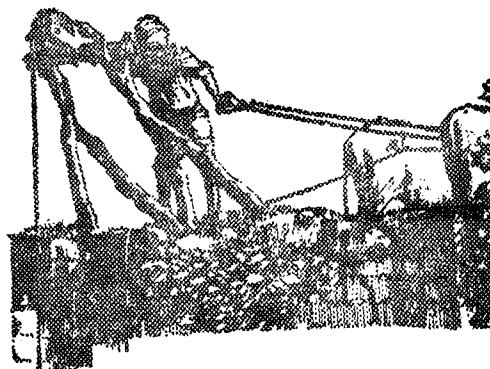
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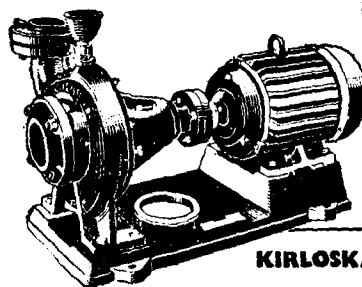
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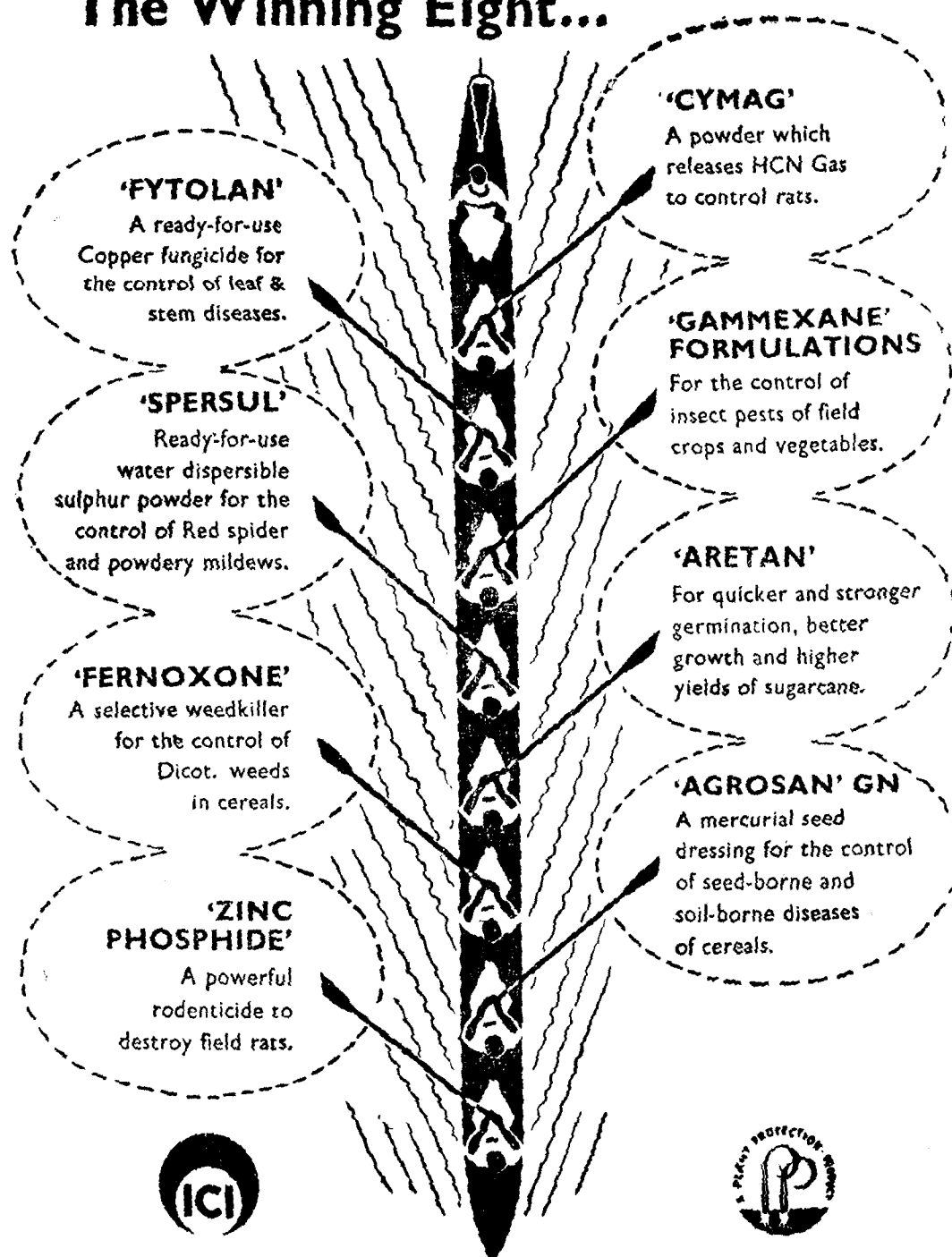
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Editorial

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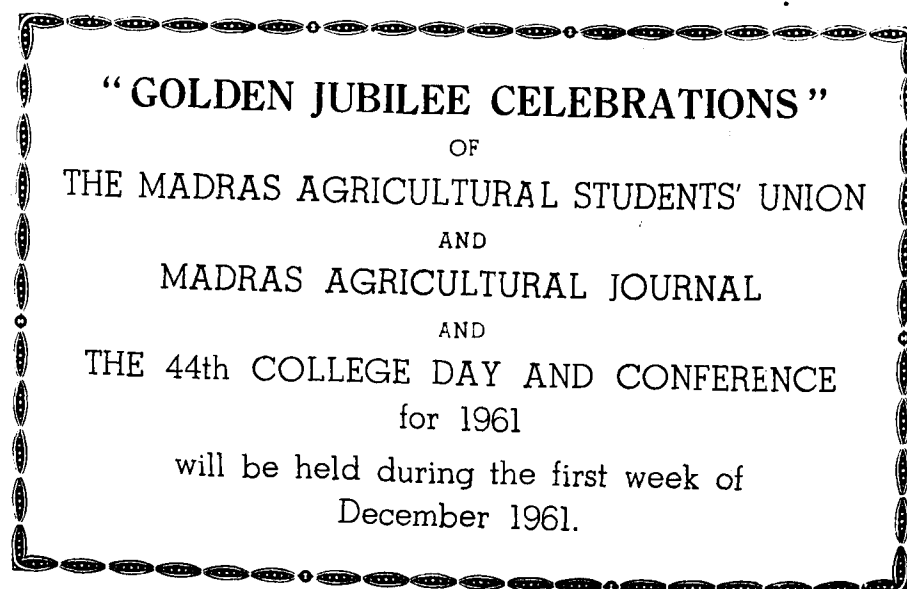
Co-operative Farming: The size and nature of farms as operational units which are very small and scattered, often prove to be the chief factors for low production in our agriculture. As institutions in farm production, they do not offer opportunities for effecting market and technical improvements and economics. The allocative and social efficiency forms the bedrock of the whole economic planning as the welfare emerges out as a goal for economic reconstruction. It appears, therefore, that streamlining of the existing production institutions is quite necessary.

Organisation of co-operative farming unit has been thought of to step up the production efficiency in agriculture. Improved farm technology and increased credit facilities, because of less risks and uncertainties, might find an easy way through co-operative institutions to the farmers who combine by voluntary association and, plan by mutual exchange of ideas and beliefs. The demand for de-officialisation of those institutions do not go unnoticed. For an effective functioning of an organisation, local leadership and initiative are essential and the lesser the interference from above, the greater the appreciation by members of their accomplishment and failures which can instill confidence in problem-solving programmes and can ensure for sustained growth in this sphere.

A comprehensive extension programme as being developed in our State will help to educate the farmers and guide them in their ventures. The overall progress may prove to be a slow one in the initial stages but it should not perturb us; co-operative farming as a social entity has to be given the time and proper leadership to take its own democratic process of formation and development.

The demonstration effect of the pilot farms organised in various part of the country, if properly organised, will have a great impact and spread of knowledge and the resultant appreciation may go a long way in breaking the initial inertia and in accelerating the momentum.

The working group for the Third Plan period has envisaged an ambitious programme for setting up of 20,000 co-operative farming societies apart from the 320 pilot projects already organised. But the Planning Commission, taking the views of the different States, feels that not more than 4,000 could be started during the Third Plan period. There are other problems pertaining to the responsibilities — both administrative and financial — of the State at various levels, on the optimum size of the co-operative farming units and on co-ordination of the activities of other credit institutions. Practical problems as they are, they will be solved when and where they develop. For our agriculture, the philosophy of co-operation has much to commend and the success of the co-operative farming units might provide an institution to stimulate agricultural production.



Review Article

A review of certain aspects of fertilizer placement for citrus in the U. S. A.

by

V. N. MADHAVA RAO *

Proper placement of fertilizer is beginning to rank with proper amounts in the minds of today's farmers. Improper placement has limiting fertilizer responses to a great extent. It is important to have it where it will intercept the roots of the young plant. An estimate of the fertilizer applications in the western section of the United States (Camp, 1947) indicates that approximately 70 percent of the acreage receives nitrogen by hand. Only one percent of the acreage receives nitrogen application in the form of foliage sprays while 20 percent of the acreage receives a part of the nitrogen in the form of urea sprays. In the eastern section too, the percentage of application by hand is 70 per cent. Aside from a few experiments in California and Florida, there is scarcely any detailed work on this important aspect.

