# THE MADRAS AGRICULTURAL JOURNAL

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## *Prize for Arecanut husking and slicing Machines.*

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The Indian Central Arecanut Committee has decided to offer a prize of Rs. 2,000/- to any person or body who designs the best model of a time-saving and economic machinery for husking arecanut in all stages of maturity and capable of slicing the kernels and demonstrates its working to the satisfaction of the Committee or a competent body appointed by it.

*Further details regarding the prize can be obtained from :*

**THE SECRETARY,**
**INDIAN CENTRAL ARECANUT COMMITTEE,**
**P. B. No. 14, KOZHIKODE - 1.**

# The Madras Agricultural Journal

Vol. XXXIX September 1952 No. 9

## *Editorial*

As our readers are aware, there is an annual change of personnel in the management of the Madras Agricultural Students' Union as soon as the College Day and Conference are over. New office bearers are elected at the Annual Business Meeting of the Union and the names of these office bearers will be found elsewhere in this issue.

In this context it may not perhaps be out of place to take stock of the present position of the journal and see how far and in what all ways it could be improved. Though the Journal can well claim credit for its regularity and a certain minimum content of scientific information of agricultural interest, not even its stoutest supporters can claim that it is perfect, nor that it is able at present to provide varied fare to suit the taste of every one in the Agricultural Department of Madras.

To a certain degree this is inevitable, since no publication can satisfy everyone. If it is aimed to be a scientific journal, it is bound to be regarded as too heavy and stodgy by the average reader of newspapers and magazines; on the other hand, to make it too "popular" in tone would impair the utility of the Journal as a source of information on scientific agriculture. At the same time it should be possible to combine to a limited extent, information with entertainment. It is also possible, in the information provided, to cover a variety of subjects, so as to appeal to a wider circle of readers.

It is in this aspect that our readers and in particular, the members of the Agricultural Department can help. The Editorial Board is always willing to consider the publication of new items of agricultural interest, sent in by our readers. At present, there is a certain sameness in the subjects and presentation in most of the papers that are received for publication in the Journal.

Another lacuna, which needs to be filled in, is the almost entire absence of any contributions from our student members. It might perhaps be argued that the students are busy enough with their own studies, but none the less, both the Journal and the students themselves would be benefited if there is a little more interest on their part to contribute some thing; some notes on items of interest that they had seen in their tours or during their vacations or periodical accounts of the activities of the Students' Club, both literary and athletic.

We would therefore request all our readers and members to help us to improve the Journal by contributing short accounts on all items of general interest from an agricultural viewpoint. We would also make another request, namely, that our contributors should not feel unduely disappointed if they fail to see their contributions published in the very next issue of the Journal, as a certain amount of blending and selection is unavoidable in making up the bill of fare in a publication of this type.

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We are happy to welcome as one of our new patrons, Sri V. C. Subbaiya Gounder, Gnanambika Mills P. O., Coimbatore, one of the leading agriculturists of the district. Sri Gounder's family has always taken a very keen interest in the Madras Agricultural Student's Union and the Journal, as his brothers Sri V. C. Palaniswami Gounder, (now Minister for Prohibition in the Madras Cabinet) and the late V. C. Vellingiri Gounder have been patrons of the Union for a number of years.

# Soil Surveys in Madras

*By*

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AND

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Soil surveys are essential to study the condition of the soil so that it can be classified on the basis of its productive capacity to, determine ways and means of improving its usefulness. Realising the importance of soil surveys many of the advanced countries in the world, particularly the U. S. A., have surveyed the soils classified and codified them and then prepared soil maps to give guidance to farmers in the proper management of their soils. Unfortunately such information is not available on an extensive scale in India. It is, therefore, essential to undertake soil surveys in India on a systematic basis.

The Madras Agricultural Department has been in the forefront with regard to soil survey work in India, and has carried out soil surveys for various purposes. For instance, it has surveyed the soils of the Godavari, Krishna and the Cauvery deltas, of the Periyar tract and of Malabar. On the basis of the results obtained in these surveys manurial programmes have been worked out for the different tracts.

In some States in India irrigation projects were sometimes started without proper soil surveys. In areas such as the Nira Valley in Bombay, the Irwin canal area in Mysore, it has been found that with the advent of irrigation the fertility of the soil decreased and within a few years the soil became unfit for cultivation on account of alkalinity. So, before an irrigation project is taken on hand the Madras Government (Agricultural Department) have been carrying out soil surveys of project areas with a view to find out the suitability of the soil and water for irrigation. Such surveys were undertaken in the Tungabhadra project, the Cauvery-Mettur project, the Lower Bhavani project, the Gundalakamma Project, the Todulur project, the Gandikota project and the Bhairavanitippa project. In addition, the Madras Agricultural Department has carried out soil surveys of some tracts in the Ceded districts to find out their suitability for fruit culture. The North-East coast of Madras which was badly affected by a cyclone in 1945 has also been surveyed to ascertain the extent of damage caused to the soil by the tidal wave from the sea and to suggest measures to reclaim them.

In a soil survey, the data to be collected in the region under investigation are; (1) the surface features of the land such as flat, undulating, broken etc., (2) the soil water conditions including drainage; (3) the texture of the soils such as clayey, loamy, sandy etc.; (4) the colour of the soils; (5) the depth and succession of soil horizons down to the parent rock; (6) the character of the parent rock; (7) the nature of cropping and the natural vegetation in the tract. After making these observations in the field, representative samples of the horizons of typical soil profiles are sent to the laboratory for detailed study. In irrigation soil surveys, waters are also examined, both in the field and in the laboratory.

In the earlier soil surveys undertaken by the Agricultural Department the object was to ascertain the manurial requirements of particular tracts with special reference to cereal crops. The soil samples were collected to a depth of 18 inches, the first 9 inches to represent the surface soil and the second 9 inches to represent the subsoil. Later, it was realized that the soil from the surface down to the parent rock, i. e. the soil profile as a whole, should also be taken into consideration. To get the profile of a soil the simplest method is to dig a pit down to the parent rock. The vertical sides of the pit can then be examined. It will ordinarily be found that there are layers in the soil differing in colour, texture etc. These different layers are called the horizons of the profile. The top soil usually is darker than the lower layers on account of the humus or organic matter content. If a profile is examined by the practical agriculturist he can see the nature of the subsoil, its drainage possibilities, bands of sand and other layers, kankar, gypsum and salt concentration etc. It is not necessary to dig a pit solely for profile examination. Pits are dug in the field for many purposes and whenever a pit is excavated for any purpose the practical agriculturist should be interested to examine his soil profile to know the depth of soil, its drainage possibilities and other characteristics. Sometimes when the soil is very deep it may not be possible to study the soil down to the parent rock. Then the soil is examined to a certain depth depending on the purpose for which it is intended. Thus in the Tungabhadra project soil survey some of the black soils were found to be very deep. So they were sampled to a depth of 8 feet. In cereal crops such as paddy, cholam, ragi etc. the roots are abundant in the first two feet and so in the case of these crops it is ufficient to study the soil only to this depth. In cotton and other deep-rooted crops the soil must be examined to a depth of three feet. For fruit trees the depth of the soil is important and must be studied to at least six feet.

*Soil surveys to assess soil fertility*: These were undertaken between 1912 and 1928 and had for their object the determination of the fertility status and the manurial requirement of the soils of certain tracts. As is well known, three most important nutrients which plants require from soils are nitrogen, phosphoric acid and potash. Hence the soil samples collected during the surveys were analysed for these constituents, for lime and for mechanical composition so that a complete picture of the soil with reference to crop production was obtained- The limits of plant nutrients for the climatic and soil conditions of our State are 0·05% of nitrogen, 0·01% of available phosphoric acid ($P_2O_5$) and 0·005% of available Potash ($K_2O$) and 0·5% of lime ($C_aO$). The soils of all the regions surveyed for fertility status were measured with this yardstick. In addition to the plant nutrients organic matter or humus also must be present in adequate amounts in the soil for good crop production. Organic matter has several important functions in improving the mechanical composition and the fertility status of soil. In our State organic matter is lost from the soil not only by microbiological (bacterial) activity but also by oxidative decomposition. Consequently the loss is considerable and the loss must be made good by the incorporation of green manure and other bulky organic manures into the soil. The results of the soil surveys are given below :

**Tanjore Delta:** The soils are deficient in available phosphoric acid and nitrogen. Patches in the delta are deficient in lime. The soils contain adequate amounts of potash.

**Guntur Delta:** The soils of this region contain adequate amounts of phosphoric acid. potash and lime. But nitrogen is deficient over the whole area.

**Krishna and Godavari Deltas** are deficient in nitrogen but rich in potash and lime. Phosphoric acid, is in short supply in half of both the regions.

**Periyar Tract:** The soils of the area are rich in potash and deficient in phosphoric acid and lime. Nitrogen is just on the border line.

**Malabar:** Some of the lateritic soils of the region contain adequate amounts of nirogen but are poor in all other plant nutrients and lime.

**Soil Survey of Tanjore District:** A soil survey is in progress in Tanjore District to determine the fertility status of the soil and to evaluate the response to manurial treatments since the current year.

**Manurial Programme Suggested:** (1) When nitrogen is deficient agriculturists are advised to grow green manure legume crops with

the application of phosphate (30 lb. of $P_2O_5$ in the form of superphospate) and to plough in the legume crop. The seeds of the legume crop should be inoculated with the specific bacteria before sowing. It is claimed that under optimum conditions one pound of phosphate supplied to the legume brings about the fixation of 3 lb. of atmospheric nitrogen. So by this means nitrogen, organic matter and phosphorus are stcked in the soil for the growth of the succeeding crop. Nitrogen may also be applied to soil as nitrogenous manures.

(2) Potash is present in most of the soils in Madras State in adequate amounts, except in the coastal regions and on the hills.

(3) Phosphate may be directly added to the crop or to the green manure legume crop. It is better to apply phosphate to the legume than to the main crop.

**Irrigation Soil Surveys:** In an irrigation soil survey the most important points to be studied are the quality of the water to be used for irrigation and the texture and salt content of the soil. Sweet water which is good for drinking and cooking purposes may contain sodium bicarbonate (baking soda) and is not good for irrigation purposes. If the water contains sodium salts such as carbonate (washing soda), bicarbonate (baking soda) and chloride (common salt) in appreciable amounts without much of calcium salts, the water is unfit for irrigation. These salts will gradually render the soil alkaline and unproductive. If the water is of good quality irrigation can be undertaken but the nature of the irrigation, light, medium or heavy which is to be adopted will depend on the soil. A soil with low salt content and good capacity for drainage is ideal for irrigation. If there is salt concentration in any depth and if these consist of sodium salts irrigation must ensure that the soil is not wetted to this depth especially if the water table is high or the drainage from the soil is not adequate. Salt concentration existing in any depth of the soil is a potential danger, leading to the alkalinisation of the soil by the rise of salts to the surface. Drainage is therefore one of the most important factors in all irrigation projects.

Of the important irrigation projects undertaken by the Madras Government the soils commanded by the following projects were surveyed: The Tungabhadra project, the Cauvery-Mettur project and the Lower Bhavani Project. The water in all the three projects were found to be of exellent quality and the soils were considered to be suitable for irrigation. But in the Tungabhadra project area patches of black soils were found to contain salt concentration in the lower depths. It was feared that alkalinity might develop in these soils in due course. So an Agricultural Research Station was started at Siruguppa in Bellary district to find out

what happens with different kinds of irrigation on such soils. The findings so far obtained indicate that there is no danger of the soils going bad, as the drainage is satisfactory. But the experimental station is situated in the midst of a vast area of drylands and the drainage is now adequate. What will happen to the drainage when the whole land mass comes under irrigation is to be investigated. The need for constant vigilance is therefore indicated.

