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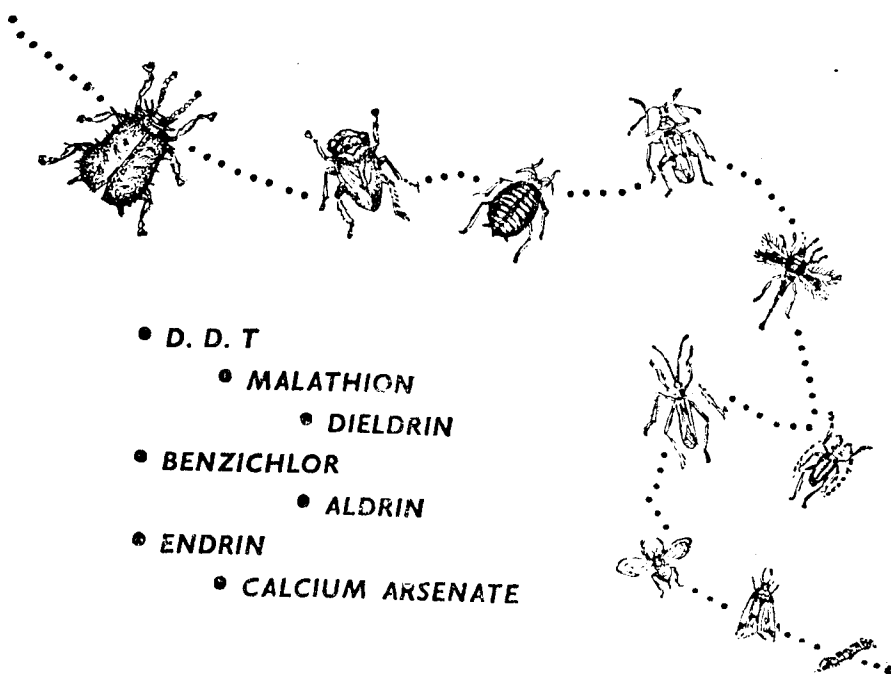
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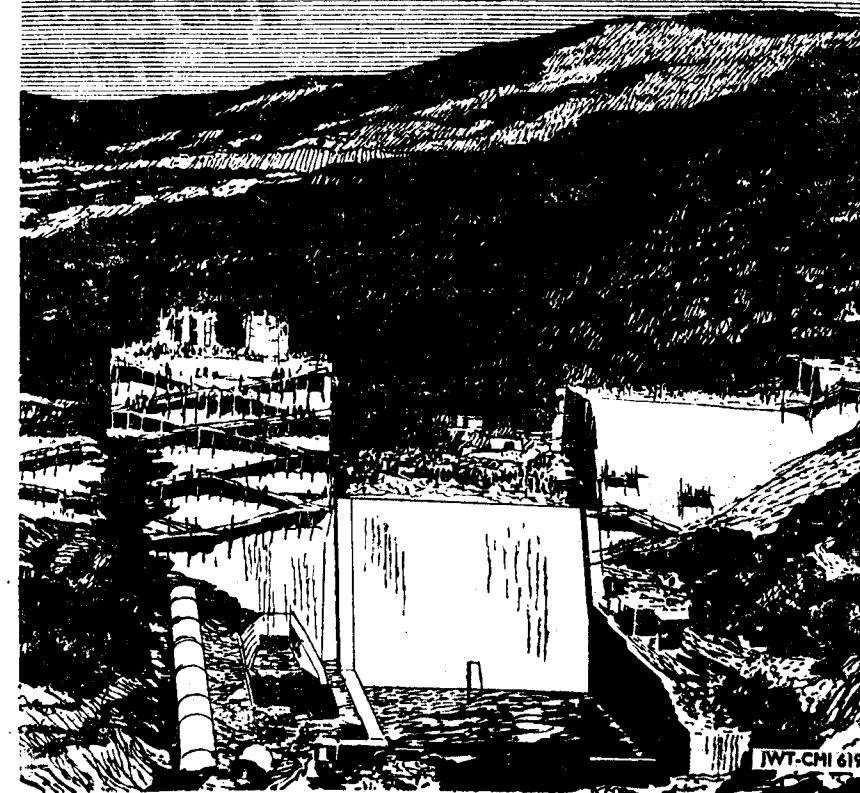
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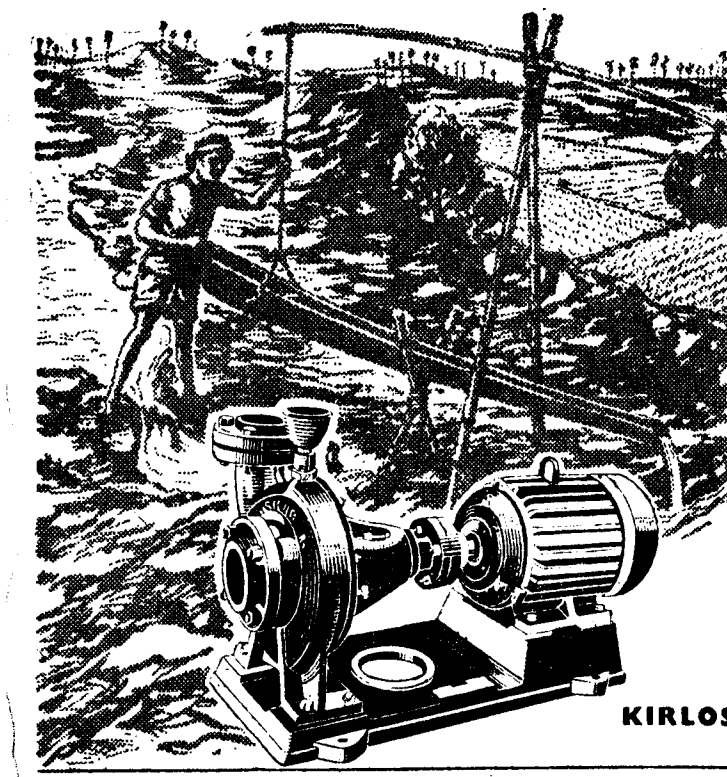
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The Madras Agricultural Journal

Vol. XLVII

June 1960

No. 6

Editorial

1. Madras Pay Commission Report:

The report of the Madras Pay Commission along with the decisions of Government taken thereon, released to the public on 20th June, 1960, fulfils in a great measure the hopes we had expressed in our Editorial on Nalagarh Committee report in April, 1959. We had pointed out then that the "Agricultural Department is yet to be recognised as a major and important one; the service conditions do not attract the best talents in the country; the disparity in pay scales between Agricultural and other officers of comparable responsibility has lowered the status of Agricultural Service; the biennial increments are totally unsatisfactory for Gazetted officers; the large number of temporary posts should be made permanent". All these have been set right to a great extent in the report.

The commission has stressed the "importance of the contribution of Agricultural scientists to the solution of the food problem and recommended higher emoluments as reasonable to concede". The pay of Agricultural Upper Subordinates has been fixed at Rs. 200-10-250-15-400, District Agricultural Officers' at Rs. 375-25-800, Deputy Director of Agriculture's and Crop specialists' at Rs. 600-30-900. The scales of pay have reduced the great disparity that existed between technical and non-technical personnel working side by side, though they are still lower compared with those in the Central Government for comparable posts.

The merging of dearness allowance, a major part or fully, with pay, the change over to annual increments, acceptance of liberalised pension scheme for State personnel are all welcome features which should set right the frustrated condition of the members of the Agricultural Department and prevent them from seeking jobs elsewhere. The acceptance of a large part of the recommendations of the commission is a good augury that services will receive sympathetic consideration of their reasonable demands in future also.

The decisions regarding reduction of holidays, casual leave and a slight (half an hour) increase in working hours should not detract the value of benefits conceded by Government. They should be

accepted cheerfully as they contribute to greater and greater efforts required for the Nation's planned development. We hope, one and all the members of the Agricultural Department would rise up to the expectation of the Government that their acceptance of the recommendations of the Pay Commission would lead to greater efficiency in services.

2. Techno-Economic Survey of Madras State :

The summary of the report on Techno—Economic Survey by the National Council of Applied Economic Research issued during the month is revealing in its scope. The total investment of 2000 crores spread over ten years suggested for development of Madras State cannot be said to be excessive for the state's industrial and economic needs. The council's recommendation on power development is note worthy. Without an adequate power supply, industrial development, big, medium or small, will be slow and halting. Agricultural development also depends upon this factor both directly and indirectly and the State Government would do well to concentrate their attention on this aspect. Handicaps there may be, but immediate action on a long term basis is necessary.

The Council's recommendation to increase agricultural production which is quite essential for increased industrial production, needs no commendation. Agricultural and industrial development should proceed hand in hand in India to meet the requirements of her ever increasing population, and to raise the standard of living of the masses. There is vast scope for increase in sugar production in Madras State, which possesses natural facilities for raising heavy yielding of crops of sugarcane and a climate favourable for a long crushing season. The state is already producing quality cottons and there is still vast scope for extension of cotton cultivation. The scope for expansion of groundnuts is high and could be developed easily.

The council's suggestion to change the crop pattern to raise more of high value crops is beset with several difficulties. Altering the cropping pattern in an old agricultural country like ours, is not an easy task nor can it be achieved in any limited period of years. With limited area under cultivation, substitution of one crop for another, however valuable it may be, is not easy of accomplishment for several reasons, agronomic, economic and psychologic also. However there is scope for introduction of cash crops in new Project areas and in rice fallows with the development of necessary irrigation facilities. Power development in this context will be greatly helpful in developing lift irrigation, which would furnish the required water during the summer months.

Insecticidal Trials for the Control of the Sweet Potato Weevil

by
A. LEELA DAVID, M. Sc.,
Assistant Entomologist, Coimbatore.

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Introduction: Since the sweet potato weevil, *Cylas formicarius* Fb. is the most destructive pest of the sweet potato crop, trials for the control of the insect have been in progress in the Agricultural College and Research Institute, Coimbatore, from 1952 onwards with the synthetic insecticides now available in the market. Experiments conducted up to 1956 had shown that six foliar applications of Aldrin, Dieldrin or Endrin at fortnightly intervals during the growth period of the crop, kept down the infestation and increased the yield (Anantanarayanan and Subramanian 1958). Aldrin and Dieldrin proved better than Endrin in these trials. Further trials were continued in the 1956—'57 and 1957—'58 seasons on the same lines for confirming the results. Trials were also laid out with different types of treatments like treatment of the slips before planting, and treating soil before and after planting with the object of reducing the cost of the treatment. The results obtained are given below.

Material and methods: Six sets of experiments were laid out with the various types of treatments given under each experiment. In each case it was laid out in half-cent plots in randomised blocks with four replications. Variety V 8 was used for the foliar application trials and V 6 for the others.

DETAILS OF EXPERIMENTS.

1. Foliar application of insecticides.

(a) *Treatments given throughout the crop period:* Aldrin 2.5% dust, 0.1% spray; Dieldrin 1.5% dust, 0.1% spray; and Endrin 1.0% dust, 0.02% spray were applied to the crop six times as in the former years at fortnightly intervals from the sixth week of planting. The experiment was conducted in 1956—'57 and 1957—'58 for the third and fourth years. The experiment conducted in 1957—'58 failed due to adverse seasonal conditions. The results of the 1956—'57 trial are given in Table 1.

During the 1956—57 season a high percentage of the incidence of the weevil was recorded. All the insecticidal treatments had given significantly lower infestation and higher yield. Of these Dieldrin proved to be the best with Endrin coming next.

(b) *Treatments given at the time of the tuber formation only:* This is a new experiment in which the chemicals were applied as foliar sprays about two months after planting at the time of the formation of tubers. DDT, Lindane, Dieldrin and Endrin at 0.1% level and Parathion (Folidol) at 0.05% were tested. Three rounds of treatments were given at fortnightly intervals. The results are given in Table 2.

The results were not significant. It however showed that there was reduction in the treated plots and higher yields than in the control.

II. Dipping slips in insecticides before planting.

This is another new experiment in which the slips of sweet potato were dipped for five minutes in the chemical and planted. Aldrin, Dieldrin and DDT at 0.1%, Endrin at 0.05%, Parathion (Folidol) 0.025%, and Systox 0.1% were tried. The results are given in Table 3.

In this experiment there was no difference in the intensity of infestation in the plots at the time of harvest. The yield was however significantly higher in Dieldrin, DDT and Parathion treatments.

III. Application of the chemical to the soil before planting.

This experiment was designed to control the weevil when it tries to infest the tuber in the soil. Two pounds of the actual chemicals per acre were incorporated into the soil before planting the slips and no further treatment was given. The results are given in Table 4.

There was no marked reduction in the incidence of the weevil due to the treatments. Aldrin recorded 19.0% against 32.1 in the control. The yield was increased in Endrin and Toxaphene treatments.

IV. Chemicals applied to the soil at the time of tuber formation.

In this experiment 2 lb. of actual chemicals per acre were incorporated into the soil at the time of formation of tubers 2½ months after planting. Dust formulations of DDT, Toxaphene, Heptachlor and Chlordane were tried. The experiment was conducted in two series with the chemicals applied (a) once and (b) twice to the soil.

(a) *Treatments given once* : The results obtained are given in Table 5. Though there was slight reduction in infestation in all treatments, it was not significant. The yield was significantly higher in DDT treatment.

(b) *Treatments given twice* : In this case the same insecticides were applied at the same rate $2\frac{1}{2}$ months after planting and again after another month. The results obtained are given in Table 6. The infestation was considerably reduced in all the treatments and was significant statistically. The yield was higher in DDT and Heptachlor treatments but was not significant.