Principles and methods of placement of fertilizers: For many years fertilizers were distributed by hand. Plantings were small and machine spreaders such as are used now in large acreages in the U. S. A. were unknown. Even as late as 1945 growers were still going around the trees with a bucket and old coffee cans depositing all the nitrate in a ring at the drip of the trees. Coit (1945) observes that this out-moded method not only fails to supply the great mass of feeder roots in the middles but it often causes damage by over-concentration of high nitrate fertilizer. In case of light rain there is often injury to roots passing under the deposits.

The methods of applying fertilizers depend on the kind of plant, the type of fertilizer, the soil and the climatic conditions. In an orchard of young trees it is not necessary to fertilize the ground beyond the spread of the roots but in older orchards particularly, all the soil should be fertilized as the roots are found below the entire surface area.

* Summary of a review presented by the author at the Louisiana State University, Agronomy Department, Baton Rouge, Louisiana, U. S. A. (1958-'59).

1. **Soil applications:** Animal manures and other bulky organic material may be spread broadcast and disked or ploughed under. This method has the apparent advantage of encircling all or most of the area of the root system and there is a likelihood of improvement of the physical condition of a correspondingly large area of soil. Dairy manure applied in trenches 10-12" deep is not considered to be as effective as spreading manure broadcast.

In the United States, citrus fertilizer practices are extremely variable. This is in part due to the diversity of soils and the use of irrigation water plus the fact that fertilizer practice rests on a variable and composite base of research evidence and practical experience.

In the application of granular nitrogenous fertilizer to citrus trees, the common practice has been to apply it broadcast. The question of whether the material should be broadcast in the irrigated middles between the rows or under the trees has never been satisfactorily answered. Jones and Cree (1953) conducted experiments on this aspect at Riverside, California. The differential treatments consisted of (1) fertilizer applied in the cultivated zone or the row middle and (2) fertilizer applied under the skirt of the tree. Navel orange, Valencia orange and grape fruit trees were used. Nitrogen was applied at the rate of 3 lb. per tree each year. The trees were 10 years old when the yield records in the experiment started in 1927. All the trees were treated uniformly for 8 years. During the fall of 1933 the differential fertilizer treatments started and were continued until 1952. The different placement treatments were found to have had no influence on production.

Decision on the best method of applying commercial nitrates depends on the time of the year. In the rainy season nitrate is broadcasted on the surface so that it is dissolved by rain and taken into the soil. In the dry season, with furrow irrigation different methods are used, else the plant food will remain near the surface and not reach the main mass of feeder roots until carried down by rains the following fall.

On some of the larger ranches in the U. S. A. power broadcasters are used with advantage. In orchards irrigated by sprinkling, nitrate is broadcasted in summer. The great majority of groves are still furrow irrigated in the U. S. A. A common practice is to distribute the nitrate in the furrows previous to

irrigation. According to Coit (*loc. cit*) use of home-made furrow drills economic time and labour as furrowing and fertilizing are performed by one man at one operation. They are efficient in getting all of the fertilizer in contact with the roots. The rate of application is varied by lever from the driver's seat to suit different sizes of trees.

The method of distribution of fertilizers in Florida citrus orchards has been well standardised. In bearing orchards, the fertilizer is spread from trunk to trunk as evenly as possible. In order to accomplish this spreading, mechanical spreaders as used which operate on the centrifugal principle. Commenting on the efficacy of the rotary distributor, Camp (*loc. cit*) observes that material that has a high specific gravity is thrown a long way and light material only a short distance. The result is that the fertilizer tends to be distributed rather loosely in bands.

A fertilizer spreader which can apply the fertilizer in a 2 to 4 foot band under the drip of the branches is considered the best. If the fertilizer is spread out over the orchard floor it is necessary to apply considerably more fertilizer per acre in order that the tree may get what it needs from beneath its branches. Fertilizer applied between the rows may have little or no effect on growth of the trees except possibly indirectly by its effect on the cover crop.

A tractor mounted whirlwind applicator is used in some groves which is driven around the tree to place the fertilizer under the drip of the branches. Its cost is in the neighbourhood of \$ 225 roughly Rs. 1000.-. It saves the grower more labour than any other tool on the farm.

Hume (1957) describes a machine commonly used for spreading fertilizer which consists of a truck with body space in which sacked fertilizer is carried, a hopper into which the fertilizer is fed, and two spinning disks at the rear separated by a step. The disks broadcast the fertilizer over the entire inter-tree spaces. It is operated by four men - a driver, two men who feed fertilizer into the hopper and a fourth who regulates distribution from the rear step by means of controls, one on each side of the hopper. A machine of newer type is operated by only one man.

2. **Application through irrigation water:** During recent years an increasing amount of nitrogenous fertilizer has been applied to citrus in irrigation water. The Shell Chemical Company markets anhydrous

ammonia in cylinders and by suitable arrangements this is released into weir boxes or open canals where water is being delivered to the acreage being fertilized. For other soluble N fertilizers such as ammonium sulphate, urea, sodium nitrate, etc., various methods of introducing this into irrigation water are now in use. They range from reservoir tanks with float valves so arranged that the concentrated fertilizer solution is delivered into the irrigation water to more crude methods where the bags of fertilizer materials are simply dumped into weir boxes or irrigation canals. Two ends are accomplished (1) economy in labour and (2) application of small, frequent doses of fertilizer during the irrigating season. Chapman (1958) estimates that more than 50% of all nitrogen now applied to California citrus orchards is through the irrigation water.

3. **Application through foliage sprays:** The fact that nutrient elements will enter the plant through the foliage has been used to advantage in the application of micro-nutrients for many years. Not until Hamilton *et al* in 1943, cited by Jones *et al* (1956) demonstrated that appreciable amounts of N could be absorbed through the foliage from urea sprays was interest aroused. They suggested that non-protein organic nitrogen (urea) could be applied to apple tree foliage without injury. Following this work it has been found that N could be applied to many plants by urea foliage sprays. Early in the work on citrus it was found that citrus is sensitive to biuret and that urea containing more than 0.25% biuret could not be safely used. Studies by Jones, *et al* (*loc. cit*) with Valencia oranges revealed that fruit production is reduced at low nitrogen levels. Fruit quality is affected above N levels required to maintain production. High N is associated with fruit that has thick peel, low percentage of juice and low ascorbic acid. Foliage application of one pound of N as urea is about equal to two pounds of N applied to the soil in maintaining production. Foliage application of N appears to be less detrimental to fruit quality than soil application.

Chapman (1947) observes that one pound of N per tree per year applied in three foliar applications has proven adequate. In many instances urea spraying could be combined with minor elements or insecticidal spray. Zinc, boron, copper, manganese and molybdenum are applied as foliage sprays, wherever possible in conjunction with insecticidal sprays. In Florida, very little nitrogen is applied in the form of foliage sprays although a certain amount is reported as being done.

Parker (1951) observes that sprays containing urea have been successful in increasing the nitrogen content of leaf to levels which have not been attained by very heavy fertilization of the soil. Preliminary indications are that three sprays a year (10 lb. per 100 gallons) will maintain yields at levels equal to those resulting from heavy soil applications of N fertilizers. However, two types of injury have frequently resulted from urea sprays. One, a chlorosis of the leaves when developing leaves were treated. It is severe when heavy concentrations are used. Burning of the tips or margins of leaves at times even more injurious, results in partial defoliation of the trees, which is more severe in orchards near the coast. Until a better understanding of these types of injury is obtained, the use of urea, according to Parker, is not generally recommended for citrus in California.

Experimental work with spray applications of P began in 1944-'45 (Parker, *loc. cit*). Strongly acidic compounds were found to be injurious to orange trees. In two subsequent experiments three sprays a year with nearly neutral or somewhat alkaline phosphates in solution or in suspension caused small increase in the P in the leaves and tended to reduce the thickness of the peel and a reduction in the acidity of the orange juice.

On the basis of three year's observations (Parker, *loc. cit*), the application to orange trees of three K sprays a year tended to increase the acidity of the orange juice and to increase the size of the fruit. It was observed that sodium was readily absorbed by orange leaves. This element is frequently present in citrus leaves in concentrations which approach toxicity and further absorption is not desirable. This may also be true of other elements such as chlorine. Low concentration of arsenic in sprays have long been known to reduce acidity of citrus fruit juices.

Acknowledgment: The author wishes to express his indebtedness to Dr. B. M. Sturgis, Head, Agronomy Department of the Louisiana State University, Baton Rouge, Louisiana, U. S. A. for his guidance in the preparation of this review. The author's thanks are also due to the International Co-operation Administration (Technical Co-operation Mission) and the Government of Madras who sponsored his deputation to the U. S. A. under the Inter-Institutional arrangement with the University of Tennessee.

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Original Articles

Note on the use of Ammonium Sulphate Nitrate as a Nitrogen carrier in the potato fertilizer mixture

by

K. RADHAKRISHNA ALWA.

Introduction : Potato is an exhausting crop and requires heavy doses of manures in the Nilgiris. It has been computed that an acre of good potato crop removes from the soil 47 pounds of nitrogen, 22 pounds of phosphoric acid and 77 pounds of potash. But in actual practice, a very much higher dose of these three nutrients has been found necessary in view of the peculiar soil and other natural conditions under which the crop is grown.