Soils commanded by several minor irrigation projects of the Madras Government have been surveyed by the Government Agricultural Chemist and recommendations have been made in each case regarding the suitability or otherwise of the soils for irrigation with the available water.

**Soil Survey of the cyclone-affected areas in North Madras Coast:** In 1945 there was a cyclone in North Madras Coast and heavy seas invaded the land 150 miles long from Yellamanchili in the Visakapatnam district to Repalle in Guntur district. It was feared that salinity would have developed in the soil on account of the inundation by sea water. The area was surveyed and the soils were analysed. There was accumulation of salt (sodium chloride) in the soil and flooding with good water and drainage were recommended to correct the evil.

**Soil Survey for Fruit Development:** Fruit trees require a deep soil (6 feet and more) with good drainage and low salt content for best growth and performance. Some areas in the Ceded districts were surveyed to find out their suitability for fruit culture. Extension of this survey to a larger area in the Ceded districts is in progress.

Soil surveys are thus useful in finding out soil fertility and in deciding what manures are necessary for good crop production in various tracts. It is necessary to find out the irrigability or otherwise of the soils commanded by an irrigation project and a soil survey must be carried out before an irrigation project is taken up. Soil surveys are important for locating areas where fruit culture can be successfully and profitably be carried out. It is also essential for many other purposes such as suggesting suitable crops for particular types of soil.

# A Short Note on the Bud Sprouts of Tapioca Setts

*By*

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In a newly planted tapioca field it is commonly observed that the young plants that have just sprung up seldom present a uniform stand for vigour and growth. Also it is seen that the young plants coming out of the top setts of a whole stem have an unhealthy look. It was felt that the differences in the vigour and stand of these young plants arising from the different zones of the entire stem might be due to differences in the potentiality of the buds for producing vigorous shoots. A preliminary trial by planting setts cut from the different zones of a whole stem was conducted to test this point. The variety used was "Valenca". Setts were cut from each of three equally divided parts of a whole stem, and those from different stems but belonging to the same zone were planted in one group. They were planted upright, at equal distances, on ridges, in conformity with the local practice. The sprouting of the buds was noted to commence on the third day after planting and occurred simultaneously in all the buds irrespective of their location above or below ground. But all the buds in a single sett did not grow up into normal branches. Only the top bud or the one below it, as a rule, grew up, although shoots from both the buds and even from a third bud in rare cases, were not quite uncommon. The first set of growth measurements was recorded 50 days after planting and a second set 45 days later. Forty plants were measured for each zone and the same plants were measured each time. The data are presented below.

| Date of measurement. | Zone. | Average height in cm. |
|---|---|---|
| | Basal. | 21·1 |
| 27—9—1951. | Middle. | 20·5 |
| | Top. | 14·6 |
| | Basal. | 77·6 |
| 13—11—1951. | Middle. | 63·1 |
| | Top. | 52·1 |

It will be noted from the data that the growth behaviour is different for the shoots from the different regions of the stem. However, it was noticed that among setts of varying lengths, a single shoot from a

longer sett was more robust and faster growing than the one coming out of a smaller sett. To verify this, setts of varying lengths but of uniform thickness and maturity were cut from the same regional zone and planted in pots. No replications were given. The details of setts and of growth measurement recorded 75 days after planting are given below.

| | Length of sett. (cm.) | Number of buds | Length of main shoot (cm) | Basal thickness of stem (cm) |
|---|---|---|---|---|
| 1. | 13·5 | 10 | 30 | 0·45 |
| 2. | 10·5 | 9 | 28 | 0·40 |
| 3. | 9·0 | 8 | 24 | 0·34 |
| 4. | 7·5 | 6 | 22 | 0·25 |
| 5. | 6·5 | 5 | 18 | 0·18 |

The results tend, in a large measure, to support the observations made in the field. Considering the heterogeneity of conditions arising from soil disposition, moisture content of the soil, size of setts employed for planting etc., that ultimately influence the bud sprouts and their subsequent development, a more accurate method to assess correctly the growth potentiality of buds from the different zones of the stem, had to be found. With this end in view, a whole tapioca stem was cut into several bits of equal lengths retaining only one bud in each bit. The bits were planted in a box containing fine sand, the planting being done in the same natural order as they occurred on the stem. They were planted end to end with buds above and daily watered. The dates of sprouting of the individual buds were noted. The first sprouting was noticed seven days after planting and after another six days the sprouting was complete. Three buds at the top end of the stem, out of 35 buds in the entire stem, did not sprout. From the very beginning it was observed that the whole of shoots belonging to the basal and the lower half of the middle zones were relatively more vigorous and healthier than the others from the remaining regions of the stem. Growth measurement for height of plants, thickness of stem and size of leaf was recorded 50 days after planting. The data are furnished in the table below.

It will be seen from the table that the time taken for sprouting is more or less the same for all the buds irrespective of their zonal distribution. This agrees well with the observations made in the field trials. However, the vigour of growth as noticed in the earlier stages of plant growth in this experiment is distinctly more in respect of buds confined to the lower half of the whole stem or roughly two-thirds of the stem, after rejecting the tender top portion as is generally practised by the ryots before the stem is cut into setts for planting.

| Serial No. | Basal Zone. | | | | Middle Zone. | | | | Top Zone. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Height of plants in cm. & date of sprouting. | Maximum thickness of stem (in mm.) | Maximum length of middle leaf lobe (in mm.) | Maximum petiole length (in mm.) | Height of plant in cm. & date of sprouting. | Maximum thickness of stem (in mm.) | Maximum length of middle leaf lobe (in mm.) | Maximum petiole length (in mm.) | Height of plant in cm. date of sprouting | Maximum thickness of stem (in mm.) | Maximum length of middle leaf lobe (in mm.) | Maximum petiole length (in mm.) |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 1. | 13·5 11—10—51 | 3·0 | 14 | 17 | 10 0 5—10—51 | 2·5 | 12 | 31 | 8 0 4—10—51 | 2 0 | 10 | 15 |
| 2. | 11 5 8—10—51 | 2·5 | 9 | 10 | 7·5 11—10—51 | 2·5 | 14 | 20 | 10·0 4—10—51 | 2·0 | 7 | 14 |
| 3. | 10·5 7—10—51 | 3·0 | 14 | 25 | 13·0 15—10—51 | 2 5 | 9 | 20 | 9·5 9—10—51 | 2 0 | 9 | 10 |
| 4. | 12·5 2—10—51 | 3·0 | 8 | 25 | 13·0 10—10—51 | 3 0 | 8 | 20 | 14 0 8—10—51 | 1·5 | 7 | 9 |
| 5. | 6·0 3—10—51 | 3 0 | 12 | 39 | 10 0 3—10—51 | 3·0 | 11 | 32 | 9·0 7—10—51 | 2 0 | 4 | 10 |
| 6. | 12·5 7—10—51 | 3·0 | 12 | 24 | 10 0 7—10—51 | 3 0 | 11 | 27 | 7·0 4—10—51 | 2·0 | 8 | 14 |
| 7. | 12·0 7—10—51 | 3·0 | 14 | 34 | 10·0 5—10—51 | 3 0· | 11 | 19 | 5·5 8—10—51 | 1·5 | 6 | 10 |
| 8. | 11·0 5—10—51 | 3·5 | 15 | 35 | 5·0 3—10—51 | 2·0 | 5 | 16 | 3·5 7—10—51 | 1·5 | 3 | 5 |
| 9. | 15·0 5—10—51 | 3 0 | 14 | 26 | 10 0 7—10—51 | 2 0 | 9 | 10 | 1·5 7—10—51 | 2 0 | 6 | 8 |
| 10. | 15·5 7—10—51 | 2·5 | 9 | 18 | 9·0 7—10—51 | 2·0 | 6 | 19 | 1·5 7—10—51 | 2·0 | 4 | 6 |
| 11. | * 7—10—51 | * | * | * | 9·0 4—10—51 | 2·5 | 9 | 18 | * * | * | * | * |
| 12. | * 5—10—51 | * | * | * | 8·0 5—10—51 | 2 0 | 6 | 5 | * * | * | * | * |
| 13. | * 7—10—51 | * | * | * | * 4—10—51 | * | * | * | * * | * | * | * |
| Mean | 12·00 | 2·95 | 12·10 | 25 30 | 9 54 | 2·5 | 9·2 | 19·60 | 6·95 | 1·85 | 6·40 | 10·30 |
| S. E. | 0·79 | 0·08 | 0 77 | 2·67 | 0·60 | 0·11 | 0·74 | 2 15 | 1·20 | 0 07 | 0·68 | 1 02 |

* Failed to sprout or died after sprouting

# The Rate of Loss of DDT

## [2. 2-bis (p-Chlorophenyl) 1, 1, 1,-Trichloro-ethane] deposits under field conditions*

### PART IV

*By*

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**Introductory**: The very scanty information available in literature to indicate the rate at which deposits of DDT disappear either under field or laboratory conditions and lose their toxicity is very contradictory in character. Whereas Fleming (1944) reported that one spraying would be sufficient to prevent attack by Japanese beetle for one season, Gunther (1245), reported that under the climatic conditions of California, DDT deposits lost their toxicity rather quickly. A systematic study on a field scale was made by Gunther (1946), using a variety of preparations and analysing the deposits at intervals. Biological tests also appear to have been carried with the residual deposits but the details were not reported.

**Experimental**: To study the rate at which deposits of DDT decrease under field conditions, 1·0% DDT emulsion prepared by using benzene as solvent were deposited at intervals of 1, 7, 13, 21 and 28 days respectively on undetached apple leaves of known area. The insecticide was applied with a micropipette at the rate of 5 mgm. per 100 sq. cm. (i.e. 50 micrograms per 1 sq. cm.) and spread uniformly. At the end of the experimental period leaves carrying deposits of the same age were collected separately and a portion washed with benzene at the rate of 6 c. c. per leaf and analysed chemically. The other portion (of leaves) was used for testing its biological activity, employing *Tribolium confusum* Duv (Satyanarayana, 1951) as the test insect.

Climatic conditions prevailing during the experimental period and other data are presented in Table I. There was a rainfall of 1·67" during the experimental period.

**Discussion**: Deposits that are 1, 13, 21 and 28 days old only are considered. The 7 days old deposft was ignored since almost immediately after deposition there was a shower, and this was clearly indicated by the lower recovery values. Analogous to the deposit which is one day old

* The investigations presented in this article formed part of a thesis submitted for the Ph. D. Degree of the University of London, and were conducted at the East Malling Research Station, England, during the years 1946 and 1947.

under field conditions, a separate trial was made in the laboratory using detached leaves. A comparison of these two sets of values gives an idea of the loss that is likely to take place in the field and under the existing climatic conditions. Under laboratory conditions out of 5·0 mgm. of DDT deposited, 3·52 mgm. i.e. 68·4% was recovered. A similar deposit under field conditions gave only 64·4% recovery, i.e. 3·22 mgm. of DDT. This 4·0% difference (68·4 — 64·4% = 4·0%) noticed between the two sets of recovery values evidently accounts for the loss that had taken place under field conditions. These results also show, that when properly conducted, field trials could be as accurate as laboratory tests, and any fluctuations noticed in the values of the former could be relied upon as giving a true picture of the effect of climatic, seasonal and other factors then prevailing.