Discussion : The six experiments laid out during the year have shown wide range of infestation by the weevil in the control plots. However it is possible to compare the merits of the various treatments given in these experiments. In spite of six fortnightly applications of insecticides to the crop during the growth period, the reduction of the infestation has not been appreciable. The infestation ranged from 58.2 to 87.7% and 43.7 to 69.6% against 95.0 and 71.2% in the control plots of the two experiments. The application of the insecticides to the soil after the tubers have begun to ripen seems to be more advantageous as indicated by the 6th experiment. The range of infestation was 7.8 to 12.5% in the treated plots as against 35.8% in the control.

Conclusions : From the results of the trials of different types for the control of the sweet potato weevil conducted during 1956—'57, the following conclusions may be drawn.

1. The use of chlorinated hydrocarbons or organophosphorus insecticides for dipping slips alone, periodical foliar applications or soil treatment have generally given increased yields.

2. The number of applications of the chemicals can be restricted to the period of tuber formation since no marked reduction in infestation or increase in yield has been obtained by more treatments.

3. Soil or foliage application of insecticides have the same effect in reducing the infestation and increasing the yield. Of these soil application during the ripening period of the tubers seems to be more useful.

4. Among the insecticides tested Dieldrin and DDT have shown promise of greatly reducing the insects and giving higher yields.

Acknowledgements: The writer acknowledges with grateful thanks the kind help of Sri A. K. Seshu, Statistical Assistant, in the statistical analysis of the data and the Government Entomologist, Coimbatore, for providing the facilities for the work.

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- Anantanarayanan, K. P. and Subramanian, T. R. 1958 Control of the sweet potato weevil. *Madras Agric. J.* 45 (2): 74.

TABLE 1

Foliar application of insecticides throughout growth period

	Aldrin 2.5% 0.1% dust spray		Dieldrin 1.5% 0.1% dust spray		Endrin 1.0% 0.02% dust spray		No treat- ment	Signi- ficant
	1	2	3	4	5	6	7	8
% infestation	62.3	87.7	58.2	58.5	63.5	60.1	95.0	yes
	S. E. 6.26		C. D. 18.60		7, 2, 5, 4, 6, 1, 3			
Healthy tubers per acre	2850	1200	3900	3950	2850	3600	400	yes
	S. E. 3.89		C. D. 11.29		4, 3, 6, 1, 5, 2, 7			
Total yield/acre	7550	8100	8900	9525	8800	9025	8025	No

TABLE 2

Foliar application at the time of tuber formation

	DDT 0.1%	Lindane 0.1%	Dieldrin 0.1%	Endrin 0.1%	Folidol 0.05%	No treat- ment	Signi- ficant
% infestation	54.0	57.0	43.7	68.6	54.8	71.2	No
Healthy tubers/acre	3300	3150	5750	2650	3650	2300	No
Total yield/acre	7425	7325	10225	8425	8075	8000	No

TABLE 3

Dipping slips in insecticides before planting

	Aldrin 0.1%	Dield- rin 0.1%	DDT 0.1%	Folidol 0.025%	Endrin 0.05%	Systox 0.1%	No treat- ment	Signi- ficant
	1	2	3	4	5	6	7	8
% infestation	41.9	19.5	29.1	29.4	38.1	41.5	39.7	No
Healthy tubers/ac.	11100	15500	14800	14950	11750	12600	12700	Yes
	S. E. 3.86,		C. D. 11.47		5, 6, 1, 7, 4, 3, 2			
Total yield/ac.	19100	19250	20875	21150	19000	21550	21050	No

TABLE 4

Chemicals applied to the soil before planting

	Aldrin	Chlordane	DDT	Dieldrin	Endrin	Toxaphene	No Treat- ment	Significant
% infestation	19.0	26.3	25.4	22.1	35.0	26.7	52.1	No
Healthy tubers per acre	12975	13055	13200	13300	13000	14450	10700	No
Yield per acre	16025	17750	17700	17075	19100	19725	15750	No

TABLE 5

Chemicals applied once to the soil at the time of tuber formation.

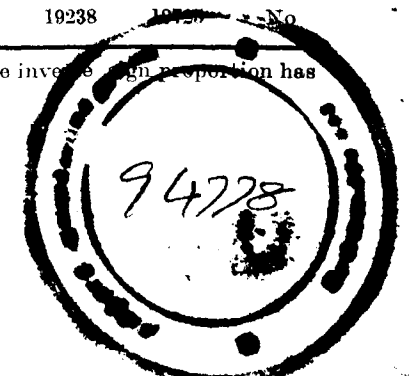
	Toxaphene	Heptachlor	Chlordane	DDT	No Treat- ment	Significant
	1	2	3	4	5	
% infestation	56.0	50.0	58.9	54.7	68.5	No
Healthy tubers per acre	900	1350	575	4050	575	Yes
	S. E. 3.81		C. D. 11.74		4, 1, 2, 3, 5	
Total yield per acre	2050	2700	1500	8050	1825	Yes
	S. E. 6.7		C. D. 20.64		4, 2, 1, 5, 3	

TABLE 6

Chemicals applied twice to the soil at the time of tuber formation

	Toxaphene	Heptachlor	Chlordane	DDT	No Treat- ment	Significant
% infestation	12.0	7.8	12.5	8.5	35.8	Yes
	S. E. 2.39,		C. D. 7.36		5, 3, 1, 4, 2	
Healthy tubers per acre	12000	15725	10738	17600	14450	No
Total yield per acre	13638	17050	12350	19238	19725	No

Note: In the case of the percentage of infestation the inverse proportion has been applied.



Monsoons at Gudiyattam (North Arcot District)

by
C. BALASUBRAMANIAN,
Agricultural Meteorologist, Coimbatore.

Introduction : At Gudiyattam a Sugarcane Research Station was established by the middle of February, 1935 with the object of catering to the needs of the Central districts of the Madras State, which grow sugarcane on a large scale with the aid of lift irrigation. Sugarcane is a crop that stands in the field for fairly a long period of eleven to twelve months. Though this crop is raised under irrigated conditions, its response to natural rains is really appreciable. Hence a statistical study of interseasonal rains with specific reference to the two monsoon periods was undertaken.

Materials and Methods : The daily rainfall data collected at the Sugarcane Research Station, Gudiyattam were compiled for the years 1937 to 1958, both inclusive and thus twenty-two years data formed the basic material for this paper.

(i) The year was divided into four seasons as dry weather period (January and February), hot weather period (March to May), south-west monsoon period (June to September) and north-east monsoon period (October to December). The details in regard to the pattern of rainfall in these four seasons were worked out individually. While working out rainfall pattern, a day with ten cents and above of rain was taken as a rainy day.

(ii) Interseasonal correlations were worked out both for rainfall and number of rainy days.

(iii) To study the cyclic nature of the performance of each monsoon standard deviation, coefficient of variation and standard error were computed by 'Centre shift average method' for periods of one to eleven years.

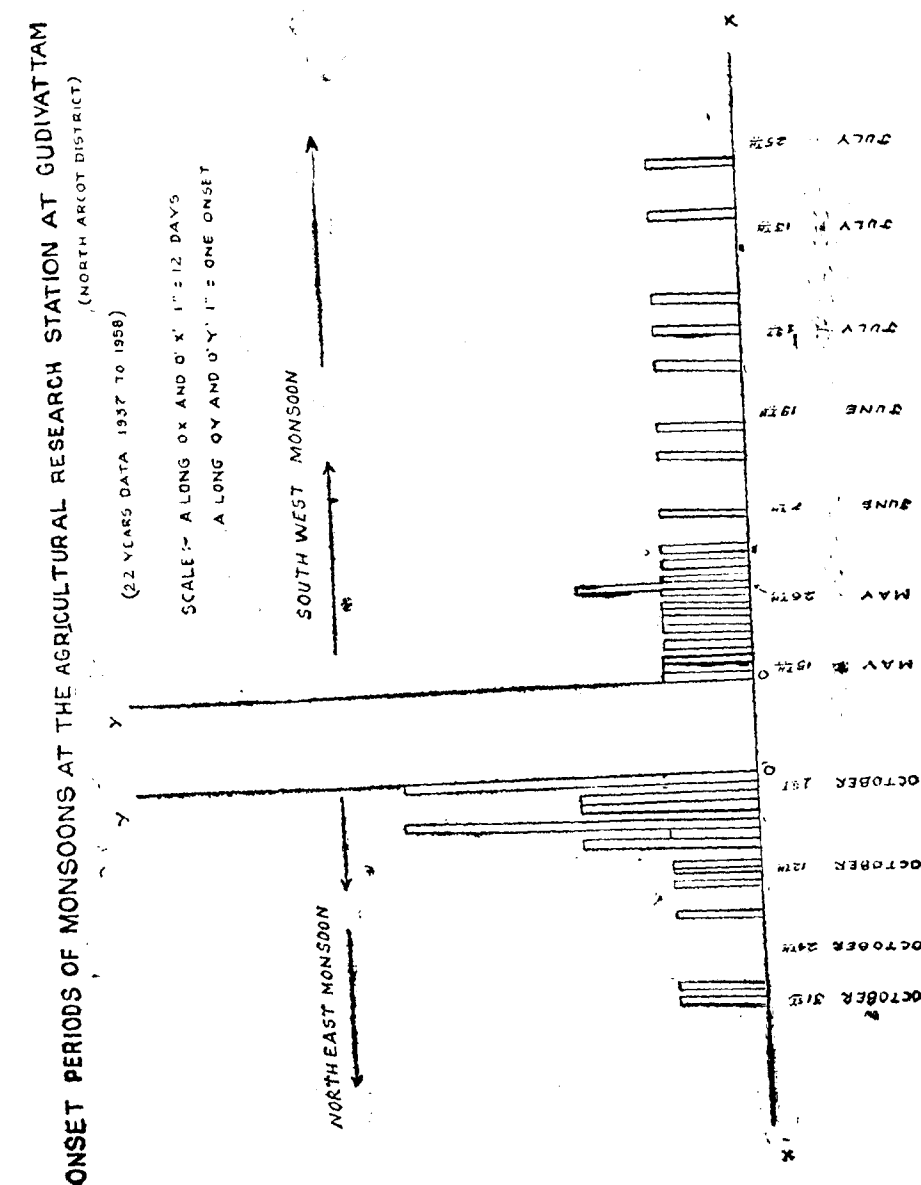
(iv) The dates of onset and cessation of the south-west monsoon and north-east monsoon were compiled and a combined onset diagram was prepared to bring out the probable periods of onset of the monsoon.

Discussion : (i) The rainfall patterns in the four main seasons of the year are indicated in Table I. The inferences drawn from this table are presented hereunder :—

(a) The rains in the first five months of the year, constituting the dry weather and hot weather periods are rather meagre, accounting for only 11.4% and 14.6% respectively of the annual rainfall and number of rainy days.

(b) In regard to the pattern of rainfall in the south-west monsoon period of June to September it is to be noted that it is in this period that 51.2% of the annual rainfall is received and it is distributed evenly to the extent of 50% of the annual number of rainy days.

(c) Coming to the north-east monsoon period of October to December it is seen that only 37.4% of the annual rainfall is received in this period with only 35.4% of the annual number of rainy days.



(ii) The correlations between the rainfall patterns in the four main seasons and also the annual rainfall pattern are presented in Table II. The inferences drawn from this table are detailed below :—

(a) If the rains are above normal in the dry weather period, it is an indication that the rains in that particular year are also likely to be above normal.

(b) If the rains and their distribution in any year are above normal in the south-west monsoon period, it is very likely that in that year the rains and their distribution are also above normal. This is explainable since the rains and their distribution account respectively for 51.2% and 50.0% and 50.0% of the annual rainfall and number of rainy days.

(c) The rainfall pattern in the retreating north-east monsoon period has also a similar influence as that of the main monsoon on the annual rainfall pattern, but to a less marked degree.

(iii) The standard deviation, coefficient of variation and standard error, computed separately for each monsoon by the 'Centre shift average method' are given in Table III for periods from one to eleven years. In all these eleven periods the coefficient of variation goes on decreasing in the case of both the monsoons, thereby connoting that the variation in the performance of the monsoons has a cycle longer than eleven-year period. This indicates that the monsoons are fairly well defined in the locality.

(iv) A study of the onset diagram reveals that in fourteen out of twenty-two years the south-west monsoon has set in the period May 15th to June 1st. This may be tentatively taken as the probable period of the onset of the south-west monsoon, which is the main monsoon.

In regard to the north-east monsoon, only twenty-one onset dates were available as both the onset and subsequent development of this monsoon in 1945 were very weak. In 18 out of 21 years this monsoon has set in the period October 1st to October 14th. The tentative inference is that the north-east monsoon is likely to set in the first fortnight of October.

If data for some more years are collected, it may be possible to narrow down the duration of the two onset periods.

Summary and Conclusion: (i) At Gudiyattam the weather in the first four months of the year is likely to be rather dry with no heavy rains.

(ii) The onset of south-west monsoon will be rather early in the tract and invariably it will be in the second fortnight of May.

(iii) From the points of view of total rainfall and number of rainy days the south-west monsoon is more important than the north-east monsoon, which is only the retreating monsoon.

(iv) The patterns of rainfall in both these monsoons have individually significant influence on the annual rainfall pattern.

(v) If a year starts with good rainfall in its first two months, it may be taken as a tentative indication that in that year the rainfall is likely to be above normal.

Acknowledgment: The author's thanks are due to all those, who have been responsible for the collection of the rainfall data, made use in this study.