Earlier manurial experiments at the Agricultural Research Station, Nanjanad have clearly indicated the value of organic manures like cattle manure and fish guano in promoting increased yields of potato, but sodium nitrate was not found useful either alone or in combination with cattle manure or fish guano when compared to the organic manures. The need for potash salts and high doses of phosphates was clearly indicated in these experiments and the first manure mixture which was formulated and proved successful at this farm consisted of fish guano 15 cwts, superphosphate 5 cwts and muriate of potash 2 cwts for one acre. A series of trials started later on to find out cheaper substitutes for fish guano resulted in the discovery of the manure mixture which came to be popularly known as Nanjanad mixture. This mixture for one acre is made of 500 pounds of groundnut cake, 350 pounds of bone meal, 200 pounds of ammonium sulphate, 3 cwts of concentrated super phosphate (or 6 cwts of ordinary super phosphate) and 2 cwts of sulphate of potash, to supply nearly 80 pounds of N, 200 pounds of P_2O_5 and 100 pounds of K_2O . Consistently high yields have been obtained by application of this mixture to the soils of this tract. Many experiments conducted to find out better substitutes for this mixture have not so far been successful and the Nanjanad mixture is at present the most economic and useful mixture for promoting maximum yields of potato in the Nilgiris.

The present investigation was carried out to examine if the replacement of the nitrogen content of the Nanjanad mixture either wholly or in part by ammonium sulphate nitrate on equal nitrogen basis would result in better yields.

Materials and Methods: Ammonium sulphate nitrate is a rich nitrogenous fertilizer containing 26 per cent of nitrogen (19.5% in the ammonical form and 6.5% in the nitrate form) as against 20.6 per cent nitrogen in ammonium sulphate. A trial was laid out over a period of three years (1956 to '58) with the summer crop of potato at the Agricultural Research Station, Nanjanad in randomised blocks replicated eight times with the following treatments including ammonium sulphate nitrate.

- | | |
|--|----------------------------|
| A: Control (Nanjanad mixture) | } on equal nitrogen basis. |
| B: Nanjanad mixture in which the ammonium sulphate content alone is replaced by ammonium sulphate nitrate. | |
| C: Nanjanad mixture in which the entire nitrogen content (provided by ammonium sulphate and groundnut cake meal) is replaced by ammonium sulphate nitrate. | |

The fertilizers were applied at the time of planting. The potato variety Great Scot was used in this trial.

Presentation of data: The results of the three years of the trial (1956 to '58) are presented below:—

Particulars	Treatments			F. value satisfied or not	Standard Error	Critical difference (P = 0.05)
	A	B	C			
<i>Summer crop 1956 :</i>						
Acre yield in pounds	11750	10650	10250	Yes	460	986
Percentage on Control (A)	100.0	90.6	87.2	...	3.9	8.4
<i>Summer crop 1957 :</i>						
Acre yield in pounds	8375	8350	9300	No	485	...
Percentage on Control (A)	100.0	99.7	111.1	...	5.79	...
<i>Summer crop 1958 :</i>						
Acre yield in pounds	15100	14700	14650	No	520	...
Percentage on Control (A)	100.0	97.35	97.01	...	3.4	...

Conclusion: Summer crop 1956: A, B, C
 Summer crop 1957: Not significant
 Summer crop 1958: Not significant

The results presented above though significant during one season (1956) go to show that the replacement of the nitrogen in the Nanjanad mixture either wholly or in part by ammonium sulphate nitrate has not been generally conducive for increasing potato yields.

Summary and conclusion: A trial was laid out over a period of three years to study the efficacy of ammonium sulphate nitrate as a nitrogen carrier in the Nanjanad mixture for application to potatoes at the Agricultural Research Station, Nanjanad. The results have revealed that (i) the replacement of the nitrogen in the Nanjanad mixture either wholly or in part by ammonium sulphate-nitrate has not resulted in increased yields and (ii) that the ammonium sulphate nitrate has no special virtue as a nitrogen carrier over ammonium sulphate and groundnut cake which are at present used in the Nanjanad mixture.

Acknowledgment: The author thanks the numerous workers who were associated with the conduct of this trial, and the Horticulturist and Associate Professor of Horticulture, Coimbatore under whose guidance this trial was conducted as one of the items in the three year programme of research of the Agricultural Research Station, Nanjanad.

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A trial on chemical control of mango leaf hoppers (*Idiocerus atkinsoni* L. and *I. clypealis* L.)

by

M. SHAM SUNDER* and MIR. HAMID ALI†
College of Agriculture, Osmania University, Hyderabad Dn.

Introduction: Different workers from time to time advocated different formulations of insecticides against mango leaf hoppers. An attempt was made to evaluate the efficacy of various insecticides against this pest. The authors have tried in their control experiments for two seasons (1958-'59; 1959-'60) four insecticides, viz., DDT 50% W. P., BHC 50% W. P., Parathion (Ekatox 20% W. P.) and Endrin 20% E. The general belief of the workers in the use of Parathion is not favourable because it being a phosphatic compound is toxic to the operators and the workers engaged in the orchards. However, this fear seems to be baseless as the concentrations used are very light. What is required is a little care while spraying. It was successfully sprayed on the orchards without any adverse effects on the persons concerned. The purpose of using Endrin for jassids was simply to assess its efficacy as it is usually considered to be a good insecticide for controlling immature stages of insects. BHC also was tried for comparing its efficacy with the other insecticides mentioned in the above para.

Review of Literature: For the control of mango hoppers various insecticides have been advocated from time to time. Ballard (1915) used crude oil emulsion for jassids. Hussian and Pruthi (1921) recommended rosins and crude oil emulsions. Fletcher (1914) and Clouston (1928) successfully applied fish oil rosin soaps against mango leaf hoppers. Subramaniam (1932), Basin (1926) and Rahman (1939) used kerosene oil emulsion and rosin wash. Ramachandran (1924) recommended fish oil rosin soap at the strength of one pound to 10 gallons of water as the best insecticide to tackle the nymphs.

Subramaniam (*loc. cit.*) reported that Hongay (*Pongamia glabra*) oil rosin soap was as effective as fish oil rosin soap. A 0.066% suspension of powdered roots of *Derris elliptica* was found to give 80% mortality by Bhatta and Narayanan (1958).

* Contribution No. 1. Department of Entomology and Plant Pathology, College of Agriculture, Osmania University, Hyderabad Dn., part of the thesis submitted by the Senior author towards the partial fulfilment of the requirement for the degree of Master of Science in Agriculture.

† Reader and Head, Department of Entomology and Plant Pathology.

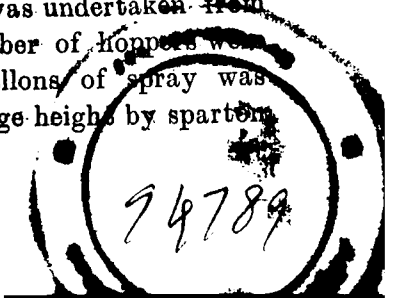
In Philippines, nicotine sulphate (40%) diluted at the rate of 1:500 was initially recommended (Merinio, 1929), but later, Palo and Garcia (1935) found that 0.38% solution mixed with 0.12% nicotine sulphate was very effective against mango hoppers.

Kunhikannan (1929) found that Pyrethrum dust either alone or mixed with Calcium cyanide had also given good results. Later on sulphur dust though recognised to be a weak insecticide, attained considerable popularity for mango hopper control. It was found to be effective by Wagle (1930) and Subramaniam (1932). Uppal and Wagle (1944) found sulphur dusting to be most effective in controlling mango hoppers in Konkan.

Sen and Prasad (1954) of Bihar tried DDT and other new organic insecticides like Chlordane, Dieldrin, Aldrin, Folidol E 605 and Pyrethrum. DDT (0.125%) proved to be the most effective insecticide in the control of mango hoppers. De and Dutta (1955) have tried a systemic insecticide octamethylpyro-phosphoramidate (Schradan) (trade name Pestox III) for controlling the *Idiocerus atkinsoni* Letta. A concentration of 0.4% was found to be the most effective.

Methods: The experiments for the control of mango hoppers were undertaken in the mango orchards of the Horticultural Section on the College Farm and were continued for two years viz., 1958-'59 and 1959-'60. It was started in a compact area of about 3/4 acres. The infestation was found to be uniformly high in both the years. In all twenty trees of uniform height in full blossom stage were selected and the area was divided into five blocks. Counting was taken on ten branches from each tree (the branches were numbered for this purpose) at random before spraying. The insecticides used were DDT 0.156% (W. P.), BHC 0.15% (W. P.), Endrin 0.041% and Parathion 0.0087% (W. P.). There were four treatments and one control with four replications. The spraying operations were carried from 10 A. M. to 4 P. M.

The efficacy of these insecticides was judged by taking counts immediately within 48 hours and the data statistically analysed which showed the reduction in populations of hoppers subsequently to various degrees. The counting of hoppers was undertaken from 8 A. M. to 10 A. M. during which the largest number of hoppers were found seated on trees. On an average 7½ gallons of spray was required for spraying a single tree of average height by spartan power sprayer.



Data and Discussion: The authors have observed two species of mango hoppers i. e., *Idiocerus atkinsoni* L. and *I. clypealis* L. on the Agricultural College Farm, Osmania University. The percentage of mortality was calculated and presented in Tables 1 and 3 for the two seasons respectively. Then the values were transformed into degrees for statistical analysis as given in Tables 2 and 4.

TABLE 1.

Percent mortality of *Idiocerus spp.* after treatment with different insecticides, (15-1-1959 to 8-2-1959).

S.No.	Treatments	Replications			
		I	II	III	IV
1.	DDT. 0.156%	83.33	88.79	96.30	90.00
2.	BHC. 0.156%	21.81	33.93	31.43	11.25
3.	Parathion 0.00876%	92.85	98.33	100.00	97.56
4.	Endrin 0.041%	66.66	88.88	100.00	94.97
5.	Control	17.24	12.50	...	...