It would appear from a perusal of the results in Table I, that out of every 100 parts DDT deposited on apple leaves, 68·4 parts are recovered after 24 hours even under laboratory conditions, which indicates that the rest (31·6 parts) is absorbed by the leaf tissue and confirms the observations already made by Satyanarayana (1951-b). These 68·4 parts that are on the surface get reduced to 64·4 parts in 24 hours, 46·1 parts in 13 days, 39·7 parts in 21 days and 37·6 parts in 28 days by weathering action.

Calculating as a percentage, if the original 68·4 parts that are on the surface represent 100, then the recoveries obtained during the subsequent rounds will be 94·1, 67·4, 58·1 and 54·9 respectively (Col. 6, Table I). The rate of loss of deposits would, therefore be 5·9% in 24 hours, 32·6% in 13 days and 45·1% in 28 days. (Col. 7, Table 1).

Plotting the values of deposits found at various rounds against the logarithm of days a straight line graph was obtained. (Chart I). In an experimental period of 28 days when there was a rainfall of 1·97", the loss was 30·8 mgm. (68·4 — 37·6 = 30·8) or roughly 1 mgm. per day. When considered as loss per sq. cm. of leaf area, out of the 5·0 mgm. originally spread on 100 sq. cm. only 3·4 mgm. (i.e. 34 micrograms per 1·0 sq. cm.) were left on the surface which was reduced to 1·88 mgm. (or 18·8 micrograms per 1 sq. cm.) on the last day of the experiment. The loss, therefore, per sq. cm. of leaf surface in the 28-day period was 15·2 micrograms. Gunther (1946) in similar studies reported a loss of 20 micrograms per sq. cm. in a period of 85 days under Californian conditions.

Tested biologically, the washed leaves gave no kill whereas the unwashed ones gave nearly 100% kill in every case. Even after 28 days there was a residual deposit of 1·88 mgm. per 100 sq. cm. of leaf area (i.e. 18·8 micrograms per sq. cm.) which is much more than what is needed to kill by contact action an insect like *Tribolium* [Satyanarayana, 1951(a)].

It is obvious from the foregoing that, (1) there is a close logarithmic relationship between the age of deposits and the rate at which they are lost, and (2) the deposits on leaves treated with 1% preparations retain their insecticidal activity for more than a month. In practice, however, where agricultural crops are concerned the use of such high concentrations is rare, but this high percentage was purposely chosen to make the estimation of the deposits possible and see whether any relationship could be established between the rate of loss of deposits and their age.

Having obtained the necessary preliminary information, attention was next directed to study the rate of loss of deposits when applied in concentrations that are usually employed in field practice. Accordingly, DDT emulsions of 0·2%, 0·1%, 0·05%, 0·025% and 0·0125% concentration were prepared and undetached apple leaves each measuring 20 sq. cm. in area at stated intervals were dipped individually. for a period of 10 seconds, allowed to dry and drain. All the leaves thus treated were collected at the end of the experiment and the toxicities of residual deposits tested biologically (Table 2).

A perusal of the results (Table 2) show again that, (1) the toxicity of deposits decreases with decrease in concentration, and, (2) the same preparation loses its toxicity with age (vide results of 0·2% emulsion). Represented graphically, the probits for the 0·2% preparations fall in a line when plotted against log of days (chart 2), and the line runs almost parallel to that found in chart I. It is evident that when the rate of loss of deposits is studied either by chemical or by biological means there is a close paralielism, and if suitable chemical methods could be found for estimating the residues, they could be easily correlated with their biological performances.

Chart.1

D.D.T deposits found at different rounds

(TABLE I COL. 5)

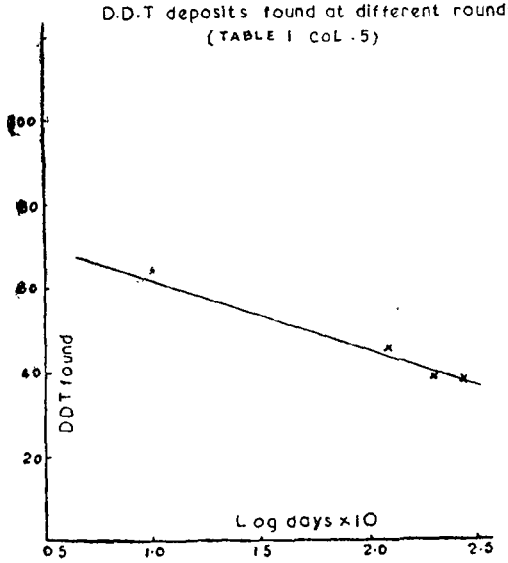
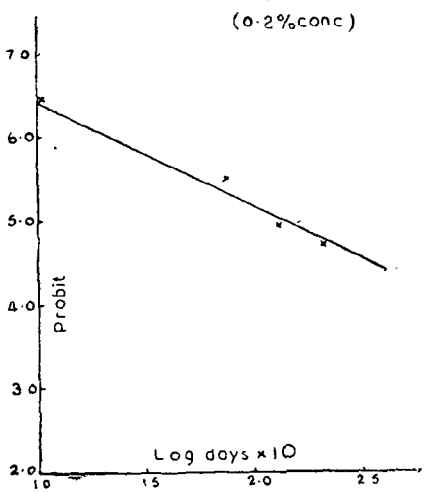



Chart.2

Relation between age of deposits & their toxicity

(0·2% conc)



Barring the 0·2% preparation, all the rest seem to have lost their toxicity within about a week's time under the existing climatic conditions. Certain limitations inherent in such tests must, however, be borne in mind while perusing such results like the variation in the toxicities of poisons to insects, the test insect used, its age etc. Again, in the laboratory tests, the insects are always in contact with the treated surface which is not so under field practice. Accordingly, with the same pest higher dosages of poison might be needed under field conditions to give a similar response.

**Summary:** Studying the rate of loss of DDT deposits it was found that there was a close parallellism between the chemical and biological tests, and if suitable methods could be found for evaluating the former in micro-amounts they could be properly correlated with the latter. The rate of loss is dependent upon the climatic and other factors.

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**TABLE I**

**Effect of Weathering on DDT Deposits. 1% DDT Emulsion in Benzene Periodically Deposited on Apple Leave**
**Benzene :— 3%; Emulsifier :— Soap, 0·5%.**

| Round of depositing | Age of deposit when analysed days. | DDT deposited on 100 sq. cms. of leaf (mgm.) | DDT recovered (mgm.) | % DDT recovered | % DDT recovered | % DDT recovered | Biological Tests (*Tribolium confusum*) Washed leaves. Insects tested | Washed leaves. % killed | Unwashed leaves. Insects tested | Unwashed leaves. % killed | Weather Data Date (1947) | Rain fall. | Max. tem. | Minimum temperature. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
| No. 1 | 28 | 5·0 | 1·879 | 37·58 | 54·9 | 45·1 | 75 | 0 | 75 | 95·9 | June 18 | ·06 | 72 | 49 |
| | | | | | | | | | | | ,, 19 | ·09 | 71 | 50 |
| | | | | | | | | | | | ,, 20 | ·02 | 64 | 52 |
| | | | | | | | | | | | ,, 21 | T* | 73 | 53 |
| No. 2 | 21 | 5·0 | 1·986 | 39·72 | 58·1 | 41·9 | 75 | 0 | 75 | 100·0 | ,, 22 | | 67 | 52 |
| | | | | | | | | | | | ,, 23 | | 69 | 42 |
| | | | | | | | | | | | ,, 24 | | 75 | 43 |
| No. 3 | 13 | 5·0 | 2·305 | 46·10 | 67·4 | 32 6 | 75 | 0 | 75 | 96·0 | ,, 25 | | 76 | 51 |
| | | | | | | | | | | | ,, 26 | T* | 84 | 46 |
| No. 4 | 7 | 5·0 | 1·807 | 36·14 | ... | ... | 75 | 0 | 75 | 96·1 | ,, 27 | ·99 | 84 | 64 |
| | | | | | | | | | | | ,, 28 | ·17 | 84 | 58 |
| | | | | | | | | | | | ,, 29 | ... | 70 | 58 |
| No. 5 | 1 | 5·0 | 3·220 | 64 40 | 94·1 | 5·9 | ... | ... | ... | ... | ,, 30 | ·02 | 68 | 57 |
| No. 6 | 1 (Lab) | 5·0 | 3·420 | 68·40 | 100 | 0 | 75 | 0 | ... | ... | July 1 | ·03 | 69 | 51 |
| | | | | | | | | | | | ,, 2 | T* | 74 | 55 |
| | | | | | | | | | | | ,, 3 | | 76 | 54 |
| | | | | | | | | | | | ,, 4 | ·05 | 75 | 52 |
| | | | | | | | | | | | ,, 5 | | 65 | 45 |
| | | | | | | | | | | | ,, 6 | ·08 | 68 | 46 |
| | | | | | | | | | | | ,, 7 | ·02 | 69 | 54 |
| | | | | | | | | | | | ,, 8 | ·10 | 61 | 48 |
| | | | | | | | | | | | ,, 9 | T* | 67 | 50 |
| | | | | | | | | | | | ,, 10 | ·24 | 61 | 56 |
| | | | | | | | | | | | ,, 11 | | 66 | 51 |

*T = Trace

**TABLE I—*cont.***

| Round of depositing | Age of deposit when analysed days. | DDT deposited on 100 sq. cms. of leaf (mgm.) | DDT recovered (mgm.) | % DDT recovered | % DDT recovered | % DDT recovered | Biological Tests (*Tribolium confusum*) | | | | Weather Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Washed leaves | | Unwashed leaves. | | | | | |
| | | | | | | | Insects tested | % killed | Insects tested | % killed | Date (1947) | Rain fall. | Max. tem. | Minimum temperature |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
| | | | | | | | | | | | July 12 | | 70 | 45 |
| | | | | | | | | | | | ,, 13 | T* | 78 | 49 |
| | | | | | | | | | | | ,, 14 | | 80 | 55 |
| | | | | | | | | | | | ,, 15 | | 79 | 57 |
| | | | | | | | | | | | ,, 16 | | ... | 58 |
| | | | | | | | | | | | Total rainfall ... | | 1·67 inches | |

*T = Trace

## TABLE II

**Effect of Weathering on the Toxicity of DDT Deposits—Dipping and Draining of Leaves.**
**Emulsifier used :— Product MB 320 at 0·05%. Benzene as solvent :— 10%**

| Concentration of emulsion | Age of deposit days | No. of insects tested | No. of insects dead | Percentage of dead insects | Weather Data | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Date | Maximum temperature °F | Maximum temperature °F | Rainfall in inches. |
| | | | | | 1947 | | | |
| 0·0125 | 22 | 90 | 0 | 0 | July 29 | 83 | 65 | |
| | 14 | 90 | 0 | 0 | ,, 30 | 69 | 59 | |
| | 8 | 91 | 2 | 2 | ,, 31 | 73 | 61 | |
| | 1 | 90 | 60 | 67·7 | Agust 1 | 79 | 52 | 0·05 |
| 0·025 | 22 | 90 | 0 | 0 | ,, 2 | 74 | 58 | |
| | 14 | 90 | 0 | 0 | ,, 3 | 78 | 55 | |
| | 8 | 91 | 1 | 1·1 | ,, 4 | 76 | 51 | T |
| | 1 | 93 | 49 | 52·7 | ,, 5 | 68 | 55 | T |
| | | | | | ,, 6 | 73 | 54 | |
| 0·05 | 22 | 89 | 0 | 0 | ,, 7 | 69 | 49 | |
| | 14 | 90 | 0 | 0 | ,, 8 | 75 | 44 | |
| | 8 | 89 | 23 | 25·8 | ,, 9 | 73 | 45 | |
| | 1 | 90 | 59 | 65·6 | ,, 10 | 69 | 49 | |
| | | | | | ,, 11 | 73 | 51 | |
| 0·10 | 22 | 88 | 0 | 0 | ,, 12 | 74 | 52 | |
| | 14 | 92 | 0 | 0 | ,, 13 | 78 | 51 | |
| | 8 | 90 | 18 | 20·0 | ,, 14 | 78 | 55 | |
| | 1 | 88 | 77 | 87·0 | ,, 15 | 82 | 59 | T |
| | | | | | ,, 16 | 86 | 57 | |
| 0·20 | 22 | 90 | 34 | 37·7 | ,, 17 | 85 | 59 | |
| | 14 | 90 | 40 | 44·4 | ,, 18 | 83 | 59 | |
| | 8 | 92 | 63 | 68·5 | ,, 19 | 78 | 66 | |
| | 1 | 87 | 80 | 92·0 | ,, | | | |
| Controls. | ... | 75 | 0 | 0 | Total. | | | 0·05 |

T—Trace.