TABLE I
Seasonal Rainfall Pattern

Sl. No.	Details of Season	Rainfall in inches	Number of rainy days	Percentage on annual		Remark
				Rainfall	No. of rainy days	
1.	Dry weather period (January and February)	0.8	1	2.4	2.1	...
2.	Hot weather period (March to May)	3.0	6	9.0	12.5	...
3.	South-west monsoon period (June to September)	17.1	21	51.2	50.0	...
4.	North-east monsoon period (October to December)	12.5	17	37.4	35.4	...
5.	Annual	33.4	48	100.0	100.0	...

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TABLE II

Rainfall Pattern - Inter-seasonal Correlations

Season	Hot Weather Period		South-west monsoon period		North-east monsoon period		Annual	
	A		A		A		A	
	r ± S.E.	r ± S.E.	r ± S.E.	r ± S.E.	r ± S.E.	r ± S.E.	r ± S.E.	r ± S.E.
1. Dry weather period	...	...	...	...	...	...	...	...
2. Hot weather period	...	...	...	...	...	...	...	...
3. South-west monsoon period	...	...	...	...	...	...	...	...
4. North-east monsoon period	...	...	...	...	...	...	...	...

Remarks:— (i) 'r' = Correlation Coefficient, S. E. = Standard Error.

(ii) 'S' = Nature of Significance, 'N' = Not significant

(iii) 'Y1' = Significant for P = 0.1, 'Y2' = Significant for P = 0.01 and 'Y3' = Significant for P = 0.001

(iv) @ = Actual value of r = -0.0003

(v) 'A' = Rainfall; 'B' = Number of rainy days

TABLE III

Cyclic Nature of the Monsoons

S. No.	Centre shift average for	South-west monsoon		North-east monsoon	
		S. D.	C. V. %	S. D.	C. V. %
1. One Year		5.7	33.3	6.2	49.6
2. Two years		4.2	24.6	3.4	27.6
3. Three years		3.4	20.2	2.4	19.4
4. Four years		3.0	18.1	2.3	18.5
5. Five years		2.5	15.2	2.1	17.1
6. Six years		2.2	13.5	1.9	15.4
7. Seven years		2.1	13.0	1.8	14.6
8. Eight years		1.9	11.8	1.7	13.9
9. Nine years		1.7	10.6	1.5	12.4
10. Ten years		1.5	9.3	1.5	12.3
11. Eleven years		1.2	7.5	1.2	9.9

S. D. = Standard Deviation. C. V. = Coefficient of Variation. S. E. = Standard Error.

*Description and Biology of a New Species of Weevil
Damaging Snake Gourd (*Trichosanthes anguina*)
in South India (Part II)

by
T. R. SUBRAMANIAM, M. Sc.,
Agricultural College and Research Institute, Coimbatore.

LIFE-HISTORY AND DESCRIPTIONS OF STAGES

Copulation: The weevils freely copulate both in the field and laboratory. Copulation lasts for 30 to 40 minutes. The time from emergence to copulation varies from 1 to 2 days.

Pre-oviposition, period of oviposition and fecundity: Observations on these aspects were made on 15 females. The pre-oviposition period ranged from 5 to 11 days with an average of 21.9 days. The maximum number of eggs laid under captivity was only 42. The number of eggs laid varied from 23 to 42 with an average of 31.6. The daily range of egg laying varied from 1 to 4.

Place and method of oviposition: Eggs are laid in the leaf petiole and at the nodal region of the stem. The weevil makes a small puncture at the place of oviposition, the length of which being as long as rostrum, and inserts one egg. The gummy fluid that oozes out due to the injury made dries up and forms a covering for the egg.

EGG

The egg is pale yellow, smooth, glossy and oblong oval in shape. A freshly laid egg measures on an average 0.51 mm. in length and 0.36 mm. in width. As it develops, the egg swells up slightly and the brown mandibles of the embryo become visible in 3 days.

The incubation period with reference to 50 eggs was found to range from 5 to 6 days with an average of 5.8 days in the laboratory when the average maximum and minimum temperatures and humidity were 83.4°F, 76.7°F and 87.1% respectively.

LARVA

The larva passes through five instars. There is not much difference in the general characters between the various instars. The description of each instar and the duration of each studied with reference to 20 individuals are given below.

* Forms part of thesis submitted for M. Sc., degree of Madras University.

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First instar: Length of the body 0.9 mm.; width 0.4 mm.; length of head 0.27 mm.; width 0.27 mm.

Apodous. Colour pale white. *Body* slender, cylindrical, moderately curved with a narrow posterior end. *Head* smooth, pale yellowish brown, shiny with a dark streak on the posterior end of frons. *Mandibles* prominent and dark brown. The whole body is sparsely beset with minute hairs.

The duration of the first instar varied from 3 to 4 days with an average 3.1 days.

Second instar: Length of the body 1.9 mm., width 0.5 mm. Length of head 0.36 mm.; width 0.34 mm.

Colour and body characters similar to first instar. A dark line or epicranial ridge on each side of the cranium commencing from a small posterior emargination and running anteriorly more or less parallel to the outer margin of the head capsule and a broad V shaped pale whitish band on the dorsal side are very distinct. Other characters similar to first instar.

The duration of the second instar varied from 3 to 4 days with an average of 3.6 days.

Third instar: Length of body 2.3 mm.; width 0.75 mm. Length of head 0.47 mm.; width 0.42 mm.

Characters similar to previous instar.

The duration of third instar varied from 3 to 4 days with an average of 3.9 days.

Fourth instar: Length of body 2.8 mm.; width 1.0 mm. Length of head 0.61 mm.; width 0.52 mm.

Colour white. Other characters similar to third instar.

The duration of fourth instar varied from 4 to 5 days with an average of 4.2 days.

Fifth instar: (Full grown grub)

Length of body 4.2 mm.; width 1.2 mm. Length of head 0.7 mm.; width 0.62 mm.

Colour uniformly white. Apodous. *Body* weakly curved, slender, cylindrical and much wrinkled with posterior end narrowing slightly.

Head Capsule: Chitinised, yellowish brown, longer than broad with a distinct and characteristic dark line or epicranial ridge posteriorly placed on each side of cranium on the dorsal surface and a system of broad V shaped pale whitish bands on the dorsal surface in addition to frontal and epicranial sutures. *Epicranial suture* somewhat longer than half the cranial sutures. *Epicranial ridge* curved, commences from posterior end of epicranial suture and runs anteriorly parallel to the outlines of the head capsule, each ridge a little more than half as long as as epicranial suture. Each epicranial half with five setae. *Frons* subtriangular, a little wider than long, length three fourths epicranial suture and with a distinct dark median line on the posterior end extending to half the length of frons; provided with three pairs of setae. *Ocellus* one present on each side. *Antenna* small, two jointed: basal joint wide, flat, membranous; apical joint conical and proximally with a ring-shaped chitinisation. *Clypeus* one and a half times wider than long with two pairs of tiny setae and four sensory punctures on the posterior margin. *Labrum* strongly transverse, anterior margin convex and posterior margin prolonged into a triangular projection and covered by the clypeus; upper surface with one pair of long and two pairs of medium sized setae. *Epipharynx* with a pair of rods extending beyond the middle of clypeal zone, and converging posteriorly, the anterior margin with six median setae and a lateral group of three stout elongate ovate, somewhat curved, basally suddenly constricted setae arranged in slightly oblique, inwardly and anteriorly directed series on each side: between the rods are two pairs of setae; anterior pair much bigger and more widely separated, and placed between the apices of the rods. *Mandibles* strong, subtriangular, with broad basis and heavy condyle, apex acutely bidentate: length equal to its greatest width. *Maxilla* elongate; cardo smooth without setae; stipes longer than broad with a basal lateroventral seta and two setae in the palpiferous region; palpus two jointed, basal joint as long as broad with a small seta and a pair of sensory pores; apical joint longer than broad, a little shorter than basal joint in length and only half as wide as basal joint; provided with one sensory pore in the middle and sensory pegs at the tip; mala simple, large and armed with nine long setae and a minute seta. *Labium* longer than broad, posteriorly limited by a Y shaped chitinised band and with one pair of setae on labial stipe; palpus two jointed, basal joint as long as broad with one sensory pore, apical joint distinctly longer than broad with one sensory pore in the middle and a few sensory

pegs at the tip; ligula thick with two pairs of setae anteriorly; subfascial area entire with one long and two short setae on each side.

Thorax: With three distinct divisions namely prothorax, mesothorax and metathorax. *Prothorax* is hardly so wide as mesothorax; tergum simple with four pairs of setae. *Meso and Metathorax* with tergum divided into two folds namely prescutum and scuto-scutellum; pre-scutum with a pair of setae, scuto-scutellum with four setae in a straight line; alar area with one minute seta. Pedal lobes are distinct and not protuberent each carrying four small setae.

Abdomen: Ten segmented, each of the first eight segments has three distinct tergal folds namely prescutum, scutum and scutellum, scutum being smaller; prescutum with two pairs of setae, scutum without seta and scutellum with two pairs of setae; alar area with two setae; each epipleural lobe with a single seta and hypopleural lobe with two setae. The ninth abdominal segment has a simple entire tergum with few hairs and the last segment is short and wart shaped with a few minute setae. *Spiracles* small, bifore and present on the mesothorax and first eight abdominal segments; each with two contiguous air tubes which are longer than peritreme and each air tube with about seven incomplete annuli; spiracular opening circular.

The duration of fifth instar was found to be four days in all the individuals.

The total larval period was found to vary from 18 to 20 days with an average of 18.7 days for 20 individuals.

Habits of larva: Immediately after hatching the grub starts feeding on the tissues around the hole in which egg is laid. Later it gradually starts boring and reaches the nodal region if egg is laid in the petiole. If egg is laid in the node, the grub feeds on the contents surrounding the nodal region. The grubs very often complete the lifecycle in the nodal region itself and do not bore long distances in the vines. When full fed the grub forms inside the stem an entirely close elongate oval cocoon formed of largely excrementitious matter. The grubs are very sluggish by nature.

PREPUPA

At this stage the grub measures 3 mm. in length. This stage lasts for one day. The stage can be recognised by the shortening of the grub in length and thickening of the thoracic region.

PUPA

Average length of the body 2.8 mm. : width 1.1 mm.

General colour uniformly white but turns still darker before transformation into adult. *Body* soft beset with hairs which are concolourous with the body. *Head* smooth, broader than long and provided with three pairs of setae originating from minute tubercles as follows: one pair on the vertex near the longitudinal middle line, one pair laterally above the eye case and one on the inner margin of the eyes. *Rostrum* about one third total length of pupa, curved, and bears three pairs of setae on small tubercles, posterior pair placed close to the eyes, middle pair between the position where scape is inserted and the third pair at the anterior end. *Antenna* geniculate, segments not distinct. *Prothorax* one and one fourth times broader than long, posterior end more than twice as broad as anterior end, provided with six pairs of long and one pair of tiny setae raised on tubercles which consist of four pairs marginal, two pairs discal and one pair basal setae. *Mesothorax* broader than long and bears two pairs of setae on tubercles. *Metathorax* with six pairs of setae, three placed in scutellar area. *Abdomen* one and a half times longer than broad, nine segmented: segment 1 to 8 with transverse row of setae on prominent tubercles dorsally, consisting of two median pairs and one pair in the pleural region: ninth segment with a pair of curved processes. There are no setae on any abdominal sternum. *Legs* folded and each femora with one pair of setae at the distal end.

Pupation takes place inside the larval burrow itself in a cocoon composed of largely excrementitious matter. The duration of pupal stage ranged from 6 to 8 days with an average of 7.2 days.

The total life cycle from egg to adult varied from 29 to 33 days with an average for 31.8 days for 20 individuals.

Habits of adult: The adult is a small black weevil which is usually found clinging to the nodal region and to the base of the leaf blade in an infested creeper. The adults are very active especially during the early hours of the morning. When approached they fall down suddenly and feign death and in this posture they remain for

only a short time. They are capable of flying quickly to long distances and by this they spread to other places. They feed on tender stem and leaf petioles.

Longevity: Observations on the length of life of adults were made on 30 individuals in each sex, 15 without food and 15 with food. The duration varied from 13 to 49 days with an average of 27.2 days for females and from 21 to 39 days with an average of 21.2 days for males with food. Without food it ranged from 3 to 6 days with an average of 4.3 days for females and 2 to 7 days with an average of 4.0 days for males.

Dissemination: The weevil spreads from one place to another by flight.

Natural enemies: No parasite or predator noted either on on grubs or adults during the studies.

Seasonal occurrence: Snake gourd is raised in two seasons at Coimbatore one from July to January and the other from March to July in summer. The weevil occurs mostly in the main season crop grown from July onwards. The adults appear early in September when the crop is about one and half months old. Egg laying is commenced in September and continued as long as the crop is left. Grubs are noted from September upto removal of the crop and pupae from end of October. About three generations are passed by the weevil in the main season crop. In the crop raised during the summer egg laying is commenced in the middle of May and continued up to the removal of crop. Most of the adults emerge by end of June. Only one generation of this weevil has been noted in the summer crop.

Summary: The description of a new weevil *Baris trichosanthis* n. sp. attacking the shoots of snake gourd (*Trichosanthes anguina*) a common vegetable grown throughout South India, is given. The aspects of biology of the weevil are also fully described. Eggs are laid on the nodal region and petioles in excavations made by the adult in 5 to 11 days after emergence. The maximum eggs laid is only 42. The oviposition period also is short maximum being only 28 days. The period of different stages of the weevil are 5 to 6 days for egg, 18 to 20 days for larva and 6 to 8 days for pupa. The larva has 5 instars the duration of each varying from 3 to 4 days. The duration of adult life for both sexes is short under captivity with a range from 13 to 49 days in female and 21 to 39 days in male. The

pest occurs throughout the year at Coimbatore. It has three generations in the main crop raised from July to January and only one in the crop raised in summer from March to July.