TABLE 2.

Transformed values from Table 1. (in degrees) for statistical interpretation.

S.No.	Treatments	Replications				Total	Means
		I	II	III	IV		
1.	DDT. 0.156%	65.6	70.6	78.5	71.6	286.3	71.57
2.	BHC. 0.156%	28.0	35.7	33.8	19.4	116.9	29.22
3.	Parathion 0.00876%	74.7	81.9	90.0	81.9	328.5	82.12
4.	Endrin 0.041%	54.9	70.6	90.0	77.1	292.6	73.15
5.	Control	24.4	20.3	...	...	44.7	11.17
Total		247.6	279.1	292.3	250.0	1069.0	...

F Test Table value at 1% level is 5.41 and at 5% level 3.26 with calculated value as 38.5.

As the calculated value is much greater than the table value the treatment differences are highly significant.

As the difference between the means in case of DDT, Parathion and Endrin is less than 15.36, so all the three insecticides are superior to BHC. and control.

The data for the next season are given as below :

TABLE 3.

Percent mortality of *Idiocerus spp.* after treatment with different insecticides (8-1-1960 to 3-2-1960).

S.No.	Treatments	Replications			
		I	II	III	IV
1.	DDT. 0.156%	100	84.90	98.00	80.23
2.	BHC. 0.156%	44.60	18.64	...	32.14
3.	Parathion 0.00876%	91.14	91.66	90.00	91.30
4.	Endrin 0.041%	88.48	86.85	88.88	83.60
5.	Control	18.18	4.71	11.11	15.73

TABLE 4.

Transformed values from Table 3 (in degrees) for statistical interpretation.

S.No.	Treatment	Replications				Total	Mean
		I	II	III	IV		
1.	DDT. 0.156%	90.0	67.2	81.9	63.4	302.5	73.63
2.	BHC. 0.156%	41.1	25.8	...	34.4	102.3	25.58
3.	Parathion 0.00876%	72.5	73.6	71.6	72.5	290.2	72.55
4.	Endrin 0.041%	69.7	68.9	70.6	66.4	275.6	68.90
5.	Control	25.1	12.9	19.4	23.6	81.0	20.25
Total		299.4	284.4	243.5	260.3	1051.6	...

So the F test value at 5% level is 3.49 with calculated value as 30.01.

As the calculated value is much greater than the table value the treatment differences are highly significant.

The mean mortality was 82.12 for Parathion during the 1st trials in January, February 1959 (Table 2). The same value is slightly lesser i. e., 72.55 during the next season i. e., January,

February 1960 (Table 4). So Parathion appears to be the best insecticide for the control of mango leaf hoppers on the basis of the average mean figure from two seasons which comes to 77.33. This insecticide is hazardous to use, particularly if used carelessly. However, the cultivators or the orchardists can use it safely if trained properly.

DDT may be regarded less toxic than Parathion in its effect on mango leaf hoppers as per the average mean figure obtained for this insecticide for the two seasons which comes to 73.55. The means for each season were 71.57 and 75.63 respectively. It may, however, be pointed out that the mean mortality obtained for DDT in the second season was 75.63% compared with 72.55% for Parathion. In other words, DDT can be better than the Parathion in its effectiveness or on par with it. Therefore, further trials are necessary in order to prove the relative efficacy of these two insecticides. Endrin proved to be next to DDT and Parathion in its toxicity to the mango leaf hoppers on the basis of the data obtained. The average mean for Endrin for the two seasons works out to be 71.02%. However, in the 1st season the figure is slightly higher than the same for DDT. Therefore, Endrin can be regarded as one of the effective insecticides in the control of mango leaf hoppers. BHC proved to be the poorest of all the four insecticides tried in the present study. The average mean mortality (Table 2 and 4) obtained for it for the two seasons was 27.48%. Therefore, it cannot be regarded as one of the effective insecticides against mango leaf hoppers.

The control figures for mortality for the two seasons were 11.17 and 20.25 respectively.

As the difference between means in case of DDT, Parathion and Endrin is less than 15.38, so all the three insecticides are superior to BHC and control.

Summary: On the basis of trials made against the mango leaf hoppers for two seasons it was found out that DDT, Parathion and Endrin are more or less similar in toxicity, giving effective control. BHC proved to be quite ineffective.

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Research Notes

A Bacterial Leaf Blotch Disease of Cumbu (*Pennisetum typhoides* Stapf & Hubbard)

A bacterial leaf blotch disease of *cumbu* or *bajra* was observed in some parts of South Arcot district during 1959-'60. The disease was common during the months of August–October. Both the young seedlings and grown up plants were found affected. The disease first appears on the upper surface of the leaf as minute linear streaks, very narrow and 5 to 10 mm. in length. The streaks are reddish brown in colour. As the disease advances several streaks appear in a row along the length of the leaf blade and they coalesce to form a large blotch. These blotches are distributed throughout the leaf blade, but the mid rib of the leaf seems to be unaffected. The blotches may measure 1 to 2 cm. in width and 2 to 5 cm. in length. On the under surface of the leaf the blotches are dull brown coloured whereas on the upper surface they are characteristically orange brown in the beginning, turning dull brown and finally drying up in patches.

The bacterium was isolated and brought into pure culture and its pathogenicity on the host established by inoculating the leaves in the usual manner. There are earlier reports on the occurrence of *Xanthomonas penneaseti* Rajg. & Rang. on this host in Madras State (Rajagopalan and Rangaswami 1958) and of *Pseudomonas syringae* v. Hall on *Pennisetum glaucum* and *X. vasculorum* (Cobb) Dowson on *Pennisetum purpureum* Schum. in other countries (Hughes 1939, Elliott 1951). But the organism under investigation differs from them considerably. On the basis of its pathogenicity and morphological, cultural and biochemical properties the bacterium is identified as a new species.

Xanthomonas annamalaiensis Rangaswami, Prasad and Eswaran, *Sp., Nov.* The bacterium is a short rod, 1.8–2.7 X 0.8–1.0 μ , single or in chains of two, monotrichous with single polar flagellum, aerobic, non-capsulated, non-spore forming and non-acid fast. It forms honey coloured yellowish slimy colonies on nutrient agar and the growth in nutrient broth is yellow with turbidity and sedimentation. No soluble pigment is produced either in agar or liquid media. The organism liquefies gelatin only very slowly and also it does not hydrolyse starch. Litmus milk turns neutral with coagulation of milk. Nitrate is reduced, H_2S produced but indole and ammonia not produced. It gives negative lipolytic activity and M. R. test, but positive V. P. test. It utilizes lactose and maltose with acid and slight gas production.

The bacterium is pathogenic on *Pennisetum typhoideum* Rich., causing leaf blotch. On artificial inoculation it was found to infect *Cenchrus glauca* L., and *C. setigerus* Vahl., *Paspalum scrobiolatum* L.,

Zea mays L. and *Sorghum vulgare* Pers. and not *Brachiaria mutica* Stapf., *Cenchrus ciliaris* L., *Echinochloa frumentacea* L., *Oryza sativa* L., *Panicum maximum* Jacq., *P. miliaceum* L., *Saccharum officinarum* L., *Setaria italica* Beauv. and *Pennisetum purpureum* Schum.

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Leaf Variation in *Tetrastigma sulcatum* Gamble

The phenomenon of leaf variation has been reported by several authors like Saktharam Rao (1955) in *Cadaba trifoliata* W. & A., Sinha (1933) in *Ipomoea pulchella* Roth., and Arber (1950) in *Parthenocissus tricuspidata* Planch. Arber considers the leaf as a partial shoot and the series of variations in the number of leaflets as due to repeated branching. Other workers attribute these variations to accidental splitting.

Tetrastigma sulcatum of Vitaceae is a large climber with woody stems. Leaves are pedately 5 foliate and rarely 3 foliate. In the College Orchard, Agricultural College, Coimbatore, it was observed that a plant raised for cytotaxonomical studies had leaves with one to six leaflets. It was also observed that the shape of the leaflets depended on their number.

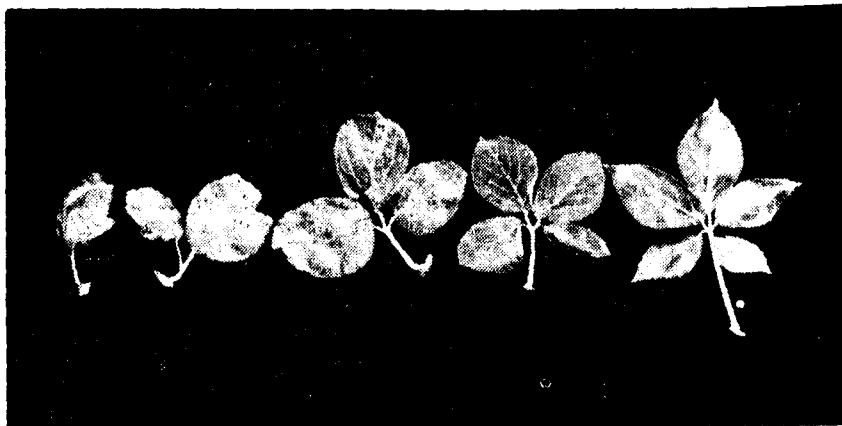
The purpose of this note is to record the following variations in *T. sulcatum*.