# Progress of Pulses Improvement Work in Madras

*By*

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**Introduction**: Pulses form a group of food grains which play an important role in the Indian diet, especially in Madras, which is predominantly a rice-consuming State. They form the chief source of protein food to vegetarians and to the poorer classes who cannot afford the higher cost of animal protein. The pulses which are, important in the Madras State are redgram, greengram, blackgram, horsegram and Bengalgram. The pulse grain is mostly consumed by human beings, while the by-products such as broken grains, husk, chaff etc., are fed to cattle. Apart from their food value the cultivation of these crops increases the fertility of the soil in which they are grown, as the atmospheric nitrogen is fixed by the bacteria present in their root nodules. In spite of their importance, work on their improvement has not received the attention they deserve. The total area of all the pulses in Madras is about 3 million acres with a production of about 2·9 lakhs tons of grain. The average consumption of pulses in the State is about 5·8 lakhs of tons, which works out at the rate of 1 oz. per day per adult. Dr. Aykroyd has suggested that every adult should consume a minimum of 3 oz. of pulses a day to have a balanced diet. Even for the consumption of 1 oz. per day the production in the State is not sufficient, and as much as 50% of the requirements is met by imports from other States. The following table shows the acreages, production, consumption and deficit under each pulse in the Madras State.

| Crop | Normal area sown (Acres) | Normal production (Tons) | Normal consumption (Tons) | Deficit Tons |
|---|---|---|---|---|
| Redgram | 3,52,390 | 53,010 | 1,22,500 | 69,490 |
| Blackgram | 3,02,900 | 34,480 | 63,100 | 28,620 |
| Greengram | 4,97,810 | 54,220 | 60,400 | 6,180 |
| Bengalgram | 85.290 | 16,240 | 1,84,000 | 1,67,760 |
| Horsegram | 15,55,850 | 1,11,580 | 1,25,000 | 13,420 |
| Other pulses | 2,52,290 | 22,430 | 28,450 | 6,020 |
| Total | 30,46,530 | 2,91,960 | 5,83,450 | 2,91,490 |

From the above table it will be seen that in our State, the deficit is serious in the three major pulses viz., Bengalgram, redgram and blackgram. To make the State self-sufficient with regard to these pulses, without depending upon their imports from other States, it is essential that their production is increased considerably. This can be done both by increasing the area of cultivation and by the evolution of higher yielding strains. Pulses are mostly grown as mixtures with other crops such as paddy, millets and oilseeds, and mainly on drylands in low rainfall areas. Consequently their production is dependent on the vagaries of the monsoons. So, it is suggested that in all newly reclaimed lands pulses should also figure as a major crop. The progress of work in this State on the problem of evolving higher yielding strains is summarised in this paper.

A scheme of work for the improvement of pulses, partly financed by the Indian Council of Agricultural Research, New Delhi, was commenced in 1943. Prior to that, some of the pulses had been studied by the Cotton Specialist and Millet Specialist and cultures isolated by them were transferred to the scheme. Besides these, a large number of samples of different pulses were collected from various parts of the State. The cultivation and study of these seed materials was commenced at Coimbatore, Vizianagaram and Salem. While at Coimbatore all the pulses were under stndy, only redgram, blackgram, greengram and horsegram were studied at Vizianagaram, and redgram, lablab and horsegram at Salem. The work was confined to the evolution of high yielding strains by pure line selection.

**Redgram :** *(Cajanus cajan,* Millsp.): In addition to the cultures taken over from the Cotton Specialist, 47 samples from various districts were collected and grown at Coimbatore in 1944 – '45, and 140 single plants selected. In the succeeding years all the cultures were tested for yield. None of the cultures was found to yield significantly better than the standard, a selection made from a Coimbatore variety by the Cotton Specialist. Subsequently 760 single plants were selected afresh from the ryots' crops in the Tanjore (Vallam area), Kurnool, Anantapur and Bellary districts and studied for yield in 1949 – '50 and 1950 – '51. Fifty-two promising cultures from these have been retained for further tests. One of the cultures of the Cotton Specialist, No. 2900, which was reported to yield well in Salem district is under distribution in Salem and Coimbatore districts. Twenty-three samples were collected from Salem and neighbouring districts and grown in 1944 – 45 at Salem and and 120 single plants were selected. From the results of the trials in the subsequent years it was found that culture No. 37 gave a significantly higher yieid than the local bulk and its performance was consistent. This culture was also tried in the southern districts of the State under cultlvators' conditions and it proved its merit by yielding 12 to 41% extra grain over the local variety It has

been released for general cultivation in the southern districts. The details of its yield performance are summarised below: One hundred single plants were selected from the district samples collected and grown at Vizianagaram in 1944–'45. From the yield trials in the subsequent years, two cultures, No. 72 (medium duration) and No. 97 (long duration) have been retained for further trials.

*Performance of redgram No. 37.*

| Year | Yield per acre in lb. | | Percentage of increase over control | Remarks |
|---|---|---|---|---|
| | No. 37 | Control | | |
| 1946–'47 | 647 | 487 | 34·3 | At Salem Sub-Station |
| 1947–'48 | 786 | 486 | 61·7 | do. |
| 1948–'49 | 489 | 397 | 23·1 | At Dharmapuri Sub-Station |
| 1949–'50 | 661 | 429 | 54·1 | At Coimbatore Station |
| 1950–'51 | 810 | 574 | 41·1 | do. |

*Results of district trials.*

| Name of taluk | Percentage of increase over local variety |
|---|---|
| Nilakottai | 12·5 |
| Periakulam | 35·5 |
| Thirukoilur | 41·6 |
| Gingee | 16·7 |
| Cuddalore | 33·5 |

**Blackgram:** *(Phaseolus mungo, L.):* Out of 49 district samples grown and studied in 1944–'45 at Coimbatore 190 single plants were selected. Based on the results of their yield trials in the succeeding years, two cultures, Nos. 212 and 216, which gave consistently higher yields than the local variety have been selected for further tests. One hundred single plants were selected in 1944–'45, and tested for yield, at Vizianagaram, in the subsequent years. One culture, No. 189, gave consistently higher yield than the local variety and this is under trial in the northern districts. A summary of its performance on the station is furnished below:—

*Blackgram No. 189.*

| Year | Yield per acre in lb. | | Percentage of increase over local bulk. |
|---|---|---|---|
| | No. 189 | Local bulk | |
| 1948-49 | 311 | 248 | 25·4 |
| 1949-50 | 350 | 252 | 38·8 |
| 1950–51 | 324 | 204 | 58·8 |

**Greengram :** (*Phaseolus aureus*, Roxb): Two hundred and ninety single plants were selected from 36 samples collected and grown at Coimbatore in 1944-45. In succeeding years, they were tested for yield, and one culture, No. 62, proved to be the best by giving significantly higher yield than the local variety, with an average increase of 24·4%. This culture has been issued for trial in the southern districts. Its performance at the station is summarised below :—

*Greengram No. 62.*

| Year | Yield per acre in lb. | | Percentage of increase over local bulk. | Remarks. |
|---|---|---|---|---|
| | No. 189 | Local bulk | | |
| 1948–49 | 408 | 344 | 18·6 | |
| 1949–50 | ... | ... | ... | Crop failed due to adverse season. |
| 1850–51 | 406 | 312 | 30·1 | |

Sixty-three samples collected and grown at Vizianagaram in 1944-45 resulted in the selection of 100 single plants. The trials in the subsequent years showed that culture No. 127 was significantly superior to the local variety. This has been issued for trial in the northern districts. Its yield data are summarised below :—

*Greengram No. 127.*

| Year | Yield per acre in lb. | | Percentage of increase over local bulk. | Remarks. |
|---|---|---|---|---|
| | No. 127 | Local bulk | | |
| 1948–49 | 363 | 256 | 41·8 | |
| 1949–50 | ... | ... | ... | Crop was damaged by cyclone. |
| 1950–50 | 468 | 358 | 30·7 | |

**Horsegram :** (*Dolichos biflorus*, L.): From sixty-two samples collected and grown in 1943–44, 169 single plants were selected. Further trials revealed that none of the cultures out-yielded No. D. B. 7, an earlier release of the Millet Specialist. From further samples collected and studied 56 cultures are under yield tests. From the district samples grown at Salem in 1943-44, 194 single plants were selected. They were tested for yield in subsequent years and based on their performance, three cultures, No. 86, 122 and 153, have been retained for further tests. Out of a total of one hundred single plants selected in 1943–44 and tested for yield in subsequent years, at Vizianagaram, four cultures, which gave consistently higher yields than the local variety were selected for yield

trials. Among them one black-seeded culture No. 93, was found to be significantly better than the local variety and it has been released for trial in the northern districts. Its yield data are summarised below :—

*Horsegram No. 93.*

| Yeald | Yield per acre in lb. | | Percentage of increase over local bulk. |
|---|---|---|---|
| | No. 93 | Local bulk. | |
| 1947-48 | 266 | 166 | 60·2 |
| 1948-49 | 210 | 136 | 54·4 |
| 1949-50 | 202 | 160 | 26·2 |

**Bengalgram:** (*Cicer arietinum, L.*): Twenty-two samples were collected and grown at Coimbatore in 1943-44, and 120 single plants were selected. Since none of them out-yielded culture No. 482, an earlier selection by the Cotton Specialist, fresh samples were collected and studied in 1945-47. Twentysix promising cultures from these are under trial.

**Lablab:** (*Dolichos lablab*, L.): One hundred single plants were selected from the district samples collected and grown at Coimbatore in 1944-45. None of them out-yielded culture No. D. L. 231, a selection by the Millet Specialist and fresh samples were collected and grown in 1950-50, and 360 single plants were selected. They were tested in 1950-51, and 120 cultures were retained for further trials. Ninety-eight single plants, selected at Salem in the year 1944-45, underwent yield trials in the subsequent years. Two cultures No. 44 (buff seed) and No. 92 (white seed), gave higher yields than the local variety, and they await multiplication of seed and trial in the districts.

**Cowpea:** (*Vigna unguiculata*, Walp.): One hundred and forty single plats were selected at Coimbatore in 1944-45, and tested for yield in the subsequent years. None of the cultures out-yielded the control C. 57, a selection by the Millet Specialist. Fresh samples were collected and studied and 200 single plants were selected in 1949-50. They were tested for yield in 1950-51 and 120 cultures have been carried over for further study.