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REVIEW

1. **Power and Irrigation Projects of Madras State** (in English) Price: 10 nP.
2. **Power and Irrigation Projects of Madras State** (in Tamil) Price: 10 nP.
3. **Nutritive Wheat** (in Tamil)

The above three booklets are issued by the Director of Information and Publicity, Madras.

Booklets (1) and (2) give briefly useful and interesting information of the Irrigation and Electricity Power Projects completed and under execution in Madras State. The photographs and particulars about amount spent, area irrigated, power developed etc. in respect of each project are interesting. The public would benefit by these details.

Booklet No. (3) furnishes details of the ultimate value of wheat and gives over 50 recipes for sweet and savoury wheat preparations, which will be interesting to house wives. The booklet is worth possessing by those interested in wheat as an article of diet since large imports of wheat are expected shortly under the recent Indo-American food agreement.

Quality of Irrigation Waters in the Amaravathy Ayacut Area, Coimbatore District

by

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Introduction : The Government of Madras sanctioned a scheme of irrigation soil survey in the Amaravathy Reservoir Project ayacut area in early 1959. In addition to arriving at a classification of the soils into irrigation suitability classes, the scheme envisages the zoning of areas which might deteriorate on irrigation due to salts or alkali and suggesting suitable remedial measures for their reclamation. Quality of water is an important consideration in an appraisal of salinity or alkali conditions in an irrigated area. Therefore, a study of the quality of canal and well waters in the area has been made and reported in this paper.

Amaravathy Project : The river Amaravathy is a major tributary of Cauvery. It rises in the Western Ghats near Munar at about 5,000 ft. above M. S. L. and flows through the dense forests of the Anamalais range of hills. It enters the plains near the present dam site at Amaravathinagar at about 1,100 ft. above M. S. L. The Amaravathy canal taken out from the dam and running parallel to the river will provide irrigation on 21,500 acres distributed between the canal and the river in Udumalpet and Dharapuram taluks of Coimbatore District. The new irrigation on 21,000 acres consists of 3,000 acres of sugarcane, 1,000 acres of paddy and 17,500 acres of dry crops. The irrigation season for the new ayacut is from 1st August to 31 January. Water was first let into the canal for irrigation in 1958. Irrigation in the ayacut area is also practised from a large number of wells. The dry crops raised are cholam and cumbu. Irrigated groundnut is also common.

Soils of the ayacut area : A rapid tour in the commanded area has enabled a broad classification of soils into two series : Udumalpet and Dharapuram. The entire ayacut area is undulating with a general fall in level from the canal to the river. Several small rivulets drain the area into the river. The difference between these two series exists in the calcareous nature of the parent material occurring in Dharapuram taluk. Both the series are red soils of 2 to 6 feet depth and of a light soil texture at all depths. Abundant kankar nodules occur in the soils of the latter series.

Throughout the ayacut area many drainage-ways are silted up. This in conjunction with a fairly rolling topography has given rise to several ill-drained phases where saline and alkali conditions exist.

Review of literature: Literature on the quality of irrigation water is very extensive. Numerous methods of analysis, interpretation and categorization of waters in suitable classes have been worked out and adopted by various workers. The most pioneering work in this branch has been done in the United States, specially in the west and particularly at the United States Salinity Laboratory, Riverside, California. Very voluminous data have been collected and published by the United States Geological survey pertaining to waters from all over that country. Comprehensive methods of laboratory examination of irrigation waters and a tentative scheme of classification were initially proposed in the preliminary manual of the U. S. Salinity Laboratory, Edited by Richards (1947).

The progress of entire work was reviewed by Wilcox (1948) in his technical bulletin wherein he also proposed a chart for classifying water into five classes based on electrical conductivity and Sodium percentages. Divisions between Sodium percentage groups were determined by calculations based on the mass-action equation of Gapon (1933) to give the percentages of sodium that would provide certain exchangeable Sodium percentages on soil clay when the solutions and clay were in equilibrium. This chart was modified by Thorne and Thorne (1951) to provide a binomial classification system giving five classes for salt and five for increasing Sodium adsorption hazards.

On the basis of observations on irrigation with waters of the Nile and the Euphrates Rivers, Eaton (1950) proposed that carbonates and bi-carbonates may have an indirect effect on water quality through the precipitation of Calcium and Magnesium, thereby increasing the Sodium percentage. The effect is particularly important in the presence of "residual Carbonates" defined as $(\text{CO}_3^{++} + \text{HCO}_3^{++}) - (\text{Ca} + \text{Mg})$. The residual carbonates represent the excess of the carbonates over the lime elements. Waters with more than 2.5 m. e./l residual carbonates are not suitable for irrigation purposes. Waters containing 1.25 to 2.5 m. e./l are marginal, and those containing less than 1.25 m. e./l are probably safe. It is believed that good management practices and proper use of amendments might make it possible to use successfully some of the marginal waters for irrigation. These conclusions are based on limited data and are, therefore, tentative.

In 1953, The United States Salinity Laboratory proposed a new expression of Sodium hazard called Sodium-Adsorption Ratio (SAR). This ratio is related to the adsorption of Sodium by the soil from salt solutions or irrigation waters and is therefore, a definite improvement over previous indices for sodium or alkali hazard from irrigation waters. The waters have been categorised into four grades of salinity, denoted as C1 to C4, and four grades of alkalinity, expressed as S1 to S4, in the form of SAR values, making up 16 classes in all.

This classification has been represented by the workers of the U. S. Salinity laboratory on a diagram.

The U. S. Salinity Laboratory suggests that waters above 2,250 Micromhos in conductivity are generally unfit for irrigation. There are, however, many important irrigation waters with salt concentrations great enough to give conductivities much higher than this. For such areas Thorne and Peterson (1954) suggested additional classes above 2,250 Micromhos/cm.

Very few publication have dealt with the quality of irrigation waters of the Indian Sub-continent and so only little information is available on the subject. Mention may be made of the studies on the water from drains, rivers, and canals of the Punjab by Asghar and Dhawan (1947). They estimated conductivity, total salt content, Calcium-Sodium ratio pH values and made comparison of relationships between these values and 'salt index' proposed by Taylor, Puri and Asghar (1935). Recently, a study and classification of irrigation waters in Uttar Pradesh has been reported by Agharwal, Mehorotra and Gangwar (1956). In this study canal and well waters of three typical districts of Uttar Pradesh were chemically analysed and the data compared with the water categorization system put forward by the U. S. Salinity Laboratory.

In classification of irrigation waters it is assumed that the water will be used under average conditions with respect to soil texture, drainage, quantity of water used, climate, and salt tolerance of crop. Large deviations from the average for one or more of these variables may make it unsafe to use what, under average conditions, would be a good water; or may make it safe to use what, under average conditions, would be a water of doubtful quality. This relationship to average conditions has been emphasised by the workers of U. S. Salinity Laboratory to be kept in mind while using any general method for the classification of irrigation waters.

Materials and Methods: Irrigation water samples from the different sources: wells, river and canal, were collected at a number of places in the Amaravathi ayacut area in August 1959. All the samples were collected within a week thus keeping the time of collection of the samples as uniform as possible.

The quality of irrigation water depends upon its content of salt constituents. Among the most important salt factors in water quality are (1) total concentration, (2) the proportion of Sodium to other cations, and (3) the presence of special toxic ions such as borate or, for some crops, possibly Chloride, Sodium or Bi-carbonate.

Each sample was analysed for total concentration by evaporating an aliquot of the water to dryness, weighing the dry residue and expressing as parts per million. Total salt concentration was also measured as electrical conductivity and expressed as micromhos per centimeter ($EC \times 10^6$) at $25^\circ C$. These two values for each sample were used to check the approximate relationship between them Viz. $\frac{\text{Parts per million}}{0.64} = EC \times 10^6$

Each sample was also analysed for cations and anions by the usual laboratory methods. The difference between the total anionic concentration and the sum of the bivalent cations, Viz. Ca and Mg was taken as Na. All were expressed as milliequivalents per liter.

Percent Sodium was calculated as $100 \times \text{Na} / \text{Total Cations}$; Residual alkalinity as $(CO_3 + HCO_3) - (Ca + Mg)$; and Sodium absorption ratio as $\text{Na} / \sqrt{(Ca + Mg)/2}$

The following approximate relationships among the total cations, electrical conductivity and total soluble salts as established by the United States Salinity Laboratory workers were used to check the values obtained.

$$EC \times 10^6 / 100 = \text{Total Cations in Me./Litre}$$

$$\text{Total soluble salts p. p. m.} / 64 = \text{Total Cations in Me./Litre.}$$

Results: Then analytical data of the water samples obtained in these studies were averaged on the basis of soil characteristics. The average composition thus obtained for each soil class is presented in Table I. The deviations observed in electrical conductivity and in percent Sodium in each soil class are given in Table II.

An examination of the data presented in Table I reveals that the composition of well waters is one of moderate salinity. Comparatively higher contents of dissolved salts are generally met with in the wells of the Dharapuram Taluk. The average percent sodium is about 50 in both the taluks. The balance chiefly is calcium. The anionic portions of the well waters contain predominantly bicarbonate ions. In Dharapuram taluk the sulphate ions are also as high as the bicarbonate ions. Significant amounts of carbonates are absent since the average values in both the taluks are only a little over 5 percent of the total anions. The reaction however is on the alkaline side of neutrality but the pH is only about 8.5 or less on the average.

The salt content of canal as well as river water increases with distance though not in a regular fashion. The average figures for the taluks indicate that it is of low salinity in Udumalpet but of moderate salinity in Dharapuram taluk. The percent Na. is much lower than that of the well waters in respective taluks. The anionic portion is predominantly bicarbonate in Udumalpet taluk, while it is sulphate in Dharapuram. The pH gradually increases from about 7.5 to 8.5 as the distance increases.

There are some remarkable deviation from the average values for conductivity and percent Sodium. These are only few as indicated in Table II and are associated with Hydromorphic areas. The other values are distributed close to the mean value.

Discussion: Wilcox (1948) proposed the following grades for electrical conductivity and percent Sodium.

Grade	Conductivity $EC \times 10^6$ at $25^\circ C$	Percent Na
1. Excellent	less than 250	less than 20
2. Good	250 to 750	20 to 40
3. Permissible	750 to 2000	40 to 60
4. Doubtful	2000 to 3000	60 to 80
5. Unsuitable	more than 3000	more than 80

According to this categorization the canal and river waters throughout are "excellent to good" while the well waters are of 'permissible' quality.

The above was modified by Thorne and Thorne (1951) for the classification of irrigation waters of Utah. The categories of classification are designated by 25 symbols viz.: 1A 1B 1C 1D

1E.....5A 5B 5C 5D 5E. The number refers to the rating with respect to increasing concentrations of total salt and the letters to increasing proportions of Sodium in the water or to different Sodium percentages. The categories to which the average values of the different sources of irrigation water fall are shown in Table III. The well water in both the taluks belong to 2A and the canal and river waters belong to 1A. This means that the well waters may not cause any sodium accumulation in soils but may cause salt accumulation where drainage is poor. The canal and river waters in general can be used safely on all soils.

In terms of Eaton's (1950) "Residual Carbonate" concept the average values indicate that well waters of Dharapuram taluk are only of a marginal quality, while those of Udumalpet as well canal and river waters throughout the ayacut are safe to be used for irrigation. Even these marginal waters according to Eaton can be used successfully if accompanied by good management practices and proper use of amendments. There are several positive deviations from these average values mainly associated with Hydromorphic areas. They are alkali areas and require special management practices.

The water analysis data were also compared in detail with the water categorisation system put forward by the U. S. Salinity Laboratory in their manual (1953) wherein the use of S A R values, apart from the salinity classes have been made in place of Sodium percentage for assessing the Sodium hazard. The U. S. Salinity Laboratory workers suggest that waters above 2,250 Micromhos in conductivity are generally unfit for irrigation. There are however some well waters in the ayacut area with salt concentration great enough to give conductivity values greater than 2,250. Thus it would appear that further classes must be added to the U. S. Salinity Laboratory classification system in range above 2,250 micromhos per cm. The following additional classes therefore, above 2,250 micromhos/cm are adopted as suggested by Thorne and Peterson (1954) in such cases:

Class 4- 2,250 to 40,00; class 5- 4,000 to 6,000, and class 6- above 6,000.

Table IV shows the distribution of the irrigation waters amongst the different conductivity classes. It will be seen from this table that as high as 80% of the samples fall under "moderate" and "medium to high" salinity classes.

Average values of conductivity representing the different taluks as presented in Table I indicate, that the well waters in both the areas can be categorised as medium to high salinity class. Both canal and river waters are of low salinity in Udumalpet taluk but gradually take up salt and turn to be moderately saline when they flow through Dharapuram taluk. The values of S A R calculated for all the water samples were utilised along with the conductivity values for classifying water. For this, use was made of the diagram proposed by the U. S. Salinity Laboratory (1953) and later modified by Thorne and Peterson (1954) for higher salt classes. In this diagram waters have been categorised into 6 grades of salinity with increasing hazards from total salt concentrations and into four grades of S A R values representing increasing hazards from exchangeable sodium accumulation in irrigated soils. The lines dividing the S A R classes are empirical and based on green house and field tests. These are diagonal lines with negative slope to take into account the dependence of the Sodium hazard on total salt concentration. By plotting the values for individual samples in the diagram it was observed that the irrigation waters in the area fall in general in C_2S_1 and C_3S_1 classes. The waters in Udumalpet taluk mostly belong to C_2S_1 and those of Dharapuram to C_3S_1 . Waters belonging to higher alkali hazard classes are few in both the taluks. Thus with respect to Sodium hazard the waters in general in the entire ayacut area belong to S_1 i. e. Low Sodium class which can be used on almost all soils without any danger of Sodium accumulation.