1. *Simple leaf*: Occurrence of the simple leaf is an interesting feature that was observed. In the normal leaf, the leaflets are elliptic and acuminate but in the simple leaf the lamina is thick and irregularly ovate.

2. *Bifoliate leaf*: Depending upon the nature of splitting, the size and shape of the leaflets vary. Usually they resemble the leaflets of a normal leaf and rarely one of them is bigger than the other with a tendency to show further splitting.

3. *Trifoliate leaf*: Even though abnormal, it was found to occur frequently. In contrast to the typical leaf where the central leaflet is relatively longer than the other leaflets, all the three leaflets in this leaf are of equal size. The shape of the leaflet varies from ovate to obovate.

4. *Tetrafoliate leaf*: All the four leaflets are of equal size. The tendency of foliar division shows that the tetrafoliate leaves are derivatives of bifoliate leaves. The leaflets are ovate and rarely one or to lower leaflets are smaller and lanceolate.



Leaf Variation in *Tetrastigma*

5. *Pentafoliate leaf*: This is the typical leaf with a long elliptic leaflet in the middle and four other leaflets, two on each side. From detailed morphological studies it appears to be a derivative of the trifoliate leaf.

6. *Hexafoliate leaf*: Occasionally this type of leaf also occurs. The leaf has a long acuminate and elliptic leaflet in the middle and five other leaflets, three on one side and two on the other. The third additional leaflet of one side is due to further splitting of the lowermost leaflet on one side.

The nature of splitting shows that the leaflet in the centre does not usually split.

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Mass Incidence of *Cyclopelta siccifolia* Westwood (Hemiptera - Pentatomidae) on *Sesbania speciosa* in Coimbatore

Cyclopelta siccifolia Westwood, an oval, black and brown stink bug has been noted to be a common pest of Murukkam or Dadap (*Erythrina indica*) in the West Coast (Kerala) region of South India. It feeds on the succulent branches in massed colonies in the North East monsoon season from September to October and severely damages the trees (Ananda Rau, 1942). It has a wide range of host plants like pungam (*Pongamia glabra*), redgram (*Cajanus cajan*), clusterbeans (*Cyamopsis psoraloides*), sithagathi (*Sesbania aegyptiaca*), drum-stick (*Moringa pterygosperma*), betel (*Piper betel*) and pepper (*P. nigrum*) which it occasionally infests. Apart from the western portion of South India, it is distributed over North India in Poona, Bombay, Surat, Belaum, Moorshidabad, Sikkim and Bengal and in Ceylon and Burma in the Indo — Malayan region (Distant 1902).



Adults and egg masses of *Cyclopelta siccifolia* Westwood on stems of
Sesbania speciosa

The black stink bug has hitherto been noted only in small numbers in Coimbatore which is on the eastern plains of South India. This year a heavy incidence occurred on *Sesbania speciosa* in the wet-land area of the Agricultural College and Research Institute, Coimbatore. Considerable numbers of adults and nymphs with egg masses spread over 6 to 12 inches of stem at heights ranging from 3 to 5 ft. from the ground level were seen on a five month old crop. The crop had been raised in about

2 acres with plants sown one foot apart and had grown to a height of 6 ft. The insects were found almost in half the number of plants in the field in June and July but no injury was perceptible. Murukkam, its usual food plant and pungum, which were present around the field, had not been affected. Even *Sesbania speciosa* plants in other fields which did not have a compact stand of the kind mentioned above were not visited.

The incidence of the black stink bug in Coimbatore affords an opportunity of calling attention to certain features of ecological interest.

1. The insect has now appeared on a new food plant *Sesbania speciosa* although its normal food plants like Murukkam and Pungam were available in the vicinity. *Sesbania speciosa* is now prized as a valuable green manure crop and is grown on an extensive scale in the Madras State. Therefore the activity of the insect and the reaction of the plant to its feeding assume considerable importance.

2. The insect which was so far confined to the rainy and humid western region has now spread out to the drier plains of the east also.

3. Its usual season of multiplication which was September-October has now been altered to summer which synchronised with the period when *Sesbania speciosa* is grown in this area.

4. The incidence of the insect in the thickly grown portions of the fields in preference to the more exposed ones indicated that necessary conditions of humidity are available in such places. It would seem necessary to device cropping schedules of an open type which will preclude the breeding of the insect.

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Preliminary studies on Population and Yield in Ragi (*Eleusine coracana* Gaertn.)

An observational trial in ragi was laid out at the Millets Breeding Station, Coimbatore during summer 1960 to study the performance of short duration strains AKP 1, AKP 2, Co 7 and a promising selection E. C. 4728 under two different spacings. The two spacings viz., 6"×6" (normally adopted) and 9"×9" between rows and within the row respectively were adopted for all the strains. The plots were of 15×12 links size. The nursery was raised during the end of February and after 20 days the seedlings were transplanted in the main field. The main field received a basal dose of 5 tons of farm yard manure and 40 lb. N per acre in the form of ammonium sulphate at the time of preparation of the main field. Among the strains tried, AKP 1, AKP 2 and E. C. 4728 came to flowering a week earlier than the strain Co. 7. The height of plant, number of tillers, panicle length and the total number of fingers in each ear head were also recorded for the plants in all the strains, to study the differential response of the strains to the spacings adopted. The yield data and the other details of plant measurement are given in the Table.

TABLE

	AKP 1		AKP 2		Co 7		E. C. 4728	
	6"×6"	9"×9"	6"×6"	9"×9"	6"×6"	9"×9"	6"×6"	9"×9"
1 Plant height in cm.	58±6.4	59±5.7	54±6	64±5.3	87±6.1	89±5.4	64±5.2	74±6.5
2 Plant height expressed as percentage	100.0	101.7	100.0	118.5	100.0	102.3	100.0	115.6
3 No. of tillers	4±2.0	6±2.2	3±1.8	5±1.9	2±0.5	4±1.4	3±0.3	4±1.0
4 Expressed as percentage	100.0	150.0	100.0	166.7	100.0	200.0	100.0	133.3
5 Panicle length	5±0.5	5±0.5	5±0.5	4±0.5	6±0.5	6±0.5	5±0.5	6±0.5
6 Expressed as percentage	100.0	100.0	100.0	80.0	100.0	100.0	100.0	120.0
7 No. of fingers	7±1.2	7±1.1	6±1.4	7±1.9	8±1.0	9±0.9	7±1.3	7±0.9
8 Expressed as percentage	100.0	100.0	100.0	116.7	100.0	112.5	100.0	100.0
9 Yield of grain per acre in lb.	1666	2014	1389	1944	1597	2014	1737	1944
10 Expressed as percentage	100.0	120.9	100.0	139.9	100.0	126.1	100.0	111.9
11 Yield of straw per acre in lb.	2500	2678	3674	3789	12674	14844	4671	5556
12 Expressed as percentage	100.0	107.1	100.0	103.1	100.0	117.5	100.0	118.7

Population per acre for 6"×6"=1,53,000.

Population per acre for 9"×9"=1,00,000.

In the plant height, panicle length and number of fingers there was no appreciable difference between the two treatments. It is however interesting to record that the number of fingers is greatest in Co 7. In yield of grain and straw, all the strains recorded a consistently higher yield in the treatment where a 9" x 9" spacing was adopted. The increase ranging from 11.9 to 39.9% in grain and 3.1 to 18.8% in straw. Further there was a marked increase in the number of tillers with the increased spacing indicating that wider spacing is conducive to tillering with the result that the reduction in population is more than compensated by the increase in the number of tillers. The increased yield registered in the treatments where a wide spacing was adopted may thus be attributed to the greater number of tillers produced by a plant thus indicating the existence of a possible correlation between yield and tillering.

The help and guidance given by Sri S. G. Aiyadurai, the then Millets and Pulses Specialist and Sri A. Subramaniam, Assistant Millets Specialist are gratefully acknowledged.

Agricultural College and
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K. SAMATHUVAM.

College and Estate News

Foundation Lectures: Dr. K. Ramiah, Special Officer for Rice, I. C. A. R. New Delhi delivered lectures to the Post Graduate trainees on Rice breeding and Rice Agronomy on 22-5-'61 and 23-5-'61.

Award of M. Sc., degree: Kumari K. Meenakshi, Assistant Millets and Pulses Specialist, Coimbatore has been awarded the M. Sc., degree of the Madras University for the thesis entitled "Studies on the Comparative Anatomy of Sorghum". Our hearty congratulations to her.

Visitors: The following Distinguished Visitors were received and taken around the A. C. & R. I.

A team of Russian Botanists lead by Mr. Nekolay N. A. Avrorin on 18-5-'61.

Dr. T. G. Menon I. F. S. Indian Ambassador at Mexico on 17-5-'61.

H. V. R. Iengar, Governor, Reserve Bank of India, New Delhi on 20-5-'61.

V. Subramanian, Vice-Chancellor, Annamalai University on 30-5-'61.

AGRICULTURAL JOTTINGS FOR JUNE, 1961.

The South West Monsoon breaks along the West Coast in June and the present forecasts indicate that this year the monsoon may arrive in time or even earlier. The summer showers were disappointing and in many places the rainfall received was very much below normal. We hope and look forward to a good and timely monsoon.

1. Hints on preparatory cultivation for paddy:

In preparing the field for the paddy crop, a good puddle should be aimed at. A good puddle can be obtained by ploughing or puddling the field a number of times with the optimum quantity of water. While puddling, keep the field outlets always closed and do not allow the water to flow out. If the outlets are kept open, that will lead the fine silt and clay particles to be carried away in the drain water. Therefore prevent this loss of valuable soil and nutrients by keeping optimum quantities of water while puddling.