Simultaneously with the trials of the cultures for their production, their quality, particularly with reference to protein content, was also kept in view in recommending promising ones for trial in the districts. Samples of the improved cultures and the local varieties were analysed

by the Government Agricultural Chemist. It will be seen from the results furnished below that the improved cultures were not inferior to the local ones in protein content.

*Protein Content.*

| Crop | Improved strains | | Local variety |
|---|---|---|---|
| Redgram | No. 37 | 21·48% | 21·12% |
| Greengram | No. 62 | 22·81% | 22·63% |
| Greengram | No. 127 | 26·00% | 25·69% |
| Blackgram | No. 139 | 25·56% | 24·56% |
| Horsegram | No. 93 | 25·13% | 24·63% |

In addition to the isolation of high yielding strains of local pulses, trials were also conducted to study the possibility of introducing improved varieties from States. Improved other types of redgram, greengram, blackgram and Bengalgram were obtained from North India and tried, but without much success. These types were either too long or too short in duration and low in yield and so were unsuitable for cultivation under the conditions of climate and soil prevailing in Madras.

To sum up, as a result of work on the improvement of pulses in this State, the following high-yielding cultures suitable for general cultivation by ryots have been isolated and are under mutiplication and distribution.

| Crop | Cultures Suitable for Southern Districts | Cultures Suitable for Northern Districts |
|---|---|---|
| Redgram | No. 37 | ... |
| Greengram | No. 62 | No. 127 |
| Blackgram | No. 212 | No. 189 |
| Horsegram | D. B. 7 | No. 93 |
| Bengalgram | No. 482 | ... |
| Lablab | D. L. 321 | ... |
| Cowpea | C. 57 & C. 521 | ... |

Besides the above cultures in field crops, culture No. C. 419 in vegetable cowpea, half-a dozen high-yielding and good quality kitchen garden lablab types and two cluster-bean types have also been isolated, and their seeds are being distributed for general cultivation.

The above cultures are suited only to certain specific localities, and strains for other localities and for cultivation under different conditions, as in wetlands, as an after-crop succeeding paddy, have yet to be isolated. Moreover, varieties vary in their time of sowing and duration according to the rainfall and other conditions which prevail in different parts of the State. Strains suitable to such local conditions are also to be isolated. The work which has been in progress mainly by selecting single plants. It is considered desirable to collect varieties from a wide range, study and select desirable types with a view to cross them and isolate promising types from their hybrid progeny. These aspects are kept in view in the future programme of work on pulses.

**Summary:** Madras State is deficit in pulses to the extent of 50%. The output has to be increased by bringing in more area under cultivation and by evolution and spread of high-yielding strains. As a result of work done during the past eight years a few high-yielding cultures of different pulses, suitable for general cultivation by ryots, have been isolated. These not only yield more than the local varieties but also possess a higher percentage of protein. The pulses are found to be zonal in their performance and in any programme of improvement this aspect also is to be considered.

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# Storage and Germination of Millet Seeds

*By*

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**Introduction:** The preservation of the viability of seeds is a problem to all workers engaged in crop husbandry. To a plant breeder whose work necessitates the testing of innumerable cultures, the preservation of seeds without impairing their germination capacity is of prime importance, as all the material cannot be studied at the same time and a certain period of storage is always necessary. To a farmer growing crops on a large scale, a knowledge of factors governing the viability of the seeds and the best means of preserving it is a vital necessity. The effect of certain storage treatments for preserving seeds of millets were studied at the Millet Breeding Station, Coimbatore and the present paper is a review of the results obtained.

**Materials and Methods:** Seeds of millets grown in the Station were used for the experiments. In the case of small quantities, the seeds were kept in wide-mouthed jars of 8 oz. capacity with tin screw tops provided with cork washers. Large quantities of grain were kept in metal bins, single and double gunnies as the case may be, as detailed under the experiments. The germination tests were conducted in zinc trays on wet blotting paper, as is usually done.

**Experiment I** *Viability of millet seeds under proper storage conditions:*

The object of this experiment was to find out how long millet seeds keep viable, when they are properly stored and protected from insect attack.

Well-dried seeds of millets kept in screw top bottles maintained a satisfactory germination capacity of about 70% upto three years, as indicated below:

| | Seeds of | Initial germination percentage | Reached 70% germination during a period of:- |
|---|---|---|---|
| 1. | Cholam *(Sorghum spp.)* ... | 79 | 26 months |
| 2. | Cumbu *(Penni setum typhoides)*... | 91 | 36 ,, |
| 3. | Ragi *(Eleusine coracana)* ... | 96 | 32 ,, |
| 4. | Tenai *(Setaria italica)* ... | 92 | 38 ,, |
| 5. | Samai *(Panicum miliare)* ... | 92 | 38 ,, |
| 6. | Panivaragu *(Panicum mileaceum)* | 96 | 38 ,, |
| 7. | Kundiraivali *(Echinochloa frumentacea)* ... | 96 | 38 ,, |
| 8. | Varagu *(Paspalum scrobiculatum)* | 88 | 34 ,, |

(i) **Cholam:** To find out the effect of age of seed on the germination of cholam, experiments were conducted with 40 lb. of seeds in four strains Co. 4, Co. 7, Co. 8 and Co. 9 kept under proper storage conditions, i. e., in good metal bins, seed frequently dried and preserved with naphthalene balls. The seeds were tested once evey fortnight for germination, for a period of 23 months i. e., from August 1948 to June 1950.

The data are given below:

Loss in germination percentage of cholam seeds through age

| | Co. 4. | Co. 7. | Co. 8. | Co. 9. |
|---|---|---|---|---|
| Initial germination percentage (in August, 1948) | 96 | 93 | 91 | 92 |
| Germination percentage in June, 1950. (after 23 months) | 71 | 78 | 69 | 72 |

It will be seen that a satisfactory germination capacity about 70% is maintained in sorghum if the seed is stored under proper conditions even upto a period of two years.

(ii) **Cumbu:** To find the variations in the percentage of germination of cumbu, seeds of Co. I, obtained from the bulk crop of 1948 summer season were preserved as in the case of cholam. They were kept for germination every fortnight from the date of harvest and the percentage of viability recorded for two years. The percentage of germination in the case of Co. I was 96·5 at the start in 1948 and it maintained the same germination till June 1950. If cumbu seeds are periodically dried and preserved free from moisture and insect damage, very little of its viability is lost even after storage for two years.

**Experiment II** *Effect of some types of ordinary storage methods on the germination of millet seeds.*

With the object of determining the loss in germination and deterioration in storage, an experiment was started in 1948 February with seeds of cholam (Co. I) (Co. 4, Co. 5 and Co. 9) cumbu (Co. 3) ragi (Co. 1) tenai (Co. I) and minor millets (panivaragu P. V. 36) and samai (P. M. 2) Forty pounds of seeds in all the six millets were packed in (i) single gunny and (ii) double gunnies, in two sets. One set was subjected to sun drying once every month while the other set was not sun-dried. Representative samples were drawn once a month and tested for germination. Observation were also made on the insect population and bored grains in cholam and cumbu. The data are presented in Tabels I to IV.

## TABLE I

**Effect of different methods of storage on the germination of cholam stored in bulk**

*Treatments :* (1) *Strains :* Co. 1, Co. 4, Co. 5 and Co. 9.
(2) Periodical drying (once a month) *Vs.* No drying.
(3) Stored in double gunnies and in single gunny bags.

| Strains | Co. 1 | | | | Co. 4 | | | | Co. 5 | | | | Co. 9 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Drying or otherwise | Sun-dried. | | No drying | | Sun-dried | | No drying | | Sun-dried | | No drying | | Sun-dried | | No drying | |
| Number of gunnies | Dou-ble | Sin-gle | Dou-ble | Sin-gle | Dou-ble | Sin-gle | Dou-ble | Sin-gle | Dou-ble | Sin-gle | Dou-ble | Sin-gle | Dou-ble | Sin-gle | Dou-ble | Sin-gle |
| Initial germination, February, 1948 | 90 | 90 | 90 | 90 | 97 | 97 | 97 | 97 | 93 | 93 | 93 | 93 | 96 | 96 | 96 | 96 |
| After one year, February, 1949 | 64 | 66 | 40 | 33 | 61 | 61 | 40 | 37 | 73 | 75 | 51 | 58 | 72 | 63 | 50 | 44 |
| After 1½ years, July 1949 | 28 | 21 | 18 | 8 | 35 | 24 | 18 | 15 | 38 | 31 | 30 | 24 | 27 | 20 | 9 | 4 |

**Observations :—**

(1) *Strains :* The behaviour of all the four strains is practically the same.

(2) *Periodical drying Vs. No drying :—* This factor seems to be the decisive factor in maintaining the germination of seeds. The sun-dried seeds show a definitely higher percentage of germination than seeds which are not periodically dried. At the end of one year, the sun-dried seeds showed a variation in the germination ranging from 61 to 75% while the seeds that were not dried showed a variation ranging from 33 to 58%. This shows that periodical drying of the seeds is very important, in order to keep them viable for at least one year. There is a rapid fall after one year by which time a large number of insects were noticed in both kinds of storage.

(3) *Single gunny Vs. Double gunnies storage :—* Storing in double gunnies has not shown any decided advantage over storage in single gunnies, at the end of one year. After this period, there is a rapid fall in the germination of grains in all the types of storage.

TABLE II.

**Effect of different methods of storage on the germination of cumbu (Strain Co. 3)**

*Treatments:* (1) Periodical sun-drying (once a month) Vs. No drying.
(2) Stored in double and single gunnies.

| | Sun-dried | | No drying | |
|---|---|---|---|---|
| | Double gunny | Single gunny | Double gunny | Single gunny |
| Initial germination percentage (in March 1948) ... | 98 | 96 | 96 | 92 |
| Germination percentage after one year, (March 1949) | 86 | 86 | 86 | 83 |
| Germination percentage after 22 22 months, (in January 1950) ... | 72 | 68 | 71 | 50 |

It is seen that cumbu grains keep better in storage than cholam grains. The fall of germination from 98 to 72% in the case of sun-dried treatment after 22 months is not quite satisfactory as compared to its germination when insect population is killed by fumigation or by preserving with naphthalene balls. Under ideal conditions, cumbu maintains full germination capacity over a period of two years.

TABLE III.

**Effect of different methods of storage on the germination of ragi and tenai.**

*Treatments:* (1) Periodical sun drying (once a month) Vs. No drying.
(2) Stored in double and single gunnies.

| Crop | Ragi (Co. 1) | | | | Tenai (Co. 1) | | | |
|---|---|---|---|---|---|---|---|---|
| Drying or otherwise | Sun-dried | | No drying | | Sun-dried | | No drying | |
| Number of gunnies | Double | Single | Double | Single | Double | Single | Double | Single |
| Initial germination percentage (in March 1948) ... | 97 | 95 | 97 | 94 | 94 | 94 | 96 | 92 |
| Germination % after 1 year (March 1949) ... | 96 | 96 | 98 | 98 | 97 | 97 | 97 | 97 |
| Germination % after 22 months (January 1950) ... | 97 | 98 | 93 | 92 | 90 | 94 | 91 | 93 |

It is seen from the Table that ragi and tenai are less liable for insect attack that either cholam or cumbu. There is no difference between double and single gunny packings.

TABLE IV.