In the light of the above discussion it may be inferred that the canal and river waters in the ayacut area in general are of low Sodium and of low salinity. They may be used for irrigation with most crops on most soils with little likelihood that soil salinity or high exchangeable Sodium will develop. Some leaching is required but this will occur under normal irrigation practices except in cases where the soil has extremely low permeability. The well waters on the other hand are of medium to high salinity. Owing to the presence of a good proportion of bivalent cations in the total soluble salts, the Sodium hazard for these waters also is of a low order. The waters can be used only on soils of medium to good permeability to prevent serious salinity problems. Plants with moderate to good salt tolerance may be grown.

The soil texture of the ayacut area is in general sandy to sandy loam. Such soils are not only permeable, but also will permit higher exchangeable Sodium percentage without developing undesirable

physical properties. Moreover, the tract has an average rainfall of about 25" which may be sufficient to wash away the salts accumulated by irrigation water. Being mostly grown to dry crops, the area requires only light irrigation with these waters. It is thus possible to use the well waters of the area without any adverse effect on soils and plants provided the drainage is not impaired by inefficient drainage-ways or by the occurrence of any indurated pan or a high water table.

Summary: A quality appraisal of the irrigation waters from wells, canal and river of the Amaravathy ayacut area in Coimbatore District, has been made by using the recent water categorization schemes adopted in the U. S. The canal and river waters are of good quality while those of wells are of medium quality.

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TABLE I
Average Chemical Composition of irrigation water in the Amaravathy Reservoir Project Ayacut area

Average Chemical Composition of irrigation water in the Amaravathy Reservoir Project Agricut area														
Taluk	Nature of Soil	No. of Samples	EC Micro mhos/cm	pH	Cations ME/l			Anions/ME/l			Total Soluble Salts ppm	Total Cations ME/l	Soluble Na ⁺ Na ⁺ × 100 / total cations	
					Ca	Mg	Na	CO ₃	HCO ₃	SO ₄				
Udumalpet	Red earth developed on non-calcareous parent material	44	825	8.20	Well water			0.37	3.36	2.04	1.35	7.36	47.61	
					Canal water									
		4	113	7.47	0.70	...	0.25	...	0.50	0.42	0.12	61.25	0.95	25.00
		2	175	7.70	0.75	...	0.35	...	0.75	0.35	...	91	1.10	35.50
Dharapuram	Red earth developed on calcareous parent material	57	1217	8.54	Well water			0.61	4.22	2.78	3.82	999	11.63	50.63
					Canal water									
		6	366	8.03	1.42	0.65	1.68	0.18	1.26	0.37	1.63	261	5.45	32.00
		3	333	7.90	1.50	0.43	1.60	...	1.43	0.40	1.71	229	3.53	27.00

TABLE II

Deviation from the average values of electrical conductivity and Percent Sodium in the Irrigation waters of the Amaravathy Agricut Area.

Taluk	Source	Average Micro Mhos/cm	Deviations		Average % Na	Deviations	
			Max	Min		Max	Min
Udumalpet	Well	825	3500	300	47.61	83	3
	...	...	2500	350	...	78	8
	...	...	1600	400	...	76	15
	...	...	1200	...	...	80	...
	Canal	113	150	100	25.00	73	11
Dharapuram	River	175	350	150	35.50	50	21
	Well	1217	7800	200	...	85	13
	...	...	2700	250	50.63	80	9
	...	...	2800	300	...	77	14
	...	...	2500	...	...	72	5
	Canal	366	900	150	32.00	80	19
	River	333	750	100	27.00	56	7

TABLE III

Average derived ratios for the different Irrigation waters in the Amaravathy Agricut Area

Taluk	% of Na	Residual alkalinity	S. A. R.	Water quality		
				Wilcox:	Thorne & Thorne	Thorne & Peterson
Udumalpet	Wells	47.61	1.01	3.21	Permissible	C ₂ S ₁
	Canal Water	25.00	0.13	0.62	Excellent to Good	C ₁ S ₁
	River Water	35.00	0.05	0.77	Do.	C ₁ S ₁
Dharapuram	Well Waters	50.63	1.38	4.00	Permissible	C ₂ S ₁
	Canal Waters	32	0.26	1.72	Excellent to Good	C ₁ S ₁
	River Water	27	...	1.30	Do.	C ₁ S ₁

TABLE IV

Distribution of water amongst the conductivity classes.

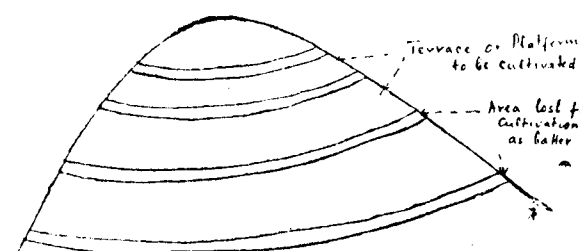
Distribution of water amongst the conductivity classes.				
Conductivity Range Micromhos/cm at 25 c		Water quality	No. of Samples	Approximate %
C-1	Less than 250	Low salinity		
C-2	251 to 750	Moderate salinity	15	13
C-3	751 to 2250	Medium to high	57	49
C-4	2251 to 4000	High salinity	36	31
C-5	4001 to 6000	Very high salinity	6	5
C-6	More than 6000	Excessive salinity	...	...
			2	2

Research Notes

Planting of scented Geranium (*Pelargonium Spp.*—Geraniaceae) on the Embankment of Bench Terraces in Nilgiris.

In Nilgiris, soil conservation had attained such a problem that the Government had been forced to extend the Madras Hill Stations (Preservation of Trees) Act of 1955 to the entire taluks of Ootacamund and Coonoor from 1-4-1959. According to this act, lands situated on slopes steeper than 1 in 3 (33%) should be put only under trees and lands situated on slopes milder than 1 in 3 should be cultivated only after undertaking the execution of appropriate soil conservation methods. According to the land-use capability devised for Nilgiris, agricultural lands having a slope between 10%—33% should be bench-terraced at 4 to 6 ft. vertical interval with disposal drains and drop-pits. At present soil conservation works in the above fields are executed by the Agricultural Department after obtaining necessary agreements (Consent Statements) from the ryots. It is estimated that an extent of about 15,000 acres (major portion of potato growing area) have to be bench terraced in the coming years.

Figure-1 Front View of a terraced field

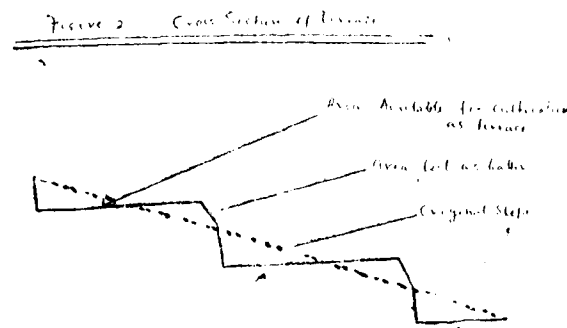


For the execution of the above works a lot of propaganda has to be made and the ryot should be convinced on the advantage of bench terracing as a means of increasing the yield of potato and other crops. The main objection of the ryot for bench terracing is

on the wastage of certain portion of the area known as batter on the front face of terrace. It is found that the area lost to cultivation is roughly equal to half the slope of the land. i. e. in a field situated on a 30% slope the area that is lost to cultivation after terracing is 15% of the total area. The area that is lost to cultivation is shown in the sketch.

As the dug-out soil requires a batter of 1:1 slope for proper embankment there is no possibility of reducing this area except by stone-wall rivetment which is a costly venture. If the slope is reduced the filled up soil cannot withstand and will fall on the terrace situated lower below. Hence under the present method of execution of bench terracing as practised in Nilgiris this loss of area is inevitable.

Therefore the problem arises on the best use of the above area by taking the following facts into consideration.



1. The crop raised on the batter must be of economical use, i. e. It must be a source of income to ryots.

2. It should be easily propagated and should be of perennial nature.

3. It should have a building effect on the soil so that the soil should not be washed during heavy rain.

4. The crop should have copious foliage so that direct beating of rain on soil can be prevented.

5. This should not affect the main cultivated crops adversely by shade or root effects and should not hinder their cultivation.

6. This should not be eaten by cattle or goats and should not be a source of pests and diseases for the main crop cultivated.

7. This should withstand lopping and pruning.

8. This should not invade the crop as an encroachment.

It has been found that by planting scented Geranium, on the batter of bench-terraces in an area of about 10 acres at Adigaratty Village in Coonoor Taluk, the above facts are well answered.

Scented Geranium is a shrubby fragrant plant cultivated extensively in North Africa and South Europe. This was introduced to Nilgiris during 1947 under a specific scheme started to test new introduction of medicinal and essential oil plants for economic use. There are 46 varieties of Geraniums among which geranium oil is distilled from the leaves of *Pelargonium capitatum*; *P. radula*; *P. graveolens*; *P. odoratissimum* and *P. roseum*. The main use of geranium oil is to adulterate or substitute attar of roses in the manufacture of perfumes, soaps, tooth powders and ointments. The oil is usually extracted from leaves and distilled in the same way as eucalyptus oil by steam distillation method. The leaves are mixed up with water in a copper still and then heated till the water boils. The oil vapourizes and passes with the steam into a condenser, where on cooling oil collects as a layer on the surface of water which is removed and filtered.

In scented Geranium, it has been estimated that by planting a pure crop, a total gross income of Rs. 1,000/- (Rs. One thousand only) can be obtained per acre per year. So, in the batter area of terraced field an

income of Rs. 150/- can be obtained from the 15% area lost. (An average of 20 lbs. of geranium oil in an acre can be obtained out of 10,000 to 15,000 lbs. leaves harvested and the oil can be sold at the minimum price of Rs. 50/- per lb. — the usual price ranges between Rs. 50—80). The soil in the batter area being very fertile and filled up top soil, no manuring is necessary. Only planting and harvesting has to be carried out. The roots are of spreading and fibrous type. The crop is perennial and can be kept in the field for 4 to 5 years. It has copious foliage and does not affect the main potato crop. This is not eaten by cattle and there seems to be no pests and diseases affecting the crop. This withstands lopping and pruning. This can be easily propagated by stem cutting.

Hence, in scented Geranium, an affective economical, binding material is found for the terrace front faces in Nilgiris.

I am very grateful to Sri T. Nataraj, Agronomist and Associate Professor of Agronomy and Dr. D. Daniel Sundararaj, Systematic Botanist and Associate Professor of Botany, Agricultural College and Research Institute, Coimbatore for valuable suggestions in the preparation of this note and for going through the manuscript.

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Coimbatore.

Y. B. MORACHAN,
Post Graduate Student.

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Proliferation in *Crossandra undulaefolia* Salish.

Several cases of proliferation have been observed from time to time in various plant species, particularly the grasses. The proliferated plant organ may be any part exhibiting either vegetative or reproductive characters. Instances wherein a single flower of a spike transforming into a secondary spike due to floral proliferation have been quoted in *Plantago major* (Great Plantain), in which the proliferated flowers terminated in panicle inflorescences, and in *Plantago lanceolata* (Ribwort) the proliferation of the lower flowers of the spike, into secondary spikes was observed (Worsdell, 1916). Further, the development of secondary capitula in the case of *Bellis perennis* (Daisy) and *Echinacea serotina*, from the normal capitulum arising from the axil of the involucre bracts afford additional evidence for the frequent occurrence of this

abnormal phenomenon (Worsdell, loc. cit.). The development of a secondary capitulum from the normal main capitulum has also been recorded in *Eriocaulon quinquangulare* Linn., the causes attributed being environmental i. e., existence of a very wet surrounding (Raizada *et al*, 1949).



Photograph showing the normal spike on the left and the proliferated spike on the right side

A similar case of floral proliferation, where one of the basal flowers of the spicate inflorescence in *Crossandra undulaefolia* Salisb. had proliferated into a secondary spike is recorded here. The specimen was observed in a normal plant grown for its flowers. The inflorescence was quite normal but for the single basal flower that had transformed into a secondary spike. The bract subtending this secondary spike was also normal and similar to those bearing regular flowers at their axils.

The causes for such a modification, as suggested by Worsdell primarily aim at the reversionary tendencies of the plant species, wherein the inflorescence is derived from a complex paniculate type

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Selected Articles

FRESH WATER FROM SEA WATER

Modern technology has brought the residents of Aruba, a little island off the coast of Venezuela, a gift from the sea—drinking water fresher and purer than any mountain stream or spring.

Turning salt water into fresh is made possible by the world's largest sea water conversion installation. This plant went into operation during the summer, and government sources predict that the plentiful supply of fresh water now available will facilitate the industrial, commercial and agricultural development of Aruba.

Such development has been seriously hampered until now by island's serious shortage of water. Aruba's annual rainfall is less than 15 inches, not nearly enough to supply its needs. Sometimes there is no rain at all for periods as long as six months.

(Other world cities with a rainfall approximating that of Aruba are Santiago, Chile; Mendoza, Argentina; Chihuahua, Mexico; Karachi, Pakistan; Lima, Peru; and Kimberly, South Africa.)

The new plant, which has a daily capacity of 27,00,000 U. S. gallons, replaces an older sea water conversion plant of very limited capacity and low efficiency.

Unique Feature: An unique feature of the new plant is that the steam it uses for distilling the sea water is first used to generate electric power. The efficiency of this combined operation, which squeezes every ounce of energy from the steam, makes the cost of converting the sea water very much lower than usual. The electric power is sold for general use throughout the island and surplus is available for new industry.