A light mould board plough is more efficient in creating a good puddle. The number of ploughings can also be reduced resulting in economy in the cost of preparation of the paddy fields.

The Burmese Settun: This is a new implement for efficient puddling and also to facilitate the easy and quick incorporation of the green manures. The Settun consists of a number of rotating blades fixed to a central axis and these blades help to stir the wet soil and also to push in the green manure into the soil. Thus, it helps to produce a fine puddle. An average pair of bullocks can draw this settun in your field. You can buy this implement for about Rs. 60/. It saves a lot of labour and the resulting saving in cost will itself earn for the implement in two or three years. The Burmese Settun is a must for all farmers who grow green manure crops for the paddy crop.

2. Sow your crops in lines:

Sowing or planting crops in lines have several advantages. An even stand is obtained throughout the field, thus assuring a normal stand of crop and the required space for each plant for its proper development, both contributing to good yields. Researches have shown that good yields for each kind of crop result only from an optimum population. If this optimum population is not assured, yields are likely to go down. In the same way, if the population is increased beyond normal, the yields do not generally increase. A sure way of assuring proper stand and proper spacing is to sow or plant in lines.

This apart, the line method facilitates easy intercultivation with interculturing implements. In these days of high wages, it is profitable to use labour saving implements for weeding, intercultivation etc. Many

other operations like plant protection could be conveniently carried out. Harvesting of a crop sown in lines is also easy. Apart from all these, there is a saving in seeds too.

3. Placement of phosphates :

The need to apply super phosphates to crops to step up yields was stressed last month. The application of super phosphate presents certain special problems due to its immobility and tendency to get fixed. Fixation of the phosphate in the soil is the process by which the soluble phosphates combines with iron and aluminium compounds and become insoluble and unavailable to the crop.

When super-phosphate is simply broadcast over the field, owing to its immobile nature, it does not reach the root zone and its accessibility and availability to the crop is therefore very much reduced. To overcome this difficulty, the fertiliser should be applied at a place where the roots can easily take it and this is called placement of the fertiliser. For this purpose, the super phosphate is applied in the bottom of the plough furrows behind the plough, in effect it is placing the phosphate in the root zone. For some crops raised in lines, the fertiliser is placed in bands or localised areas along the rows at such distances from the seed or plant so that the roots can easily absorb the fertiliser.

4. Prevent the Blast Disease of Paddy :

"Prevention is better than cure". Many pests and diseases that occur to crops could be prevented if due precautions are taken at the proper time. For example, blast in paddy is a very serious disease resulting in considerable loss in the yields. Sometimes whole fields are apt to be wiped out. Such a calamitous disease could be very easily prevented. Plant breeders have found out that certain varieties get the disease while some others do not. They have also found that resistance to this disease could be introduced in some varieties by some complicated breeding techniques. There are several such resistant strains and the most important are Co 25, Co 29, Co 30 and TKM 6. They cover a range of durations suitable for all seasons. These strains generally do not get the disease even though the disease is prevalent in the neighbourhood. This is an easy way of preventing the disease.

If by any chance, you are not growing a resistant strain, the disease can still be controlled by spraying fungicides at different stages of crop growth. A first spraying with 1% Bordeaux mixture or 0.25% strength copper oxychloride (available at your agricultural depot) can be given to the seedlings in the nursery. Subsequent sprayings of the same chemical are given after transplanting, followed by another spraying when the crop is going to start flowering and the last one when the grains

are setting. The four sprayings can save the crop if you have not planted a resistant strain. But why trouble with all this spraying when you can buy and grow a disease resistant variety?

5. Sow Improved Strains of Millets :

With the onset of the monsoon, it is time to think of sowing a millet crop in your dry lands. There are some excellent, high yielding strains of cholam, cumbu and other minor millets evolved by the Millet Specialist and suitable for dry lands.

Cholam strains, Co 1, Co 3 and Co 19 are excellent ones combining high yield of grain with better quality of straw suitable for dry lands. Co 1 is a Periamanjil cholam strain and Co 3 and Co 19 are Talaivirichan types. They have yielded from 15 to 25% more than the locals under normal conditions. They are uniform in growth and the grain quality is good.

Hybrid cumbu, the new comer—try it: All have heard of the success achieved in the United States of America in producing the high yielding hybrid corn. In Madras State, the hybrid cumbu is noted for its high yield and is produced in the same way the hybrid corn is produced in the United States. We have hybrid cumbu X2, X3 etc., These yield much more than your local types. The only point in growing hybrid cumbu is that you must get the seeds afresh for sowing every time. The Agricultural Department maintains a special scheme to produce and distribute every year fresh hybrid cumbu seeds. Your Extension Officer will be glad to help you in the matter of securing seeds and telling you more details about this hybrid cumbu.

6. How much water for your Ragi Crop?

Over large areas in the Madras State, Ragi is grown as an irrigated crop. Ragi is a crop which loves to have a little more water than cholam and indeed among the millets ragi needs more water than any of the others. Researches have indicated that ragi crop needs about eight irrigations, each irrigation taking in 3 acre inches of water. An acre inch is that quantity of water that stands to a height of one inch over an acre or 22687 gallons and 3 acre inches would be 68060 gallons. The number of irrigations may need to be slightly varied or the quantities applied in each irrigation modified to suit local conditions from general experience. If some rain is received during the crop period that amount of water could be cut in the irrigation.

7. Stop the Aphids and Jassids in your Ragi Crop :

On pulling out and examining a stunted ragi plant, a large number of these tiny shining insects called aphids would be found adhering to the roots. The jassids are found on the leaves. They are very tiny insects seen only after careful examination. They could be found hopping about from the leaves. They are also called hoppers.

For root aphids, apply B. H. C. 10% in the soil. The dust could be lightly applied round the affected plants which could be easily located by the disturbance in the base of the plants by the ants that live in association with the aphids. The soil is then slightly stirred to mix the chemical dust well. About 20 - 25 lb. B. H. C. 10% dust would be required per acre. Crude oil emulsion can also be mixed with the irrigation water when the field is irrigated.

For controlling jassids, dust D. D. T. 5 or 10% at the rate of 20 lb. per acre.

8. Grow your own Vegetables:

There are some excellent varieties of vegetables evolved by the Agricultural Department and seeds are stocked in the nearest agricultural depot. Mention may be made of the following strains among vegetables.

Brinjals	H. 128 and H. 129.
Bhendi	A. F. 8, A. E. 9 and H. 127.
Tomato	H. 123 and H. 204.
Snakegourd	H. 8, H. 371 and H. 375.
Pumpkin	H. 59.
Ash gourd	H. 57 and H. 105.

Outstanding performers are H. 128 among brinjals, A. E. 8 among Bhendi and H. 123 among tomatoes. From the point of view of satisfying home needs or for commercial production, there is no vegetable like the tomato. Over 20,000 lb. of fruits are harvested from an acre and sold at anything from an anna to sometimes three annas per pound, depending on the demand in the market. H. 123 tomato is a star performer.

Departmental Notification

Gazetted Officers—Madras Agricultural Department Postings and Transfers during the month of May 1961.

Name and Designation	Posted or Transferred to
Sri L. Anavaradham, Millet Assistant	Assistant Millet Specialist, Sathyamangalam
„ L. Sivagnanam, Millet Assistant	Superintendent, A. R. S., Kovilpatti
„ R. Veeraswamy, Assistant Millet Specialist, Sathyamangalam	Superintendent, A. R. S., Aduthurai
„ T. Arunachalam, District Agricultural Officer, Erode	Survey Officer, A. C. & R. I., Coimbatore
„ C. Ratnam, Assistant Agricultural Chemist	Assistant Agricultural Chemist, Scheme for Sugarcane Soil Survey, Coimbatore

Name and Designation	Posted or Transferred to
Sri V. Ravikumar, Assistant Agricultural Chemist	Assistant Agricultural Chemist, Salaine and Alkaline Lands Reclamation Scheme, Coimbatore
Kumari S. Malathi Devi, Assistant Agricultural Chemist	Reverted
Sri D. M. Samuel, Assistant Agricultural Chemist	Assistant Agricultural Chemist, Parambikulam Soil Survey Scheme, Coimbatore
„ K. Shivarama Shetty, Assistant Agricultural Chemist	Assistant Agricultural Chemist, Maximisation of Phosphate Potential Scheme, Coimbatore
Smt. Indira Raja, Assistant Agricultural Chemist	Reverted

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

Name and Designation	Posted or Transferred to
Sri S. Narayanan, Extension Officer for Agriculture, Avadayarkoil	Extension Officer for Agriculture, Pattukottai
„ S. B. Riazuddin, Horticultural Development Assistant, Tanjavoor	Extension Officer for Agriculture, Avadayarkoil
„ L. Harold V. Simon, Instructor in Agriculture, Rural Extension Training Centre, Aduthurai	Horticultural Development Assistant, Tanjavoor
„ R. Gnanasambandan, Extension Officer, Pattukottai	Instructor in Agriculture, Rural Extension Training Centre, Aduthurai
„ A. Thyagarajan, Extension Officer for Agriculture, Kodaikanal	Instructor in Agriculture, Rural Extension Training Centre, Bhavanisagar
„ S. Ramakrishnan, Instructor in Agriculture, Rural Extension Training Centre, Bhavanisagar	Alloted to Coimbatore Division
„ K. Govindan, Extension Officer for Agriculture, Pallipet	Agricultural Instructor, Katpadi
„ M. Kulasekaran, Assistant in Fruits, Kallar	Fruit Assistant, Banana Research Station, Aduthurai
„ Mohamed Azam, Horticultural Development Assistant, Coonoor	Assistant in Fruits, Kallar
„ E. R. Narayanan Nayar, Fruit Assistant, Banana Research Station, Aduthurai	Analytical Assistant, Soil Testing Laboratory, Aduthurai
„ E. N. Varatharajan, Upper Subordinate on Foreign Service	Horticultural Development Assistant, Vellore
„ V. G. Mathews, Horticultural Development Assistant, Vellore	Coconut Development Asst. Markanam
„ T. Ramanathan, Coconut Development Assistant, Markanam	Assistant in Oilseeds, A. R. S., Tindivanam
„ S. F. Bernard, Agricultural Demonstrator, Manachallur	Assistant, Parasite Breeding Centre, Coimbatore
„ V. Balasubramaniam, Agricultural Demonstrator, Rasipuram	Allotted to Thanjavoor District
„ V. Ranganathan, Chemistry Asst.	Chemistry Assistant, Sugarcane Research Station, Cuddalore.
„ T. S. Govindan, Chemistry Asst., Sugarcane Research Station, Cuddalore	Chemistry Assistant, State Agmark Testing Laboratory, Virudhunagar

Weather Review — for April, 1961.