**Effect of different methods of storage on the germination of panivaragu and samai.**

*Treatments:* (1) Periodical sun drying (once a month) Vs. No drying.
(2) Stored in double and single gunnies.

| Crop | Panivaragu (P. V. 36) | | | | Samai P. M. 2 | | | |
|---|---|---|---|---|---|---|---|---|
| Drying or otherwise | Sun-dried | | No drying | | Sun-dried | | No drying | |
| Number of gunnies | Double | Single | Double | Single | Double | Single | Double | Single |
| Initial germination percentage | 94 | 94 | 98 | 94 | 92 | 88 | 93 | 91 |
| Germination % after one year | 97 | 97 | 98 | 97 | 95 | 96 | 93 | 92 |
| Germination % after 20/21 months | 93 | 94 | 94 | 96 | 94 | 89 | 90 | 92 |

It is seen that like ragi and tenai, panivaragu and samai also do not require much attention as they are less liable to insect attack than either cholam or cumbu. These grains keep very well in storage.

**Discussion :** Provided insects and other factors are eliminated and ideal storage conditions are kept up, the seeds of all millets remain viable for a period of two years and more. From the data obtained under Experiment II, it is noticed that in the types of storage adopted, the seed deteriorated more rapidly than under Experiment I. The loss in germination at the end of the first year, was from 97% to 60% in cholam. In this type of storage treatments, it was noticed that insects were present in very large numbers, even in the bags which were periodically dried once a month. The insects were in much larger numbers in the bags that were not dried at all. So mere sun-drying and double gunnies are not sufficient to keep millet seeds viable for a satisfactorily long time. In the case of millets which are rainfed crops grown in low rainfall areas, as a consequence of periodical droughts, there is often the necessity of carrying the seed over two seasons. Experiment I has shown that millet seeds can remain viable for over two years. From Experiment II, it is seen that mere sun-drying and double gunnies are not sufficient to carry the seeds satisfactorily even for one year. If however, the insects could be prevented from attacking the grain by either fumigating the grain periodically or by preserving it with naphthalene balls or Acorus powder, satisfactory germination can be maintained for more than 2 years. Krishna Rao and Brahmiah (3) 1945—have reported that sorghum seeds at Hagari were damaged to an extent of 17·75% in the course of eight months when the grains were simply stored in a bin without any treatment while the seeds were free from insects and maintained a germination of 80% when they were treated with Acorus powder. The two factors which affect the germination of seeds are :— (1) natural deterioration due to age and (2) insect damage. If insects are controlled by fumigation or other methods, it is possible to maintain the germination of the seeds for a longer period.

Among the millets, ragi, tenai, panivaragu and samai maintained their germination at a high level over a period of nearly two years. Cholam deteriorates quickly in storage, while cumbu is a little better.

**Conclusion :** Well-dried and ripe seeds of millets can remain viable for a period of nearly two years provided they are lept free from insects. The common methods of storage like-sun-drying aud storing in gunnies single or double keep the grains viable for less than one year. They are not sufficient to keep the seeds free from insect damage. The chief cause for the rapid deterioration of seeds in storage is insects. Fumigation and the use of naphthalene, or Acorus powder keep the seeds from insect attack and maintain good germination capacity for longer periods.

**Summary:** The paper reports the results of experiments done at the Millet Breeding Station, Coimbatore and elsewhere on the germination capacity of millet seeds. Ripe and well-dried seeds maintain their germination capacity for a period of over two years, provided they are protected from insect attack with the help of substances like naphthalene etc. The ordinary methods like storing the seeds in single gunny bags or double gunny bags and sun drying them once a month help to maintain the germination capacity satisfactorily for less than a year. They are unable to prevent insect damage. It is therefore necessary to have recourse to methods which control the insect damage to maintain a high percentages of germination over a period of two years of storage.

**Acknowledgemcnt:** This paper is a review of the work done by the Millet Section staff at varrious places and times. I am thankful to the Millet Specialist for affording all facilities for writing up this paper.

**REFERENCES**

1. Vijayaragavan C., — Germination tests on Millets — Madras Year Book.
2. Agricultural Station Reports — Millet Breeding Station, 1949 - '50.
3. Krishna Rao and G. V. Brahmiah (1945) Storage of Sorghum seeds free from insect attack — Madras Agricultural Journal, May, 1945 p. 77 - 79.

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**Research Note**

## The occurrence of Striga on Cyanotis cucullata

Striga is a hemiparasite on flowering plants. Members of the Gramineae are usually attacked. It has been reported to be parastic on some dicotyledonous plants also.

At the Millet Breeding Station, Coimbatore, in a field of Sorghum heavily infested with Striga, *Cyanotis cucullata* was also present as a weed. Cyanotis is a common weed in Coimbatore. *Striga lutea* was found in close proximity to these weeds. To determine whether Striga was parasitic on this weed, Cyanotis plants with the neighbouring Striga plants were removed carefully along with a clod of earth; their root systems were washed and examined. Haustorial connections were observed between the parasite and Cyanotis. This species has not so far been recorded as a host for Striga.

Millet Breeding Station,
Coimbatore, 10-5-1952.

K. Meenakshi.
P. Krishna Rao.

## Letter to the Editor

Dear Sir,

I am glad to know that the department is taking steps to spread a new kind of spinach, *Talinum triangulare* all over the State.

I have been growing this spinach from 1949 in my backyard and have used it in place of Amaranthus in making curries, as Amaranthus has its own seasons and is not always available. This plant was given to me by a friend of mine who came back from Burma. He called it Ceylon Keerai. It can easily be grown from cuttings and grows luxuriantly in backyards. Its fruits burst and the seeds get distributed in a jerky movement during the bursting and thus the plants get distributed all over the compound The plant grown all over the year round, where there is sufficient moisture. It bears beautiful, small. scarlet flowers. The plant is not very fastidious about any particular locality as I have seen the plants luxuriantly in the compound of one of my friends in North Malabar near Quilandy. I was also told that the plants grows wild in some parts of Cochin and Travnacore. So far it seems to be free from any pests or diseases as far as my experience goes.

It is an excellent substitute for Amaranthus and the preparations cannot be distinguished from Amaranthus preparations, either in appearance or in taste. I have, however, heard that in Travancore and Cochin it is not very much used as they say that the preparations are a little mucilaginous to the touch in those parts. But during the past two or three years I have not found this defect in the plant at Palghat or Coimbatore or at Quilandy. I make it a point to use this at least twice a week, as it is reported to be very rich in vitamins and is one of the best "greens" we can think of. This may be specially valuable to diabetics and others needing extra vitamin supply.

I shall be glad if you will give the above points publicity in the Madras Agricultural Journal. I have distributed the cuttings to a number of people here and can spare a little to any one who desires to try this new vegetable.

I am glad that a very useful plant like this has awakened the interest of the Department and is being encouraged.

9/32, Lokamanya Street,
R. S. Puram P. O., Coimbatore,
26th August 1952.

Yours faithfully,
T. V. Subramaniam, B. A.,
Madras Agricultural Service (Retd.).

# National Defence Academy of India

Like a big question mark the problem of choosing a career faces the new matriculate and his parents or guardian. What next? The answer to that question is not so easy in a country like India where schools turn out matriculates by the thousand and where opportunities for productive employment are restricted by our limited technical and industrial development. Quite a large number of those coming out of schools drift into colleges and universities for higher education irrespective of the fact whether they have any inclination for it or whether they will benefit by a general education which does not give a specific direction to their life.

But quite often it is not so much lack of opportunitty as lack of correct information that accentuates the problem of finding a career. Few, for instance, would know that the Armed Forces offer a wide variety of careers suited to a wide range of educational and other qualifications. Generally, when we think of a career in the Armed Forces we think of the fighting soldier. Fighting of course, is an essential part of the Armed Forces training, but there are lots of other jobs to be done and it is here that opportunities exist for young men who have the necessary aptitude for them. It is proposed in this article to describe briefly how these opportunities can be availed of.

The main channel for joining the commissioned (Officer) ranks of the Armed Forces is through the National Defence Academy at Dehra Dun. The Academy, established in its present form in 1949, is the translation into tangible shape of the lessons learnt during World War II, which amply demonstrated that success in warfare depend greatly in inter-Services co-operation. In its Joint Services Wing, therefore, the Academy gives combined preliminary training to cadets of the three Services–Army, Navy and Air Force. As the premier Services Training Institution of India, and the first of its kind in the world, the Academy sees to it that its standard of training is in keeping with the great traditions of our Armed Forces and that the new officers that it turns out are fully equipped, mentally and physically, to play their important role in the country's defence, that they will be called upon to play.

Admission to the Academy is open to all citizens of India irrespective of their caste, creed or class and subject only to the minimum educational and other qualifications prescribed. Merit is the only criterion for recruitment.

Selection for Joint Services Wing are made through the Union Public Service Commission, followed by interviews by Services Selection Boards. The educational qualifications required are Matriculation or its equivalent and the minimum age limits are: for the Army and Air Forces 15 to 17½ years, for the Navy, 15 to 17 years.

On passing out of the Joint Services Wing, after two years' training, cadets go to the training establishments of their respective Services, those of the Army joining the Military Wing of the Academy. Direct admission to the Military Wing is also allowed in certain cases and special facilities are provided for joining this Wing to members of the National Cadet Corps and to graduates in technical subjects. Details regarding the recruitment of these categories of cadets can be obtained from any recruiting office.

A word here about the method of selection. As has been stated, the first step is a qualifying examination held by the Union Public Service Commission. Next come the interviews by a Service Selection Board. It is here that the method of selection has undergone a complete reorientation since 1943. The new method is more scientific and has been so devised as to enable the selectors to obtain the best material as well as to give the candidates an opportunity to reveal the best in them.

Under the old system selection of candidates for commissions was made through a personal interview by an officer or a board of officers. During the brief interview, lasting about 20 minutes, candidates had to be judged not only the basis of their present worth and ability but also on their potentiaiity for development as leaders of men. The system had many drawbacks. However sympathetic the interviewers might be, the candidates could not be put at their ease in 20 odd minutes and hence a correct assessment of their ability was difficult.

Under the new system condidates are interviewed by Services Selection Boards which consist of specially trained officers. The tests are spread over a period of three to four days. Candidates are comfortably accommodated and arrangements for their messing are made by the Board during the period of interview. On the first day they are left to themselves to settle down in their new surroundings and to get to know each other. On the second day the tests begin and last for three days. They comprise a series of indoor and outdoor tests to assess the psychological make-up and leadership potentialities of candidates.

The testing staff of a Selection Board consists of: the President or Deputy President who are experienced officers who have a good idea of the officer material we want for the Armed Forces; a Group-Testing Officer who is specially trained for the purpose and administers most of the indoor and outdoor tests; a Psychological Officer who makes certain intelligence and psychological tests. Each member of the Board writes an independent report on each candidate from his own point of view. The testing staff of the Selection Board are not permitted to discuss a candidate amongst themselves prior to the final conference, when each

member puts up his views on the candidate. After a discussion, a candidate is finally graded, the views of each member of the board having been taken into consideration.

It will thus be appreciated that each case receives due consideration and the fact that more than one person are concerned in deciding the fate of each candidate, each one of whom separately gives his report, obviates any chances of favouritism or foul play.

What is life like at the Acadmey ? It is neither all work nor all play but a balanced combination of both. The basic idea is to prepare the cadets for a life of discipline, for leadership of men, to make them healthy and energetic and to create in them a zest for the carreer they have chosen. While emphasis is on military training, due attention is paid, side by side, to academic subjects. On the other hand, there are plenty of outdoor and indoor games and sports and facilities for the cultivation of interesting hobbies such as music, photography, dramatics, mountaineering, hiking, 'shikar' etc., and a number of clubs provide a variety of extra-curricular activities in addition to developing an *esprit des crops* among the cadets.