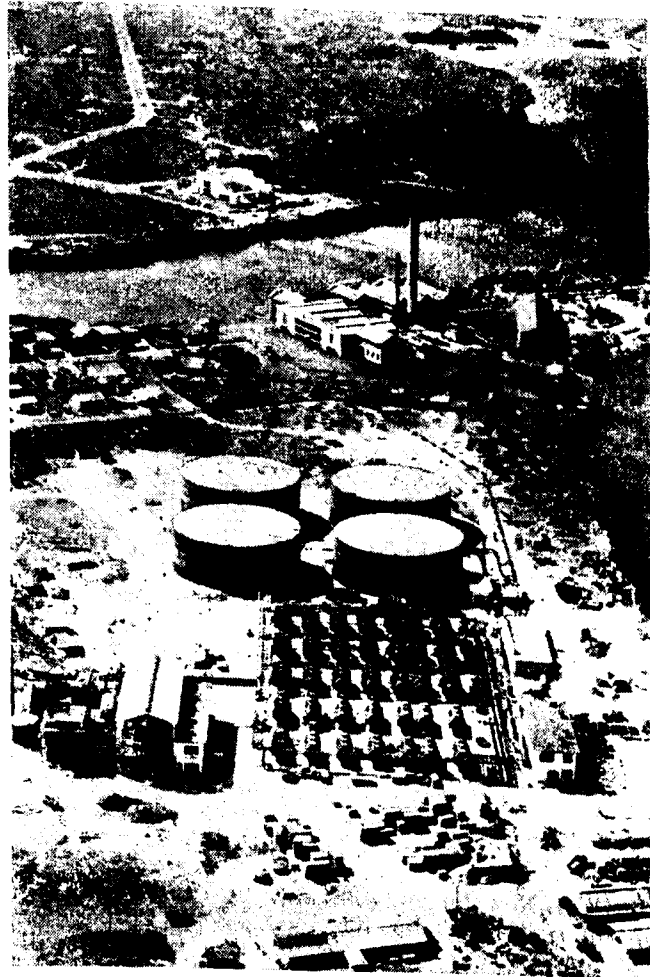
Experts concerned with the solution of water shortage problems have been quick to hail the combined water-power plant as a major step forward in man's quest for an inexpensive method of getting fresh water from the ocean.

In Harrison, New Jersey (U. S. A.), for example, Mr. J. J. Llanso, Manager of International Sales for Worthington Corporation, observed that "the Aruba plant brings closer the day when we will be able to turn many deserts into productive fields with converted ocean water".

Mr. Llanso noted that President Eisenhower told the United Nations General Assembly recently that "the ancient problem of water shortages is on the threshold of solution".

Interest on the new plant comes quite naturally from Worthington, for the company has for many years been a leader in water development projects in many parts of the world. A number of the firm's products are in use in sea water distillation plants, including the new Aruba installation—which has several Worthington pumps key spots.

How Plant Works: The Aruba plant works on the multiple-effect distillation principle. In this process the sea water passes through a series of six large evaporator tanks each resembling a steam locomotive boiler. In the evaporators, coils filled with steam supply the heat. A part of the water is turned into vapour in each of the evaporator tanks until all of it has been vaporised. When this process is complete, the water emerges free of salt and perfectly pure.



An aerial photo of the newly opened Aruba sea water conversion plant shows the facility's main elements. In the foreground are the evaporators or "effects", as they are known to engineers. Each of the large tanks in the centre of the photo holds 3,300,000 U. S. gallons of purified water. Between the evaporators and the Caribbean Sea on the right is a building housing crushed coral aerators through which the water is passed before Worthington vertical turbine pumps send it to the storage tanks. The electric power plant and the boiler producing steam for the distillation process are to the left of the evaporators. The buildings in the rear are the old water purification plant — **Globe Press Service.**

The first stage of this process, or as it is known technically, the first "effect", gets its heat from steam supplied by the electric power plant. From there on, the process is, so to speak, self heating.

This self-heating principle was explained by Mr. G. G. Sonderman, a partner of Singmaster & Breyer, the U. S. engineering firm which designed and built the U. S. \$ 1,00,00,000 plant. Sonderman said that the heat required for evaporating water in the second stage is generated by condensation of the vapour produced in the first stage and so on through the remaining effects. He said that this process depends on the fact that when water vapour is condensed, it releases a great deal of usable heat—enough, in fact to boil water.

The condensate from the steam used to heat the water in the first effect is returned to the power plant's boiler and is not mixed with the purified water.

Special Water Treatment: Sonderman noted that water entering the first effect is treated to prevent the formation of scale in the evaporator tanks. Because there is no scale formation, maintenance time for the whole plant is reduced to a minimum.

After the water is distilled, the portion to be used for potable purposes is passed through beds of crushed coral to add necessary minerals and remove the flat taste of distilled water. Passing the water through the coral also aerates it.

The water is then treated chemically to correct for acidity and pumped to four gigantic storage tanks. Worthington vertical turbine pumps with special "cutless" type bearings are used for this pumping job. Bearings of this type—which use a rubber and not the usual metal bushing around the pump shaft—were necessary because the pumps follow the crushed coral filter beds. Any particle of coral, which is extremely hard, getting into a conventional bearing would cause rapid wear and eventual pump failure. The cutless bearings thus insure trouble free, continuous operation.

Varied Uses for Water: From the storage tanks, the distilled and treated water goes into the island's homes, hotels and commercial establishments. A portion of the distilled water is drained off prior to treatment and is sent to an oil refinery with a small stream going back to the power station's boiler. Before entering the boiler, the water is pumped to the generator through Worthington centrifugal pumps.

The Aruba plant also uses a Worthington compressor for instrument air service and a second Worthington compressor for general plant use. This second unit also serves as a stand by for the other compressor.

Some of the water goes to a soil-less (hydroponic) farm where it is mixed with chemicals which are used in place of soil. While this farm requires only a little water—much less than a conventional farm of equal acreage—it is dependent on a steady supply.

While the Aruba plant is the world's largest sea water conversion facility, it is not the first. The oldest of all, of course, is the continuous process of evaporation of sea water by the sun and the condensation of the vapour as rain.

Other and smaller saline water conversion plants are either already operating or under construction in Bermuda, the Virgin Islands, in South Africa, Arabia, Kuwait, the island of Curacao near Aruba, Peru and Ecuador. Not all of these plants use the distillation technique. For instance, a plant under construction in South Africa uses an entirely different process called "electrodialysis". In this, the water and salt are separated by an electric current.

Recently the subject of sea water conversion has attracted considerable attention and a great deal of research is being done in the field. This has been prompted not only by the expanding needs of countries with very limited water resources, but also by the fact that it is becoming increasingly expensive for many countries to get sufficient quantities of water from surface supplies such as rivers and lakes.

The aim of the sea water conversion research being done these days is to reduce the costs of converting water from the oceans of the world to a point where it is competitive with conventional methods and to ultimately devise ways which will make purified sea water even cheaper than water from natural sources.

[Globe Press Service.]

SELF SUFFICIENCY IN DATES

A shipment of 200 date palm tree "offshoots", loaded aboard the American President Lines' PRESIDENT COOLIDGE at the Port of Los Angeles recently, may enable India to eventually become self-sufficient in the popular and highly nutritious fruit.

This prospect was indicated by a spokesman for the Rockefeller Foundation, shipper of the date palm tree offshoots, which are now en route to Bombay and thence to the Indian Council of Agricultural Research in New Delhi.

The plants were furnished by the University of Arizona. Most of the offshoots — which grow from the roots of date palm trees, often several feet from parent plants — came from the Yuma experiment station of the university. A small number were obtained from nurseries at Indio, California, centre of the state's date-producing area.

Admittedly, the Foundation's role was unusual in two respects: (1) its grant of \$ 6,000 to cover packing and all transportation charges was decidedly small, compared to many of its grants; and (2) its efforts to improve agricultural output in India and other areas of the world have always been concentrated in the more basic foodstuffs, such as corn, wheat and rice.

Importance to Economy : But to the Indian Council of Agricultural Research, the production of dates, if not essential to basic needs, is extremely important in the country's continuing fight to cut down on food imports. In the first nine months of 1959, India imported 759,472 pounds of dates, according to Indian Consulate sources in New York.

India's greatest lack in substantially increasing her production of dates has been offshoots of proved good stock for an intensive experimental programme. The Council took this problem to the Rockefeller Foundation's staff of agricultural experts in New Delhi who passed the request on to the Foundation's headquarters in New York.

The 200 offshoots from high quality Arizona and California date palm trees were scientifically selected. Every care was also taken to insure their arrival in first class condition. For example, each offshoot, measuring around 6 feet in height, was individually wrapped — \$ 2,000 of the Rockefeller grant went into this operation alone.

Equally important, the offshoots are being kept in a refrigerated compartment of the ship with the temperature held at 38°F. during their entire voyage.

On their arrival in New Delhi, the offshoots will be planted. Those which appear best adapted to the climate, rainfall, soil and other agronomic conditions of the date-producing areas of India will be selected as basic stock. This stock will then be used in a breeding and multiplication programme through which the Council hopes to improve date production in India, both in quality and quantity, to the point where it will satisfy all domestic demands.

[Globe Press Service]

Gleanings

Dental Cure : *Embelia ribes* Burm f (Syn. *Embelia glandulifera* Wight) is a large climbing shrub belonging to the family Myrsinaceae. It occurs abundantly in the hilly parts of India upto 5000 ft. The berries of this plant have been found to cure all the dental, oral and throat troubles except ptyslism and cancer of the lip. This plant, the Ayurved Research Council says, is a positive cure for pyorrhoea.

For the benefit of our readers we give below the local names of the plant.

Tamil	: Vayu-vilangam, Vellal.
Telugu	: Vayivilagamu, Vilangamu, Vidangamu.
Malayalam	: Tiruvittikanni.
Kanarese	: Vayivilanga.
Hindi	: Baberang.
Sanskrit	: Bidanga.

This plant was generally used as an anthelmintic (Vermifuge) for the past 3,000 years. For further details the Secretary, Ayurved Research Council, New Delhi, may be addressed.

College and Estate News

The College reopened on 15-6-60 after the summer vacation. The freshers were welcomed by the seniors in the traditional fashion.

A General Body Meeting of the Upper Subordinates Association was held on 24-6-60. The recommendations of the pay commission were discussed.

UPPER SUBORDINATES ASSOCIATION AGRICULTURAL DEPARTMENT

Abstracts of replies of the Government to the resolutions passed by the Upper Subordinates Association on 16-2-1958 and 30-8-1959.

The Government observe that the proposals for the fixation of pay of the Upper subordinates who possess a higher qualification at a higher stage in the scale of pay are already under consideration and the report of the Pay Commission in this regard is awaited.

The Association requested the Government to request the University of Madras to continue to recognise the Agricultural College and Research Institute, Coimbatore and all the Agricultural Research Stations in Madras State as centres of Post-Graduate Research so that B. Sc., (Ag.) and pure science graduates can take the degree of M. Sc. by research.

The Government accept the suggestion of the Director of Agriculture that facilities for registering students for the degree of M. Sc., by research may be allowed only in the subjects for which provision does not exist in the Post-Graduate Institute. The Director of Agriculture, Madras, is requested to have the matter examined in detail in consultation with the Dean, Agricultural College and Research Institute and take up the matter with the Madras University and intimate the result to the Government in due course.

OBITUARY

We regret to announce the sudden demise of **Sri R. M. SUNDARAM**, I. C. S., Member, Board of Revenue, Madras on 14-5-1960 at the age of 54 years.

He was one of the senior members of the Indian Civil Service and had served the Madras State in various capacities-District Collector of Salem and Tanjore, Secretary to Government in the Development, Food and Agriculture, and Public Works Departments, Labour Commissioner and finally member, Board of Revenue. As Director of Agriculture, Madras and Secretary, to Government, Food and Agriculture Department Mr. R. M. Sundaram evinced keen interest in Agriculture. On several occasions he took part in the celebrations of College Day and Conference organised by the Madras Agricultural Students' Union and also presided over the celebration on one occasion. He was popular with all members of the Agricultural department. His loss at this stage of country's development is a serious one not easily replaced.

The M. A. S. U. offers its heartfelt condolences to the members of the bereaved family.

* * * *

We regret to announce the demise of **Sri K. RAGHAVACHARI**, Retired Deputy Director of Agriculture, Madras at the age of 75. He had served in the Agricultural Department in several capacities as Agricultural Demonstrator, Farm Manager and Assistant Lecturer in Agriculture in Subordinate service and as Lecturer in Agriculture, District Agricultural Officer and for a short period as Vice-Principal, Agricultural College and Research Institute, Coimbatore. He was connected with M. A. S. U. for a long time as a member of the Editorial Board and had contributed useful articles to the Madras Agricultural Journal.

We extend our heartfelt condolences to the members of the bereaved family.

* * * *

We regret to announce the sudden and premature demise of **Sri B. R. VENKATARAMAN**, II B. Sc., (Ag.) class. He was one of the talented students of this institution who proved his worth in studies and music. The Students and Staff of this College have lost a cheerful and endearing soul.

The Madras Agricultural Students' Union conveys its sympathies and heartfelt condolences to the members of the bereaved family.

Weather Review — for May, 1960.