RAINFALL DATA (IN INCHES)

Region	Station	Total rainfall for the month	Departure from normal	Total since 1st January
North	Madras (Meenambakkam) ...	0.1	— 0.5	2.3
	Tirurkuppam* ...	...	— 1.6	1.6
	Vellore ...	...	— 1.0	0.3
	Gudiyatham* ...	...	— 1.6	0.5
East Coast	Palur* ...	...	— 1.0	8.1
	Tindivanam* ...	...	— 1.1	5.3
	Cuddalore ...	0.1	— 0.9	9.6
	Nagapattinam ...	...	— 1.1	9.1
	Aduthurai* ...	0.6	— 0.8	8.5
	Pattukkottai* ...	0.8	— 1.6	7.3
Central	Salem ...	0.8	— 1.2	3.1
	Coimbatore (A. M. O.) * ...	1.2	— 1.1	3.0
	Coimbatore ...	0.5	— 1.1	3.0
	Tiruchirapalli ...	...	— 2.4	2.2
South	Madurai ...	0.4	— 1.8	3.1
	Pamban ...	1.7	— 0.2	8.0
	Koilpatti* ...	2.0	— 1.7	10.7
	Palayamcottai ...	3.2	+ 0.7	10.0
	Ambasamudram* ...	4.3	+ 0.5	15.7
	Nagercoil* ...	0.8	— 3.0	5.3
	Capecomorin* ...	1.6	— 0.2	9.6
Hills	Kodaikanal ...	6.3	+ 1.5	12.5
	Coonoor* ...	10.7	+ 4.6	20.9
	Ootacamund* ...	3.1	— 0.6	6.0
	Nanjanad* ...	3.6	— 0.4	6.1

* Meteorological Stations of the Madras Agricultural Department.

In the month of April, 1961 there were localised or scattered thundershowers in different parts of the State.

In regard to the fluctuations of day temperatures there were no large changes. In fact, they were practically normal throughout the State except on 1—4—1961 and 2—4—1961, when the day temperatures were below normal in Madras State.

Zonal Rainfalls (in inches)

Name of the Zone	Rainfall for April, 1961 (inches)	Departure from normal	Remarks
North	...	— 1.2	Far below normal
East Coast	0.3"	— 1.1	"
Central	0.6"	— 1.5	"
South	2.0"	— 0.8	Below normal
Hills	5.9"	+ 1.6	Above normal

From the Agricultural Meteorologist, A. C. & R. I., Coimbatore.

BOOK REVIEW

[“Cytogenetics and Plant Breeding”, by S. N. Chandrasekharan, M. A., and S. V. Parthasarathy, B. Sc., (Ag.), M. Sc., 1948., Revised and enlarged by Dr. N. Krishnaswamy, B. Sc., Ph. D. (Kiel), and S. N. Chandrasekharan, M. A. chapters 29. pages i-xii + 653. P. Varadachary & Co., Madras 1960 Price Rs. 25/-].

Among the modern sciences, cytogenetics progresses in leaps and bounds with the improvement in cytological techniques and discovery of high precision instruments such as the electron microscope. Such a rapid progress necessitates periodical revision of text books to present up-to-date knowledge to the research workers and students. This task has been successfully carried out by Dr. N. Krishnaswamy who was, till recently, Cytogeneticist to the Government of Madras and Sri S. N. Chandrasekharan, the retired Professor of Botany at the Agricultural College, Coimbatore in revising the text book on ‘Cytogenetics and Plant Breeding’ originally published by Sri S. N. Chandrasekharan and Sri S. V. Parthasarathy in 1948. The original book which was the ripe product of an experience of a life time of research and teaching, is made up-to-date and authoritative by the revision and enlargement it underwent.

The book is divided into 29 chapters dealing on Cytogenetics, Plant Breeding and Statistical principles and techniques and ends with nine useful indices, of which the glossory in appendix VIII is revised and made up-to-date.

Though rearrangement of the subject matter has been attempted to a certain extent, the trend and spirit of the first edition has been maintained. In addition to the inclusion of new chapters on allelism, sex-determination and sex-inheritance, Cytoplasmic inheritance and heterosis, latest developments have also been added on in most of the chapters to keep pace with the recent progress. Deletion of certain figures and inclusion of new ones is a welcoming change since they are more instructive and quite attractive.

Under “Recent Advances”, on Page 6, the work of the Nobel laureates Beadle, Tatum and Iderberg on ‘Newrospora Genetics’ could have been added to make the information up-to-date. Though the authors have mentioned in page 56 that ‘complementary genes have the same common gene symbol with alphabetic subscrip’, this notation has not been followed in page 38. The details given in chapter IX dealing with ‘Sex determination and Sex-inheritance’ are not in an easily assimilable form and the flow of understanding is often interrupted. As for spelling and other errors, many of which are perhaps printers’ devils, there are a fairly good number, and it is unfortunate that in the ‘addendum and corrigendum’ slip attached still many are omitted.

On the whole, the authors are to be congratulated for their worthy contribution to the scientific world, and it is our considered view that this book will be found indispensable not only to the Post-Graduate scholars and research workers in South India for whom it is primarily meant, but also to the agricultural scientists all over India and in the neighbouring countries where problems are similar to those of tropical India.

B. W. X. P.



Review of market conditions of commercial crops in the notified areas in the Madras State for the month of April 1961.

Cotton : COIMBATORE DISTRICT : During the month there were some scattered rains all over the district. Harvest of Cambodia cotton was completed in all the taluks.

The kapas market at Tiruppur had an opening stock of 23616 quintals of Cambodia and 66 quintals of Karunganni kapas and total arrivals into Tiruppur during the month were 74518 quintal of Cambodia and 8571 quintals of Karunganni kapas. The despatches during the month were 63685 quintals of Cambodia and 5172 quintals of Karunganni kapas leaving a stock of 34449 quintals of Cambodia and 3465 quintals of Karunganni kapas.

The lint market at Tiruppur started with an opening stock of 17504 quintals of Cambodia lint during the month. The total arrivals into Tiruppur during the month of April, 1961 (upto 22-4-1961) were 27672 quintals of Cambodia and 321 quintals of Karunganni lint which included 11409 quintals of Cambodia and 321 quintals of Karunganni lint locally ginned. Despatches from Tiruppur market were 19616 quintals of Cambodia and 321 quintals of Karunganni lint. At the end of the month the market was left with a balance of 25560 quintals of Cambodia lint.

The prices were as follows :

Prices in Rs. per quintal.

Centre	Cambodia		Karunganni	
	Kapas	Lint	Kapas	Lint
Pollachi	125.71	331.00	...	...
Tiruppur	137.00	...	127.22	...
Sulur	137.00	372.58	119.00	...
Coimbatore	135.00	372.58	110.00	260.00
Avanashi	135.00	340.00	110.00	260.00
Erode	131.50	276.00	...	...
Gobi and Bhavani	130.00	276.00	111.00	...

RAMANATHAPURAM DISTRICT : There was severe summer during the month. Scanty and insufficient rains were recorded.

The following were the arrivals and disposals of cotton kapas and lint during the month in Ramanathapuram District :

Kapas : (Kapas in Quintals)

	Opening Stock	Receipts	Disposals	Closing Stock
Virudhunagar	3,635	24,000	23,500	4,135
Sattur	1,000	16,000	16,000	1,000
Rajapalayam	...	10,000	10,000	...
Total	4,635	50,000	49,500	5,135

Lint : (in Quintals)

	Opening Stock	Receipts	Disposals	Closing Stock
Virudhunagar	533	4,706	4,706	533
Sattur	106	4,372	4,194	284
Rajapalayam	...	2,840	2,840	...
Total	639	11,918	11,740	817

Price : (in Rs. per quintal)

Kapas :

	April, 1961	March, 1961
Karunganni	Rs. 93.33 to 106.00	Rs. 88.00 to 112.00
Tinny	„ 79.33 to 94.00	„ 86.00 to 89.00

Lint :

Karunganni	„ 253.00 to 263.00	„ 254.00 to 276.00
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Cotton Seeds :

Karunganni	„ 35.16 to 39.58	„ 39.13 to 43.87
Tinny	„ 39.48 to 39.75	„ 40.00

TIRUNELVELLI DISTRICT : There was about 80 mm of rainfall recorded during the month. In the Koilpatti market about 1,500 pothies of Karunganni kapas were received of which 1300 pothies were sold. About 1,200 candies of lint were also received of which 1,000 candies were sold. The price for Karunganni kapas was around Rs. 120/- per pothi.