While at the Academy a cadet's expenses, except pocket money which is not likely to exceed Rs. 30/-, are borne by the Government. Cadets whose parents or guardians income is below Rs. 300/- p. m. and are unable to meet this pocket expense even, may be granted financial assistance by the Government of India on the recommendation of the District Magistrate of the district concerned.

And what does the future hold for a cadet trained at the Academy ? On successful completion of training Army cadets are granted commissions as Second Lieutenants. Navy and Air Force cadets get commissions in corresponding ranks on completion of their training in their respective training establishments. A Second Lieutenant starts on Rs. 350/- per month plus allowances amounting to Rs. 130/- and upwards. Promotion up to the rank of Major is by time-scale and thereafter by selection.

But what is perhaps of greater importance to one's future and to that of the country is the opportunity for national service and whether you join the Army, Navy or Air Force, you belong to an organisation that commands the world's respect and your own country's affection and confidence.

# Proceedings of the General Body Meeting of the Madras Agricultural Students' Union

The Business Meeting of the Madras Agricultural Students' Union was held on 15th August 1952 in the College Forum at 8 A. M. with Sri P. D. Karunakar, President of the Union ,in the chair. There was a large gathering of both student and officer members present.

The minutes of the General Body Meeting held on 31st July 1951 were read and adopted.

The Annual Report of the Managing Committee for the period 1—6—1952 to 31—5—1952 was read and adopted. The Editorial Board was thanked for bringing out the Journal regularly every month throughout the year.

The Auditors' Report was presented and after some discussion, was adopted. An appeal was made by Sri C. S. Krishnaswami on behalf of the Managing Committee to every one assembled on the occasion to make a special effort towards improving the financial position of the Union, to become members. This was strongly supported by Sri M. Kanti Raj, Joint Director of Agriculture (Extension) and evoked a very prompt response from many of the District officers present at the meeting.

The election of Office Bearers for the year 1952 - '53 was then taken up. The following were elected to the different posts.

| | | |
|---|---|---|
| President (Ex-officio) | : | Sri P. D. Karunakar |
| Vice-President | : | ,, M. A. Sankara Iyer |
| Editor | : | ,, C. Balasubramanya Mudaliar |
| Secretary | : | Janab Varisai Mohammad |

## Council ( 16 Members )

President
Resident Vice-President
Editor
Secretary

*Mofussil Vice-Presidents:*

Sri S. N. Venkataraman
,, G. Sakharama Rao
,, P. N. Nair

*Mofussil Members:*

Sri K. B. Viswanathan
,, M. R. Balakrishnan
,, K. V. Natesan
,, P. Satyanarayana
,, S. V. Parthasarathy

*Resident Members:*

Sri V. T. Subbiah Mudaliar
,, M. B. V. Narasinga Rao
,, Kumari Leela (Student)
,, Selvaraj Carvallo, Secretary, Students' Club (Ex-officio)

**Managing Committee (10 Members)**

| | | |
|---|---|---|
| Resident Vice-President | | |
| Editor | | |
| Secretary | | |
| Manager | : | Sri C. R. Venkataraman |
| Treasurer | : | ,, S. Muthuswami |
| Member | : | ,, C. S. Krishnaswami |
| ,, | : | ,, T. S. Lakshmanan |
| ,, | : | ,, K. Kuppamuthu |
| ,, (Student) | : | ,, Korukutti |
| Club Secretary (Ex-officio) | : | ,, Selvaraj Carvallo |

**Editorial Board (8 Members)**

| | | |
|---|---|---|
| Editor | | |
| Secretary | | |
| Manager | | |
| Member | : | Sri T. R. Narayanan |
| ,, | : | ,, S. Varadarajan |
| ,, | : | ,, K. P. Ananthanarayanan |
| ,, (Student) | : | ,, Ponnappa |
| Club Secretary (Ex-officio) | : | ,, Selvaraj Carvallo |

# Weather Review — For August, 1952

## RAINFALL DATA

| Division | Station | Total rainfall for the month | Departure from normal in inches | Total since January 1st in inches | Division | Station | Total rainfall for the month | Departure from normal in inches | Total since January 1st in inches |
|---|---|---|---|---|---|---|---|---|---|
| Orissa & Circars. | Gopalpur | 7·7 | 0·0 | 19·2 | Central Contd. | Coimbatore A.M.O.* | 0·9 | —0·3 | 4·1 |
| | Calingapatnam | 5·9 | —0·9 | 17·9 | | Coimbatore | 0·6 | —0·6 | 4·1 |
| | Visakhapatnam | 2·4 | —2·8 | 16·0 | | Tiruchirapalli | 1·9 | —2·2 | 10·0 |
| | Arakúvalley* | 6 9 | -2·5@ | 32·0 | South | Nagapattinam | 2·0 | —1·1 | 12·0 |
| | Anakapalle* | 3·9 | —1·7 | 21·6 | | Aduthuari* | 2·6 | —2·0 | 14·1 |
| | Samalkot* | 2 7 | —3·1 | 19 8 | | Pattukottai* | 5·3 | +1·8 | 17·1 |
| | Kakinada | 2·6 | —3·0 | 21·8 | | Madhurai | 2·5 | —1·6 | 11·0 |
| | Maruteru* | 4·6 | —1·5 | 16 0 | | Pamban | 0·3 | —0 3 | 11·4 |
| | Masulipatnam | 7·4 | +1·1 | 16·7 | | Koilpatti* | 0·2 | —2·2 | 6·4 |
| | Guntur* | 2·8 | —2·7 | 11·8 | | Palayamcottai | 0·0 | —0·7 | 6·5 |
| | Agrl. College, Bapatla* | 2·4 | —3·5 | 15·1 | | Ambasamudram* | 0·0 | —0·4 | 12·0 |
| | Agrl. College Farm Bapatla* | 2·3 | X | 13·5 | | | | | |
| | Rentachintala | 2·7 | —0·8 | 11·7 | | | | | |
| Ceded Dists. | Kurnool | 2·7 | —1·8 | 26·2 | West Coast | Trivandrum | 4·1 | —0·6 | 36·2 |
| | Nandyal* | 2·7 | —2·0 | 25·0 | | Fort Cochin | 10·3 | —3·6 | 70·4 |
| | Hagari* | 0·5 | —2·0 | 6·8 | | Kozhikode | 14·2 | —2·9 | 73·2 |
| | Siruguppa* | 2·2 | —1·3 | 14·0 | | Pattambi* | 10·7 | —1·6 | 53·3 |
| | Bellary | 0·3 | —2·1 | 5·5 | | Taliparamba* | 22·3 | —1·4 | 94·2 |
| | Cuddapah | 3·7 | —1·5 | 16·4 | | Wynaad | 9·9 | —5·1 | 40·6 |
| | Kodur* | 3·8 | —0·4 | 18·1 | | Nileshwar* | 18·7 | —4·0 | 112·2 |
| | Anantapur | 1·0 | —2·3 | 6·5 | | Pilicode* | 17·2 | -13·3 | 95·6 |
| | | | | | | Mangalore | 20·4 | —5·1 | 96·5 |
| Carnatic | Nellore | 4·0 | +1·0 | 19·9 | | Kankanady* | 20·8 | —1·9 | 98·5 |
| | Buchireddipalem* | 3·4 | +1·2 | 16·1 | Mysore & Coorg. | Chitaldrug | 2·3 | —1·1 | 8·8 |
| | Madras (Meenambakkam) | 4·7 | +0·1 | 23·2 | | Bangalore | 6·1 | +1·1 | 18·9 |
| | Tirurkuppam* | 5·0 | —0·9@ | 21·3 | | Mysore | 2·2 | —1·1 | 13·6 |
| | Palur* | 4·8 | —0·9 | 12·4 | | Mercara | 36·4 | +9·6 | 93·7 |
| | Tindivanam* | 2 6 | —2 0 | 10·6 | Hills | Kodaikanal | 4·6 | —2·4 | 24·0 |
| | Cuddalore | 6·1 | +1·3 | 13·0 | | Coonoor* | 2·3 | —2·1 | 22·6 |
| | | | | | | Ootacamund* | 2·1 | —3·1 | 12·8 |
| Central | Arogyavaram (Chittoor Dt.) | 1·5 | —1·7 | 8·8 | | Nanjanad* | | | |
| | Vellore | 4·5 | —1·2 | 11·9 | | | | | |
| | Gudiyatham* | 3·2 | —1·5 | 9 6 | | | | | |
| | Salem | 4·7 | —1·9 | 18·7 | | | | | |

*Note :—*

1. * Meteorological stations of the Madras Agricultural Department.
2. @ Average of nine years' data for Tirurkuppam and seven years' data for Araku Valley is given as normal.
3. Average of ten years' data is taken as normal.
4. X – The farm was started only last year.

## Weather Review for August, 1952.

The shallow depression which formed over the North Bay of Bengal on 31st July 1952, intensified further, but weakened while crossing the West Bengal Coast on 2—8—52. This moved further West-wards and West-North-Westwards and became unimportant on 6—8—52, over North Madhya Bharat and neighbourhood. On 6—8—52 itself a low pressure wave from the East moved into the East central and the adjoining North Bay of Bengal causing unsettled conditions, which persisted there for three days and crossed the Orissa-West Bengal Coast as a low pressure wave on 10—8—52. On 10—8—52 a shallow low pressure wave lay over North Orissa and the adjoining North-East Madhya Pradesh and Chota Nagpur. On the next day this moved towards North-East and extended from South-East Uttar Pradesh to the North-West angle of the Bay of Bengal, causing unsettled conditions, which concentrated into a depression at a place about 30 miles south of Calcutta on 13-8-52. The depression crossed the coast near Balasore on 14—8—52 weakened on the following day and lay as a shallow depression over Noth-East Madhya Pradesh and the adjoining Vindhya Pradesh, which merged into the seasonal trough on 16—8—52. On 18—8—52 the seasonal trough of low extended over the North-West angle of the Bay of Bengal causing a well marked trough of low in the North and the adjoining central Bay of Bengal on the following day. The shallow low over the Bengal concentrated into a shallow depression with its centre near Lat. 19½° N, Long. 88½° E. crossed the North Orissa coast on 21—8—52, weakened and merged into the seasonal trough on the following day. In the meanwhile a shallow trough of low persisted over North Rajasthan and the adjoining parts of the Punjab (I). A shallow low pressure area lay over east Vindhya Pradesh and the adjoining parts of Chota Nagpur and South-East Uttar Pradesh on 23—8—52 but became unimportant on the following day. The axis of the monsoon trough moved towards the north and lay at the foot of the Himalayas on 28—8—52, and a 'break' in the monsoon set in over the country. A shallow low which appeared over the Punjab (I) on 27—8—52 persisted upto the end of the month. Another shallow low appeared over Bihar and the ajoining parts on 29—8—52. A low pressure wave moved North-Westwards from Central Burma and under its influence the seasonal trough extended over the North Bay of Bengal, where a well-marked trough of low appeared on the last day of the month.

Day temperatures were above normal in Tamil Nad except on the last three days of the month.