RAINFALL DATA (IN INCHES)

Region	Station	Total rainfall for the month	Departure from normal	Total since 1st January
North	Madras (Meenambakkam) ...	0.4	- 0.6	1.4
	Tirurkuppam* ...	0.5	- 2.0	1.6
	Vellore ...	0.4	- 3.1	0.4
	Gudiyatham* ...	0.7	- 1.8	1.5
East Coast	Palur* ...	...	- 3.1	0.5
	Tindivanam* ...	0.3	- 2.0	0.8
	Cuddalore ...	...	- 1.0	1.0
	Nagapattinam ...	...	- 1.6	4.7
	Aduthurai* ...	0.3	- 2.2	1.0
	Pattukkottai* ...	2.7	+ 0.9	11.6
Central	Salem ...	5.9	+ 1.3	7.2
	Coimbatore (A. M. O.) * ...	2.0	+ 0.6	10.8
	Coimbatore ...	1.6	- 1.0	4.6
	Tiruchirapalli ...	3.5	+ 0.9	5.8
South	Madurai ...	1.2	- 0.6	5.0
	Pamban ...	1.6	+ 0.6	7.9
	Koilpatti* ...	3.0	+ 0.6	11.3
	Palayamecottai ...	2.8	+ 1.0	12.7
	Ambasamudram* ...	5.9	+ 3.7	15.8
	Nagerecoil* ...	16.8	+ 10.9	21.1
Hills	Kodaikanal ...	8.3	+ 1.9	25.4
	Coonoor* ...	5.6	£	31.7
	Ootacamund* ...	5.2	- 2.9	8.7
	Nanjnad* ...	6.2	+ 0.7	10.6

1. * Meteorological Stations of the Madras Agricultural Department.
£ Actual value is 0.01*.

In the first two days of the month under report the weather was mainly dry in Madras State. For five days from 3-5-1960 either localised or scattered showers or thundershowers were received in Madras State, particularly in its southern parts. The weather again became dry on 8-5-1960 and continued to be so on the next day as well. Scattered showers or thundershowers were received in Madras State for three days from 10-5-1960. On 13-5-1960 the weather again became mainly dry. For three days from 14-5-60 scattered rains were received in Madras State.

2. The South-West Monsoon advanced temporarily in Kerala on 17-5-60, with the result that isolated heavy rains were received in South Madras State on this day. Subsequently for three days scattered rains were received in Madras State. On 21-5-60 the monsoon became active in Kerala and advanced temporarily into Coastal Mysore. It was active in Kerala on the next day as well, but on 23-5-60 it was active only in Coastal Mysore. Madras State had localised and scattered rains, particularly in interior parts on 21-5-60 and 22-5-60. There after for three days from 23-5-60 the weather was mainly dry in Madras State. Scattered showers were received in Madras State on 26-5-60. On 27-5-60 a depression was noticed in the North-West Bay at 08.30 hours L. S. T. centred about 350 Kms. (220 miles) south of Calcutta. But the weather in Madras

State was mainly dry on 27-5-60 and 28-5-60. On 29-5-60 the monsoon was vigorous in Coastal Mysore and Kerala. Madras State had scattered rains on 29-5-60 and 30-5-60. The month ended with mainly a dry weather throughout Madras State.

3. In the first eleven days of the month the day temperatures were only below normal, on certain days appreciably, throughout the Madras State. On 12-5-60 they showed an increase, though they were below normal in Coastal regions. Thereafter some fluctuations were noticed till 15-5-60. Then they continued to be below normal till 20-5-60, when they showed a tendency to rise, particularly in South Madras State. Till 23-5-60 they were below normal. On 24-5-60 and 25-5-60 they were above normal in North Madras State. Till 30-5-60 the day temperatures were practically below normal. On 31-5-60 they recorded a rise in interior Madras State, though they were below normal in other parts of the State.

4. The noteworthy rainfalls and zonal rainfall for the month of May, 1960 are furnished hereunder:-

Noteworthy rainfalls.

No.	Date	Name of Place	Rainfall in inches
1.	3-5-1960	Nagarcoil	6.10
2.	3-5-1960	Ambasamudram	4.13
3.	4-5-1960	Palayamecottai	2.36
4.	17-5-1960	Tiruchirapalli	3.15
5.	19-5-1960	Pattukottai	2.20
	21-5-1960	Nanjnad	2.04

Zonal rainfall (in inches)

Name of the Zone	Rainfall for May, 1960	Departure from normal	Remarks
North	0.5"	- 1.9	Far below normal
East Coast	0.6"	- 1.5	do.
Central	3.5"	+ 0.5	Just above normal
South	5.2"	+ 2.7	Above normal
Hills	6.3"	- 0.1	Just below normal

Agricultural Meteorology Section,
Lawley Road Post, Coimbatore-3.
9th June, 1960.

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

Departmental Notifications

Upper Subordinates - Agricultural Department
Postings and Transfers during the month of June, 1960

Name and Designation	Posted or Transferred to
Sri S. Prince, Extension Officer for Agriculture, Orthanaad	Granted leave from 3.3.60 to 31.5.60
„ M. Balasubramaniam, Extension Officer for Agriculture, Tittakudi	Assistant in Oilseeds, Pollachi
„ M. Indiran, Extension Officer for Agriculture, Thirunavalur, South Arcot District	Extension Officer for Agriculture, Orthanaad
„ S. Sundaravaradan, Extension Officer for Agriculture, Sriperumbudur	Extension Officer for Agriculture, Kottur Block
„ T. N. Subramaniam, Extension Officer for Agriculture, Tiruchengode	Extension Officer for Agriculture, Manalmedu, Tanjore District
„ K. Ramaswami, Extension Officer for Agriculture, Tirupattur, N. Arcot District	Extension Officer for Agriculture, Sendamangalam Block, Salem District
„ K. P. Srinivasan, Analytical Assistant, Soil Testing Laboratory, Aduthurai	Granted leave from 16.4.60 to 23.5.60
Kumari Vinodini Vasudevan, Deputation for Training in France	Granted Extension of leave from 16.4.60 to 15.8.60
Sri R. Venkataraman, Assistant in Meteorology, Madras	Assistant in Paddy, Coimbatore
„ K. G. Shanmugavelu, Fruit Asst. Periakulam	Granted leave from 8.2.60 to 21.1.62
„ Smt. Sunanda Sakarama Rao, (on leave)	Assistant Lecturer in Botany, Coimbatore
„ A. K. Thomas, Plant Protection Assistant, Vellore	Resignation accepted from date of relief
„ K. Dhyanchand, Asst. Lecturer in Botany, Coimbatore	Resignation accepted from date of relief
„ T. K. Chandrasekara Unnithan, Asst. Lecturer in Horticulture	Resignation accepted from date of relief
„ M. R. Vijayan, Asst. Lecturer in Agriculture, Coimbatore	Resignation accepted from 11.5.60 F.N.
„ M. K. Poethambara Menon	Asst. in the Scheme for the Co-ordinated Manurial Trials on Groundnut, Salem
„ K. S. Vasudeva Nair	Asst. in Oilseeds, Tindivanam

Upper Subordinates - Transferred to the Package Programme in Tanjore District

Name	Block to which transferred
Sri G. Ramanathan, Agricultural Demonstrator, Tenkasi	Orthanaad
„ H. Balasubramaniam, Extension Officer for Agriculture, K. V. Kuppam	Sirkali
„ K. V. Ganapathy, Agricultural Demonstrator, Salem	Kottur
„ S. Ramakrishnan, Extension Officer for Agriculture, Musiri	Mayuram
„ K. M. Ganapathy, Plant Protection Assistant, Pattukkottai	Nagapattinam
„ S. V. Kuppasami, Oilseeds Development Assistant, Tanjore	Avadayarkoil
„ V. Nagarajan, Horticulture Development Assistant, Cuddalore	Orthanaad
„ Balachandran, Extension Officer for Agriculture, Modakurichi, Coimbatore	Kuttalam

Gazetted Officers - Madras Agricultural Department
Postings and Transfers during the month of June, 1960

Name and Designation	Posted or Transferred to
Sri B. Srinivasa Rao, District Agricultural Officer, Ootacamund	Campaign Officer, Office of the Director of Agriculture, Madras
„ S. V. Ramachandran, Campaign Officer, Office of the Director of Agriculture, Madras	Assistant Marketing Officer, Trichy
„ V. Venkatasubramaniam, Dist. Agrl. Officer, Chingleput	Seed Development Officer, Madras
„ Herbert Adiseshiah, Seed Development Officer, Madras	Seed Development Officer, Tanjore
„ P. S. Ananthachari, Seed Development Officer, Tanjore	District Agricultural Officer, Chingleput
„ S. Gonsalves, Asst. Agricultural Engineer (Hqrs.), Madras	Earned leave for 30 days from 4-6-60
„ P. S. Panchanathan, Junior Accounts Officer, Agricultural College, Coimbatore	Granted leave (subject to eligibility) with effect from 18-4-60 preparatory to retirement

Name and Designation	Posted or Transferred to
Sri S. Narayanan, Dist. Inspector of Local Funds Accounts	Junior Accounts Officer, Agricultural College, Coimbatore
„ S. V. Doraisami, Lecturer in Agrl. Economics, Coimbatore	Retired
„ M. Ramachandran, Additional Lecturer in Agrl. Economics, Coimbatore	Additional Charge of Lecturer in Agrl. Economics, Coimbatore
„ T. D. Muthusami, Cane Development Officer, Cuddalore	Asst. Agronomist, Sugarcane Zonal Farms, Lakshmanagudi
„ M. K. Lingiah, Asst. Extension Specialist, Coimbatore	Earned leave for 15 days from 1-6-60
„ A. H. Subramania Sarma, Extension Specialist, Coimbatore	Addl. Charge of Assistant Extension Specialist
„ R. Ananthapadmanaba Pillai, Oilseeds Development Officer, Coimbatore	Retired from 31-5-1960 A. N.
„ P. P. Syed Mohammed, Dy. Director of Agriculture, Coimbatore	Addl. Charge of Oilseed Development Officer, Coimbatore
„ S. C. Nalla Gounder, Soil Conservation Assistant, Kodumudi	Soil Conservation Engineer, Batlagundu, Madurai
„ S. Ramiah, Agricultural Engineering Supervisor, Vellore	Soil Conservation Engineer, Salem

Announcement

The last date for the receipt of the articles for the various College Day and Conference awards has been extended upto 15-7-1960.

Secretary,
M. A. S. U.

DISTRICTS

SOUTH ARCOT, NORTH ARCOT
COIMBATORE
RAMANATHAPURAM
TIRUNELVELI



CROPS

GROUNDNUT, GINGELLY
COTTON
&
TOBACCO

Review of market conditions of commercial crops in the notified areas of Madras State for the month of May, 1960.

Cotton: In this section Cotton Kapas: Pothis of 280 lbs.
Cotton lint: Candy of 784 lbs.

Coimbatore District: Season: There was a good rainfall in all the important places of the district under report and the same were beneficial to the second crop Karunganni cotton. The harvest of first crop Cambodia cotton was over.

Arrivals and Transactions: Lint: The market opened with a stock of 8715 candys of Cambodia and 18 candys of Karunganni lint in Tiruppur market. The total arrivals into Tiruppur market were 12,807 candys of Cambodia and 187 candys of Karunganni which included 3910 candys of Cambodia and 161 candys of Karunganni lint locally ginned. Despatches from Tiruppur were 11,675 candys of Cambodia and 161 candys of Karunganni lint. At the end of the month the market closed with a stock of 9847 candys of Cambodia and 44 candys of Karunganni lint.

Kapas: The kapas market started with an opening balance of 31,736 pothis of Cambodia and 4985 pothis of Karunganni kapas. The total arrivals into Tiruppur market were 53,957 pothis of Cambodia and 8960 pothis of Karunganni kapas. The disposals during the month were 58,882 pothis of Cambodia and 5942 pothis of Karunganni kapas.

The market closed with a stock of 26,811 pothis of Cambodia and 8003 pothis of Karunganni kapas.

Prices: The price ranges of cotton lint and kapas during the month as compared to that of previous month were as hereunder:

Lint	May, 1960	April, 1960
Cambodia superior quality	Rs. 905 to 981	915 to 981
Cambodia average quality	.. 810 to 865	886

Kapas	May, 1960	April, 1960
Cambodia superior quality	Rs. 131 to 170	131 to 149
Cambodia average quality	.. 100 to 130	107 to 130
Karunganni superior quality	.. 125 to 138.37	125 to 134
Karunganni average quality	.. 110.50 to 122.50	104 to 122

Ramanathapuram District: Season: During the early part of month fairly good rains were received throughout the district under report and the same were beneficial to 2nd crop Karunganni and Uganda cotton.

Arrivals and Transactions: The arrivals and sales of cotton in three markets of Virudhunagar, Sattur and Rajapalayam during the month were as follows:

Kapas	Name of Markets	Opening Stock	Receipts	Disposals	Closing Stock
1. Virudhunagar	...	4000	9500	11000	2500
2. Sattur	...	...	7500	7500	...
3. Rajapalayam	...	...	5000	5000	...
	Total	4000	22000	23500	2500

Lint	Name of Markets	Opening Stock	Receipts	Disposals	Closing Stock
1. Virudhunagar	...	90	1100	1000	190
2. Sattur	...	...	750	650	100
3. Rajapalayam	...	1300	500	900	900
	Total	1390	2350	2550	1190

Prices: The prices of cotton kapas and lint during the month as compared to that of previous month were as hereunder:

Kapas.	May, 1960	April, 1960
Karunganni	Rs. 117 to 129	Rs. 122 to 132
Tinny Karunganni	.. 116 to 122	.. 115 to 125
Tinny	.. 108 to 109	.. 100 to 115
Inferior quality	.. 75 to 104	.. 100 to 106

Lint.

Karunganni best	... Rs. 1000 to 1051	Rs. 1001 to 1076
Karunganni	 950 to 1011	.. 975 to 1020
Tinny Karunganni Mix	 930 to 946	.. 921 to 966
Tinny	 881 to 925	.. 921 to 946
Certified Uganda	 1120 to 1150	.. N. T.
Uncertified Uganda	 1086	.. N. T.