Groundnut: SOUTH ARCOT DISTRICT: Arrivals of kernels improved as the harvest of summer peanuts was in progress. Arrivals of local produce amounted to 3,348 tonnes and receipts from North Arcot, Tiruchi and Madurai Districts amounted to 509 tonnes. Export to Pondicherry came to 122 tonnes, while despatches to other districts totalled 545 tonnes. The oil mills and country chekkus consumed 2540 tonnes and 294 tonnes respectively. Wastages were calculated at 125 tonnes. The trade had a stock of 2160 tonnes at the end of the month.

RAMANATHAPURAM DISTRICT: At Virudhunagar, there was an opening stock of 6,480 quintals and 2,720 quintals were received. Of these 4,000 quintals were sold leaving a balance of 5,200 quintals at the end.

The prices were as follows:

	April, 1961	March, 1961
Groundnut pods (37 kgs.)	Rs. 20.00 to 22.00	Rs. 24.00 to 25.00
Groundnut kernels (80 kgs.)	„ 79.08 to 85.00	„ 76.00 to 83.33
Groundnut oil (226 kgs.)	„ 453.57 to 471.43	„ 453.43 to 478.67
Groundnut oil-cake (226.80 kgs.)	„ 73.20 to 87.43	„ 73.20 to 81.33

NORTH ARCOT DISTRICT: Rains were received in the district during the month under report and hot weather prevailed during the month. The harvest of summer irrigated groundnuts in Takkolam and Tiruvannamalai continued during the month.

The arrivals disposals stocks, etc., of groundnut in the districts during the month were as follows:

	Opening Stock	Arrivals	Disposals	Closing Stock
Groundnut pods in bags of 40 kgs.	18,090	9,000	12,100	14,900
Groundnut kernels in bags of 40 kgs.	4,890	9,904	10,708	4,086

Prices:

Groundnut pods (per bag 40 kgs.)	Rs. 211.50 to 33.00
Groundnut kernels (per candy of 240 kgs.)	„ 210.00 to 250.00
Groundnut oil (per candy of 226 kgs.)	„ 462.00 to 491.00

TIRUCHIRAPALLI DISTRICT: There was practically no rains and only hot weather conditions prevailed during the month under review. The standing crop of summer groundnut was reported to be good.

The regulated markets at Jayankondam and Ariyalur received 1297 bags of 23 kilograms each and 343 bags and 31 kilograms of groundnut respectively. There were no arrivals in other markets. The price of groundnut kernels ranged between Rs. 220/- to 250/- per candy of 240.85 kilograms.

Gingelly: SOUTH ARCOT DISTRICT: Arrivals of gingelly improved and totalled to 4399 bags (80 kilograms) comprising 2740 bags of local produce and 1659 bags from Tiruchi District. A quantity of 2832 bags were despatched to Madras, Coimbatore and Tanjore Districts. A quantity of 1241 bags was crushed for extracting oil. The trade was left with a stock of 790 bags at the end of the month. The average price per bag ranged from Rs. 94.20 to Rs. 107.03 in the several markets.

Tobacco: COIMBATORE DISTRICT: At the end of the month there was a stock of 34681 quintals of chewing and 4255 quintals of cheroot tobacco. About 5780 quintals of chewing and 1048 quintals of cheroot tobacco were exported to Kerala and Mysore States and to Trichy, Madurai and North Arcot Districts of Madras State. Purchases of new crop of tobacco from growers were effected in fields by trade at rates ranging from Rs. 150/- to Rs. 300/-. The prices of the cheroot variety ranged upto Rs. 220/- per quintal.

Variety	Ist Grade	IIInd Grade	IIIrd Grade
	(per quintal)		
	Rs./nP.	Rs./nP.	Rs./nP.
1. Chewing tobacco-sun cured:			
(a) Meenampalayam	198—228	120—176	88—132
(b) Other varieties	132—225	110—185	77—115
2. Cheroot varieties:			
Grown in Erode and Bhavani taluk	154—220	132—176	44—88
3. Chewing tobacco-pit cured:			
Grown in Palladam and Sular areas	150—205	120—130	80—110

Cardamom: MADURAI DISTRICT: During the month under report there was fair to good rain fall in the cardamom plantations in Kerala hills and Madurai District. The standing crop was reported to be fair. Arrivals were good at Pattiveeranpatti and fair at Bodinayakkanur and Virudhunagar.

(Prices in Rs. per lb. (0.450)

1. Bodinayakanur :

Superior bulk	Rs. 9.26 to 10.01
Medium bulk	„ 7.80 to 8.96
Inferior bulk	„ 6.87 to 8.00
Lights	„ 4.37 to 7.37
Splits	„ 6.45 to 7.35
Seeds	„ 9.50 to 10.01

2. Pattiveeranpatti : (a) Sun-dried :

Medium and bulk	„ 8.04 to 8.72
Inferior and small	„ 6.97 to 8.35

3. Virudhunagar : (b) Store-Green :

Superior and bold	„ 9.20 to 10.68
Medium and bulk	„ 8.16 to 9.27
Inferior and small	„ 7.00 to 8.49
Splits	„ 6.50 to 7.50
Lights	„ 4.00 to 6.16
Seeds	„ 9.12 to 10.28
Bold quality	„ 9.25 to 10.62
Rabin	„ 8.36 to 9.50
Smalls	„ 7.50 to 8.00
Shipment	„ 7.25 to 8.00
Seeds	„ 10.00 to 10.50

Review of administrative activities of Market Committees
in the State during the month of April 1961 -

The Market Committees of South Arcot, North Arcot, Coimbatore, Trichirapalli, Tirunelveli and Ramanathapuram are functioning briskly under report.

Enforcement :

Name of the Market Committee	Section 5 (1)		Section 5 (3)		Weighmen	
	A	B	A	B	A	B
South Arcot Market Committee	105	977	80	709	75	683
North Arcot Market Committee	129	552	129	539	33	299
Coimbatore Market Committee	102	950	165	744	58	441
Tiruchirapalli Market Committee	191	1002	184	888	158	768
Tirunelveli Market Committee	24	121	8	167	22	117
Ramanathapuram Market Committee	69	376	54	333	54	255

A = Licences issued during the month.

B = Licences issued upto this month.

Meetings: The District Revenue Officer, Tirunelveli convened a special meeting of the members of the Tirunelveli Market Committee for the election of Chairman and Vice-Chairman on 6-4-1961. Messrs. K. Sundararajan and L. Subbiah were elected as Chairman and Vice-Chairman respectively.

A meeting of the Coimbatore Market Committee was convened by the Ex-Officio Chairman for the election of Chairman and Vice-Chairman on 28-4-1961. Sri E. R. Palaniswamy Goundar and Sri S. P. Muthukumaraswami Gounder were elected as Chairman and Vice-Chairman respectively.

An ordinary meeting of the North Arcot Market Committee was held on 30-4-1961. At the meeting 28 subjects were discussed and 3 subjects were deferred decision and 25 subjects only were disposed off.

THE MADRAS AGRICULTURAL STUDENTS' UNION.

This is an association of the students, past and present, of the Madras Agricultural College, and of the officers of the Madras Agricultural Department, the Dean of the Agricultural College being the President, (ex-officio). The Union conducts this Journal and celebrates annually the College Day, on which occasion it convenes an Agricultural Conference. The Association has Members, Associates, Honorary Members and Patrons. For detailed particulars apply to the Secretary.

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| STEM BORER | PARAMAR 50(Parathion 50%E.C.) |
| | ENDRIN 20% E. C. |
| APHIDS | — MALAMAR 50% E. C.
(Malathion 50% E. C.) |
| | PARAMAR 50 |
| MILDEW | — HEXACHLOR-SOIL FUNGICIDE |
| 3. GROUNDNUT: | |
| APHIDS & SURAL | — BHC 5% Dust, BHC 10% Dust |
| RED HAIRY CATERPILLAR | — BHC 10% Dust, BHC 50% w. d. p. |
| | PARATHION 1% Dust. |
| 4. CHILLY: | |
| THRIPS, CUTWORMS | CHILLY SPRAY BHC 50% w. d. p. |
| ROOT GRUBS, MITES & | CUPRAMAR (Copper |
| MEALY BUGS FRUIT ROT | Oxychloride 50% Cu.) |
| MILDEW | WETTABLE SULPHUR. |
| 5. FOR SEEDS DRESSING OF | |
| ALL CEREALS AND FOR | |
| CONTROL OF SEED- | HEXASAN |
| BORNE DISEASES | (Organo Mercury Compound) |

Please Contact :

BHARAT PULVERISING MILLS PRIVATE LIMITED,

589, TIRUVOTTIYUR HIGH ROAD, MADRAS-19.

TELEGRAM: 'HEXAMAR'

TELEPHONE: 51240

HEAD OFFICE AT: **38-A, SAYANI ROAD, BOMBAY-28.**

Sole Selling Agents:

RALLIS INDIA LIMITED,

320, LINGHI CHETTY STREET, MADRAS-1.

DEPOTS: **COIMBATORE, TINNEVELI, METTUPALAYAM, OOTY, TUTICORIN,**
MADRAS, CUDDALORE, SALEM ETC.