The particulars regarding the note-worthy rainfalls during month and the zonal rainfall have been furnished hereunder :—

**Note-worthy falls during the month.**

| S. No. | Date. | Place | Rainfall for past 24 hours. |
|---|---|---|---|
| 1. | 3—8—52 | Pattambi | 2·0" |
| 2. | 6—8—52 | Kozhikode | 2·0" |
| 3. | 15—8—52 | Fort Cochin | 3·3" |
| 4. | 15—8—52 | Mercara | 2·8" |
| 5. | 19—8—52 | Alleppey | 2.5" |

| S. No. | Date | Place | Rainfall for 24 hours |
|---|---|---|---|
| 6. | 21—8—52 | Calingapatnam | 2·2″ |
| 7. | 27—8—52 | Kallakurichi | 2·6″ |
| 8. | 28—8—52 | Pattukottai | 4·0″ |

## ZONAL RAINFALL

| S. No. | Name of Zone. | Actual Rainfall. | Departure from Normal. | Remarks. |
|---|---|---|---|---|
| 1. | Orissa and Circars | 4·18″ | — 1·78 | Below normal |
| 2. | Ceded Districts | 2·11″ | — 1·48 | Below normal |
| 3. | Carnatic | 4·37″ | Nil | Normal |
| 4. | Central | 2·47″ | — 1·34 | Below normal |
| 5. | South | 1·61″ | — 0·81 | Below normal |
| 6. | West Coast | 13·87″ | — 3·95 | Far below normal |
| 7. | Mysore and Coorg | 11·75″ | + 2·13 | Above normal |
| 8. | Hills | 3·00″ | — 2·54 | Far below normal |

Agricultural Meteorology Section,
Lawley Road P.O., Coimbatore,
Dated, 11—9—1952.

M. B. V. N., C. B. M., & M. V. J.

# Departmental Notifications.

## GAZETTED SERVICE

| Names of Officers | From | To |
|---|---|---|
| Dr. P. Abraham, | Pepper Specialist, Taliparamba, | Plant Physiologist, Agricultural College, Bapatla |
| Sri Balasubramanian, C. S. | On leave, | Lecturer in Entomology, Agricultural College, Bapatla |
| ,, Govinda Kutty Kurup, P. | Superintendent, Wynaad Colonisation Scheme, | Pepper Specialist, Taliparamba |
| ,, Krishnaswami, V. | Assistant Millets Specialist, Coimbatore, | Seed Development Officer (Paddy), Tanjore |
| ,, Narasimha Rao, M. P. | Secretary, Krishna District Tobacco and Groundnut Market Committee, Vijayawada, | Assistant Research Officer, Chillies Scheme, Agricul, tural Research Station-Lam, Guntur |
| ,, Raghavendrachar, C. | Soil Survey Officer, Coimbatore, | Assistant Agricultural Chemist, Tanjore |
| ,, Raghava Rao, N. | Lecturer in Entomology Agricultural College, Bapatla, | Plant Protection Officer, (Ento), Bapatla |
| ,, Sanjeeva Shetty, K. P. | Agricultural Engineering Supervisor, | Assistant Agricultural Engineer, Central Engineering Stores, Madras |
| ,, Shanmugham, C. R. | Assistant Agricultural Central Engineer, Engineering Stores, Madras | Assistant Agricultural Engineer, Contour Bunding, Chitoor |

## SUBORDINATE SERVICE

### LEAVE

| Name of officer and designation : | Leave granted : |
|---|---|
| Sri Bakthavathsalu, C. M. ... | Extension of earned leave for 45 days from 1—8—1952 to 14—9—1952. |
| ,, Ranga Rao, K. Teaching Assistant in Agriculture, Bapatla ... | Extension of extraordinary leave for 5 months from 9—8—1952 to 8—1—'53. |
| ,, Subramania Iyer, K. K., Seed Development Assistant, Tirunelveli ... | Leave on average pay for 4 months from 15—9—1952. |
| ,, Suryanarayana Iyer, P. S. Plant Protection Assistant, (Myco) Shoranur ... | Leave on average pay for 3 mont· and 12 days, half average pay for 18 days. |
| ,, Suryaprakasa Rao, P. V. Canning Assistant, Kodur ... | Earned leave for 45 days from date of relief. |

## POSTINGS AND TRANSFERS

| Name of Officer | From | To |
|---|---|---|
| Sri Achutan Nair, E. | A. D., Badagara, | P. P. A., (Myco), Tellicherry |
| ,, Appala Narasiah, K. | A. D., Anakapalle, | Storage Assistant, Bobbili |
| ,, Bhaskara Rao, G. | Special A. D., Kaikalur, | Addl. A. D., Kaikalur |
| ,, Damodaran Nambiar, | Addl A. D., Kalpetta, | A. D , Badagara |
| ,, Gopalan, N. | Asst., Zonal Nucleus Seed Farms, Tindivanam, | Asst. in Oil Seeds, Tindivanam |
| ,, Gopinath, K. V. | P. P. A. (Ento), Tellicherry, | Addl. A. D., Kalpetta |
| Janab Abdul Khadar, | A. D., Rayachotti, | Canning Asst., Kodur |
| Sri Kalyanaraman, V. M. | Storage Asst., Vijayawada | Addl. Storage Asst., Salem |
| ,, Krishna Kumar, V. M. | Storage Asst., Guntur, | Addl. Storage Asst., Vellore |
| ,, Krishnam Raju, K. | On leave, | F. M., Sugarcane Liaison Farm, Hospet |
| ,, Lakshmipathi Raju, V. | A. D., Cholavaram, | Storage Asst., Guntur |
| ,, Padmanabhan, M. K. | ... | P. A. to D. A. O., Tellicherry |
| ,, Periaswami, S. | Asst., in Oil seeds, Tindivanam, | Assistant in Zonal Nucleus Seed Farm, Tindivanam |
| ,, Raghava Rao, K. V. | Addl. A. D., Avanigadda, | Special A. D., Avanigadda |
| ,, Ramachandran, K. V. | P. A. to D. A. O., Tellicherry, | P. P. A., (Ento), Tellicherry |
| ,, Ramachandra Rao, T. | Addl. A. D., Kaikalur, | A. D., Kaikalur |
| ,, Ramamohan Rao, A. | On leave, | A. D., Tadepallegudem |
| ,, Rama Rao Ch., | A. D., Dharmavaram, | Storage Asst., Vijayawada |
| ,, Rama Rao, K. | Addl. Tiruvur, | Spl. A. D., Kaikalur |
| ,, Shiva Rao, Y. | Asst. in Chemistry, Coimbatore, | Asst. in Mycology, Coimbatore |
| ,, Sivaramakrishnan, Y. | A. D., Tadepallegudem, | A. D., Kurnool |
| ,, Sri Ramamurthy, G. | Asst. in Chemistry, Coimbatore, | Asst. in Entomology, Coimbatore |
| ,, Sudhakara Rao, K. | A. D., Siruguppa, | Storage Asst , Bellary |

# THE MADRAS AGRICULTURAL JOURNAL

## Hints to Contributors

The pages of the Madras Agricultural Journal shall be open ordinarily only to the members of the Madras Agricultural Students' Union.

All articles for publication should be addressed to the Editor, Madras Agricultural Journal, Lawley Road P.O., Coimbatore.

In view of the high cost of printing, contributions should be as concise as possible and should conform to the best usage in the leading journals published in India and abroad.

All papers should be typed with double spacing on one side of the paper only and with wide margin. They should not ordinarily exceed 5,000 words or 12 pages of printed matter including tables and illustrations in the Journal. Manuscripts should be carefully revised; numerical data and calculations checked. Main headings in the text should be typed in capitals with paragraph indentations and followed by a period and two hyphens. Sub-heads should be lower case and be underlined to indicate italics. Latin nomenclature and local terms etc, should be in italics. Original papers must conclude with a summary of not more than 300 words, drawing attention to the main facts and conclusions.

**Tables:** The number of tables should be restricted to those absolutely necessary, as numerous tables detract from the readability of the article. Each table should be numbered consecutively from I up and must have a heading stating its contents clearly and concisely. The tables are to be typed on separate sheets with their positions marked in the text.

**Illustrations:** Wherever possible illustrations should be made with pen and Indian ink for reproduction as line blocks. The name of the author, title of the article and figure number should be written on the back of each figure in blacklead pencil. Each figure should have a legend typed on a separate sheet.

**Photographs:** Photographs and wash drawings are more expensive as half-tone blocks are necessary. The cost of blocks is chargeable to the author of the article. Photographs submitted as illustrations should be unmounted, glossy prints of good quality, with strong contrasts, trimmed so as to include only the essential features to be illustrated. They should preferably be of the same size as desired in the printed paper. Photographs should always be packed flat, never rolled or folded.

**Line drawings:** Line drawings, and charts should be prepared in twice the scale desired in the printed form. All letterings, figure numbers and explanatory notes in graphs should be light face and large enough to be 1/16″ high in the finished illustrations.

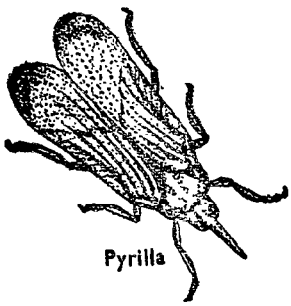
**Graphs:** Graphs should be drawn in Indian ink on co-ordinate paper ruled with blue lines. Any portion which is desired to appear in the reproduction should be drawn over with Indian ink.

**References:** References and reviews of literature should relate only to closely pertinent papers. The list of references should come at the end of the article, after the summary and should be arranged in alphabetical order of authors' names followed by the year of publication in brackets, and then the title of the paper, name of periodical, volume number in bold face type and then the page number, e. g. Darlingtion C.D., (1944) Heredity, development and infection. *Nature* **154**; 164–9. Abbreviations for names of journals are to be in the approved form as given in the World List of Periodicals.

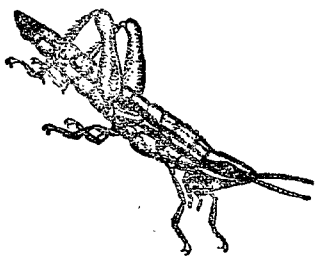
The responsibility for statements, whether of fact or opinion, rests entirely with the author of the article and not with the Editorial Board of the Madras Agricultural Journal.

# 'Gammexane'* REGD.

## dusts destroy these pests...



Pyrilla



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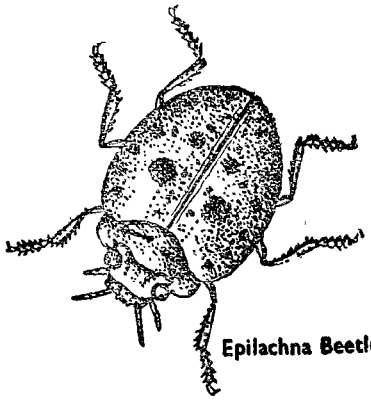
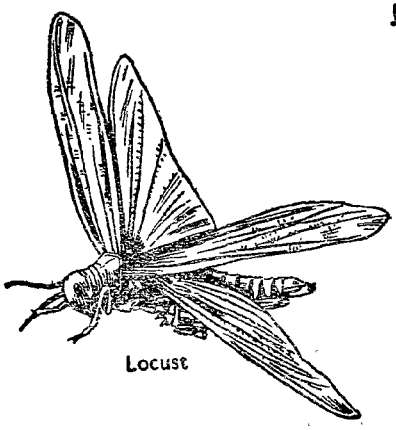
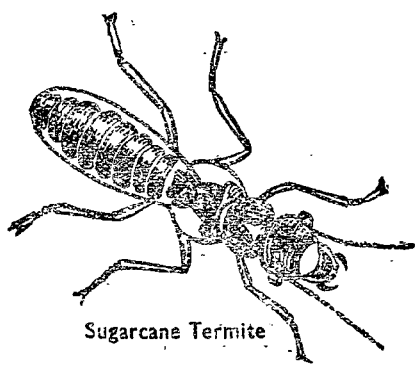


Epilachna Beetle



Locust

* Benzene Hexachloride, for the preparation of "Gammexane" Insecticide Formulations, is now manufactured by A.C.C.I. Ltd. at Rishra, West Bengal.



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