Cotton Seeds. (Prices per standard maund)

Karunganni	... Rs. 11.74 to 13.06	Rs. 11.64 to 13.06
Tinny	 13.06 to 13.38	.. 13.06 to 14.03

Tirunelveli District: Season: There was light showers during the month in the district under report. Arrivals of Karunganni kapas to the market were fair. About 2200 pothis were reported to this market alone.

The Koilpatti market started with an opening balance of 210 candys of Karunganni cotton. The arrivals into market amounted to 850 candys and disposals amounted to 480 candys. The market closed with a balance of 580 candys.

The prices of kapas varied from Rs. 98 — 135 per pothi and lint were from Rs. 1000 — 1060 per candy according to quality.

South Arcot District: Season: There was a megre rainfall of about an inch received in some places in the district during the month.

Arrivals and Transactions: Arrivals and despatches were 115 and 93 pothis of kapas respectively. The trade was left with a stock of 91 pothis in the month.

The average price at Villupuram and Panrutti market were Rs. 108.60 and 106.00 per pothi respectively.

Groundnut: (In this section a candy of Groundnut kernel is 531 lbs.)

South Arcot District: During the month the arrivals to the markets were improved and amounted 5930 tons besides 390 tons from other districts. Despatches to other districts amounted 2288 tons while exports to other states came to 170 tons. The oil mill and country chekkus consumed respectively 2587 tons and 462 tons. Wastages were calculated at 336 tons. The stock with the trade at the end of the month stood at 1877 tons.

Prices declined slightly due to increased arrivals and the average prices in the several markets ranged from Rs. 175 - 191.47 per candy of 531 lbs according to quality.

Ramanathapuram District: During the month the arrivals, sales and stock of pods and kernels in the district were as follows:

<i>Quantity in tons</i>				
Name of crops	Opening Stock	Arrivals	Disposals	Closing Stock
Groundnut pods:				
Virudhunagar	...	800	700	100
Groundnut kernels:				
Virudhunagar	600	2500	2400	700

The following were the prices that prevailed for groundnut pods, kernels, oils and cake in the district during the month as compared to previous month:

<i>Prices in Rs./n.P.</i>			
		<i>May, 1960</i>	<i>April, 1960</i>
Groundnut pods			
(per Md. of 82 2 7 lbs.)	Rs.	22 to 23	...
Groundnut kernels			
(candies of 531 lbs.)	„	205 to 215	206 to 220
Groundnut oil (candies of 500 lbs.)	„	358 to 360	...
Groundnut oil cake			
(Md. of 82 2 7 lbs.)	„	12.37 to 14.04	12.03 to 14.41

Tiruchirapalli District: Season: During the month under report light to moderate showers were wide spread in the district and the same were not adequate for harvesting the summer groundnuts.

Arrivals and Transactions: The regulated market, Jayankondan received and disposed of 2300 bags of groundnut kernels during the month. Arrivals are expected to increase next month with the harvest of summer crop of groundnuts. Karur and Alangudi markets did not receive any arrivals.

The average prices for groundnut kernels ruled at about Rs. 200/- per candy of 531 lbs.

North Arcot District: Season: Moderate rains were received in almost all parts of the district during the month under report.

The arrivals, disposals, stocks etc. in the district during the month were as follows :

		Quantity in tons			
		Opening Stock	Arrivals	Disposals	Closing Stock
Groundnut pods	Rs.	457.142	160.713	257.442	260.713
Groundnut kernels	„	218.024	1023.595	1016.875	224.173

The following were the price ranges of groundnut pods, kernels and oils in various markets in the district during the month as compared to that of previous month.

		May, 1960		April, 1960	
Groundnut pods					
(per 80 lbs)	Rs.	21 to	23.50	Rs.	...
Groundnut kernels					
(candy of 531 lbs.)	„	192 to	205	„	...
Groundnut oil					
(candy of 500 lbs.)	„	375 to	400	„	...

Gingelly: (In this section Bag: 168 lbs.)

South Arcot District: Arrivals were mainly to Vridhachalam market and the total arrivals to four markets including Vridhachalam, amounted to 426 bags. Despatches to other districts came to 245 bags while consumption by country chekkus totalled 552 bags. The trade had a stock of 515 bags at the close of the month.

Prices improved and the average price worked out to Rs. 80.77 per bag of 168 lbs. at Vridhachalam market.

Tobacco: (A candy of 500 lbs).

Coimbatore District: At the end of the month under report, there was a stock of 10,275 candys of chewing and 220 candys of cheroot tobacco. About 2150 candys of chewing and 120 candys of cheroot tobacco were exported to the districts within the State of Madras and to places in Bombay, Andhra, Mysore and Kerla States.

Tobacco market remained firm with fairly good demand from the districts of the Madras State and from Kerala and Mysore States.

The prices that prevailed during the month as compared to previous month for different grades were as hereunder :

Prices in Rs. per candy of 500 lbs.				
Variety	I Grade	II Grade	III Grade	
1. Chewing tobacco				
(Sun cured):				
(a) Meenampalayam	480 — 550	350 — 445	250 — 340	
(b) Other varieties	425 — 490	315 — 400	215 — 300	

Prices in Rs. per candy of 500 lbs. (Contd.)

Variety	I Grade	II Grade	III Grade
2. <i>Cheroot varieties</i> (Sun cured): (grown in Erode and Bhavani taluks)	280—340	240—270	140—200
3. <i>Chewing tobacco</i> : Pit cured (grown in Palladam & Sullur areas)	200—275	175—195	80—160

Cardamom: Madurai District: During this month there was heavy rainfall in Cardamom plantations areas in Kerala State adjoining Madurai District as well as in Madurai District. The standing crop is reported to be fair.

Arrivals of Cardamom in the important assembling centres like Bodinaickanur, Thevaram etc. were very few and in some other markets there was no arrival.

Despatches: The following were the opening stock, arrivals and despatches of cardamom during the month:

Names of Markets	Opening Balance	Arrivals	Sales	Closing Balance
		(Quantity in lbs.)		
1. Bodinaickanoor	21,000	37,000	47,600	10,500
2. Thevaram	8,500	...	600	2,500
3. Pannaipuram	8,000	...	8,000	...
4. Kombai	7,500	...	3,500	4,000
5. Uthamapalayam	4,000	...	1,000	3,000
6. Cumbum	50,000	1,000	1,000	50,000
7. Gudalur	8,000	...	3,000	5,000
8. Pattiveeranpatti	4,000	24,500	27,500	1,000
9. Virudhunagar	45,000	26,000	21,000	50,000
Total	1,56,000	88,500	1,18,500	1,25,000

Prices: The price ranges of cardamom in different markets, during the month were as hereunder:

1. <i>Bodinaickanoor:</i>	Name of quality.	Price in Rs./nP. per lb.
(1) Extra Green		10.00—10.49
(2) Green		9.36— 9.73
(3) Medium		9.57— 9.62
(4) Inferior		8.06— 9.12
(5) Seeds		10.00—11.26
2. <i>Pattiveeranpatti:</i>		
(a) Sundried:		
Superior and bold		9.94—11.04
Medium and bulk		9.32— 9.86
Inferior and small		8.75— 9.46
(b) Store Green:		
Superior and bold		10.22—15.32
Medium and bulk		9.45—10.04
Inferior and small		9.00— 9.55
(c) Splits		8.20— 9.01
(d) Lights		5.02— 7.64
(e) Seeds		10.00—12.16
3. <i>Virudhunagar:</i>		
(1) Bold quality		10.50—10.95
(2) Smalls		9.50— 9.75
(3) Seeds		12.50

**Review of administrative activities of Market Committees
during May, 1960**

The Market Committees of South Arcot, North Arcot, Coimbatore, Ramanathapuram, Tirunelveli and Tiruchy continued to function briskly during the month under report.

Enforcement: The progress of enforcement during the month were as detailed below:

Name of Committees	Section 5 (1)		Section 5 (3)		Weighment	
	A	B	A	B	A	B
South Arcot Market Committee	114	1113	66	710	57	673
North Arcot Market Committee	176	1194	165	1132	54	550
Coimbatore Market Committee	157	1165	61	831	26	496
Ramanathapuram Market Committee	32	44	35	48	26	31
Tirunelveli Market Committee	12	13	15	16	10	10
Trichy Market Committee	173	949	132	756	125	662

A = Licences issued during May, 1960.

B = " " up to the end of this month.

Meetings: There was a meeting of the Ramanathapuram Market Committee was held on 28-5-1960 by the Sub-Collector, Sivakasi, Ex-Officio Chairman of this Committee. In all, five subjects were disposed of.

There were no meetings held in other Market Committees under report.

Quality Analysis: Nil.

Quality Competition: Nil.

Crop and Trade Reports — Madras State

First & Final forecast 1959-'60.

BLACKGRAM: The area sown with blackgram in the Madras State in the year 1959-'60 is estimated at 98,600 acres (or 39,900 hectares). Compared with the provisional area of 99,000 acres (or 40,100 hectares) according to the Season and Crop Report for the previous year, the current years estimate shows a decrease of 0.4 per cent. Compared with the average area of 101,200 acres (or 41,000 hectares) calculated for the five years ended 1958-'59 the present estimate shows a decrease of 2.6 per cent.

2. The crop is mainly grown in the districts of Thanjavur, Madurai and Tirunelveli. The area under the crop is nil or negligible in the Nilgiris district. A decrease in area as compared with the previous year is estimated in the districts of Chingleput, South Arcot, North Arcot and Thanjavur and an increase in area in all the other districts of the State except Kanyakumari district where the area estimated is the same as that for the previous year.

3. The crop has been harvested in some districts of the State. The yield per acre is expected to be slightly below the normal in all the districts of the State. The Seasonal Factor for the State as a whole works out to 98 per cent of the normal as against 97 per cent estimated for the previous year. On this basis the total yield works out to 10,500 tons (or 10,600 tonne) of cleaned gram as against the provisional yield of 10,400 tons (or 10,500 tonne) of cleaned gram as per the Season and Crop Report for the previous year representing an increase of 1.0 per cent. The present estimate is the same as the average yield calculated for the five years ended 1958-'59.

4. The average wholesale price of blackgram dhall per standard maund of 82 2/7 lb. (or per quintal of 100 kilograms) as reported from certain important market centres on 1st January 1960 was Rs. 20.35 (or Rs. 54.52 per quintal) at Coimbatore, Rs. 20.82 (or Rs. 55.78 per quintal) at Salem, Rs. 23.66 (or Rs. 63.39 per quintal) at Vellore and Rs. 25.78 (or Rs. 69.07 per quintal) at Tiruchirappalli. Compared with the prices which prevailed during the corresponding period of the previous year, the current year's prices reveal a fall of 7.2 per cent at Coimbatore and 14.6 per cent at Vellore and a rise of 3.7 per cent at Salem and 13.1 per cent at Tiruchirappalli.

5. Figures of area (in acres and hectare) and yield (in tons and Tonne) are given in the statement below:—

District	Area in hundred acres/hundred hectares i.e., '00 being omitted						Percentage by which column 2 exceeds (+) or is less than (—)	
	Of current year's crop		Of previous year's crop		Average of preceding five years		Col. 4	Col. 6
	Acres	Hects.	Acres	Hects.	Acres	Hects.		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Chingleput	35	14	43	17	34	14	— 18.6	+ 2.9
South Arcot	120	49	140	57	123	50	— 14.3	— 2.4
North Arcot	38	15	39	16	42	17	— 2.6	— 9.5
Salem	68	28	63	25	67	27	+ 7.9	+ 1.5
Coimbatore	47	19	46	19	46	18	+ 2.2	+ 2.2
Tiruchirappalli	94	38	91	37	95	38	+ 3.3	— 1.1
Thanjavur	142	57	143	58	165	67	— 0.7	— 13.9
Madurai	130	53	121	49	109	44	+ 7.4	+ 19.3
Ramanathapuram	90	36	84	34	108	44	+ 7.1	— 16.7
Tirunelveli	220	89	218	88	219	89	+ 0.9	+ 0.5
The Nilgiris	...	...	...	...	...	...	...	...
Kanyakumari	2	1	2	1	4	2	...	— 50.0
State	986	399	990	401	1,012	410	— 0.4	— 2.6

Yield in hundred tons/hundred tonne ^{tonne} i.e., '00 being omitted (cleaned gram)										Percentage by which column 10 exceeds (+) or is less than (-)	Condition factor
Of current year's crop		Of previous year's crop		Average of preceding five years							
Tons	Tonne	Tons	Tonne	Tons	Tonne	Col. 12	Col. 14				
(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)			
Chingleput	... 3	3	4	4	3	3	- 25.0	...	98		
South Arcot	... 11	11	12	12	11	11	- 8.3	...	98		
North Arcot	... 3	3	3	3	4	4	...	- 25.0	97		
Salem	... 7	7	6	6	7	7	+ 16.7	...	98		
Coimbatore	... 5	5	5	5	5	5	...	...	99		
Tiruchirappalli	... 10	10	10	10	10	10	...	...	99		
Thanjavur	... 10	10	10	10	11	11	...	- 9.1	99		
Madurai	... 14	14	12	12	11	11	+ 16.7	+ 27.3	97		
Ramanathapuram	... 11	11	10	10	13	13	+ 10.0	- 15.4	97		
Tirunelveli	... 31	32	32	33	30	31	- 3.1	+ 3.3	98		
The Nilgiris		...	...	...	...	...	...	...	...		
Kanyakumari	... *	†	*	†	*	†	...	...	98		
State	... 105	106	104	105	105	106	+ 1.0	...	98		

* Less than 50 tons.

† Less than 50 tonne



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	—	PARAMAR 50
MILDEW	—	HEXACHLOR-SOIL FUNGICIDE

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