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Editorial

Live stock has a special important status in the national life of India. The rural economy is largely dependent on the possession of cattle as it has been the main source of power for many agricultural operations and transport. Though milk production as an industry is not much developed it has been a cottage or household one. Along with its role in the economic field it has also attained a religious symbol, since the well maintained cattle meant bounty and prosperity to the owner. Thus it was and still is the '*Kamadhenu*'. But in course of time the old religious aspect gained the upper hand while the care and well being of the cattle receded, especially, with the advent of machinery. As a result of this neglect one commonly meets with ill-kept, low grade cattle everywhere.

It was the fashion of the day for sometime, to try to improve Indian cattle by hybridising them with the European breeds, more on the belief that all Indian stuff was inferior. This lead no where, the cross-breds proving no better. Subsequently scientific enquiry became focussed on native cattle. Indian breeds have been noted to possess certain very important characters especially suited to the trying tropical climates. Perhaps only the Indian and African breeds are the two which can thrive in these climates. Indian cattle have therefore, been imported into tropical Americas as breeding stock and have proved highly successful. Very recently a large number of cattle was imported into Belgian Congo from Pakistan, the breeds being Sahiwal, Red Sindhi, Montgomery, Murrah buffalows, goats and even asses. The special qualities possessed by our cattle are the ease with which they sweat, their hardiness and greater disease resistance. With greater study it has been found that there are breeds in India which are excellent dairy animals as also draught cattle. The two have always been bred apart and maintained as such.

With all this wealth and variety in cattle till recently there has been no comprehensive classification of breeds of cattle in India.

The work of the F. A. O. though detailed enough probably allows of more additions as there may be still other types of cattle spread over in the rural parts. Such a compendium is very necessary for cattle breeders in a large country like India, and the survey must continue. The Indian Council of Agricultural Research have approved of schemes to improve non-descript cattle in certain selected hilly tracts and heavy rainfall areas by utilization of *foreign breeds*. The climatic conditions of India being so varied it is not advisable to aim at a cosmopoliton breed. Those that thrive well in the dry plateaux are most ill-suited to the regions of heavy rainfall as the West Coast etc. Perhaps the North Indian breeds may not do so well under the more tropical climate of South India. Hence in the improvement of cattle one has to have a large basic material. Further it will be a stupenduous task to weed out useless ones and pick out those with potential genetical worth. Extensive literature, monographs etc., are available in regard to the European cattle. This has been possible because of the consciousness of the individual farmer, dairyman and also of the scientist. There has been encouragement and urge to record each one's experience and observation however trivial it may have been and that with considerable accuracy. These have helped the reviewer to assay them and arrive at valuable conclusions. What little genetical data we have on Indian cattle is mostly from investigators in other countries. There are however, some correlation studies with regard to milk production. Any scheme of cattle breeding unless it pays special importance to the genetics and correlation of phenotypical characters to economic aspects will be dubious. Cattle are highly heterozygous, though a certain amount of homozygesis has been achieved in certain characters with regard to well-established breeds like the Sahiwal, Sindhi, Montgomery, Ongole, Amritmahal, Kangayam etc. Yet there is a large genetic material dispersed over the whole of India yet to be studied and classified. With the aid of artificial insemination methods now available, cattle breeders can study the inheritance with greater ease and speed. Concurrently it is very necessary to establish well organised dairy industry and marketing of cattle with other attendent requirements to induce the farmer to invest on replacing bad material with high grade ones.

Control of the Weevil — *Alcidodes bubo* Fabr. — a pest of Agathi — *Sesbania grandiflora* — in South India

By

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Introduction: The weevil — *Alcidodes bubo* Fabr. — is a major pest of agathi — *Sesbania grandiflora* — a leguminous crop grown as a standard for betelvine. The latter is an important money crop cultivated extensively in the districts of Coimbatore, Bellary, Chingleput, South Arcot, Tiruchirapalle, Tanjore and Madura of the Madras State. As the betelvine is grown trained on upright standards for support, the provision of proper standards is an indispensible pre-requisite for the successful cultivation of the betel crop. In South India, the practice is to have live standards and the plants that are generally raised for this purpose are *Sesbania grandiflora*, *Erythrina indica* and *Moringa pterygosperma*. These are preferred on account of their quick growth, coupled with a straight and tall habit. Of these, the first-mentioned is the commonest, since it grows quicker than the other two and provides sufficient shade for the tender vines. It is sown thick in rows and inside long beds separated by trenches. The crop grows to a height of about four feet within a period of three to four months, when the planting of betelvine is taken up. The weevil makes its appearance even when the plants are about a month old. The set-back to the normal progress of the agathi crop is serious if the weevil occurs in large numbers before the plants are about five months old. This is the most vulnerable period when the crop requires special attention. The pest occurs throughout the year and forms a serious handicap to betelvine growers. Apart from serving as a standard, agathi is also used as fodder, green manure and to a certain extent as a vegetable as well.

The Weevil, its Life-history and Habits: The adult weevil is a reddish-brown beetle, measuring about 8 mm. in length with longitudinal white markings on the elytra, and has a prominent snout characterestic of weevils. In a badly infested field, a large number of these beetles can be seen resting on the tender shoots of the plants, often in pairs. Pale yellowish eggs are laid singly in holes, previously excavated by the parent, in tender parts and several such eggs may be laid inside the same plant. Small yellowish-white grubs hatch out in five to six days and begin to feed on the contents of the stem. The larval period lasts for about four to five weeks, after which pupation takes place inside the stem itself, the

adults emerging in about a week. The beetles are capable of flying over long distances and hence the pest easily spreads to the adjoining gardens. Apart from agathi, the weevil attacks clusterbeans *(Cyamopsis psoralioides)*, Indigo *(Indigofera arrecta)* and Daincha *(Sesbania aculeata)*, causing appreciable damage.

Nature and Extent of Damage: The insect causes damage both in its adult as well as in its larval stage, the grubs often doing more havoc than the imago. The adults, besides biting holes through the leaves, make numerous punctures on the main stem thereby weakening the plant considerably. The grubs bore into the stem and form irregular galleries inside, eventually causing gall-like swellings. The infested plants present a sickly appearance with innumerable holes on the stem and are stunted in growth. On splitting open such plants all the stages of the beetle can be seen inside. The damage is very severe when the crop is young and sometimes even lead to the death of the seedlings. Repeated attacks by the weevil seriously interfere with the quick growth of agathi and consequently a badly attacked crop fails to serve the purpose for which it is grown.

Natural Enemies: Two parasites—*Metastenomyia juliani*, Gir. and *Eurytoma pigra* Gir have been noted on the grubs of this weevil but the natural check obtained through them does not appear to be of sufficient magnitude to effect a satisfactory control of the pest.

Control Measures: A reference to the literature on the control of weevil indicates that Lefroy (3) mentioned this weevil—*Alcidodes bubo*—to be a serious pest of agathi in South India but did not suggest any control measure. Fletcher (2) has recorded that it is a pest of considerable importance in betelvine growing areas and has mentioned that clipping of the attacked shoots is the only practicable measure of control. Ramakrishna Ayyar (5, 6) has also recommended the clipping treatment and application of Calcium or Lead arsenate if the crop is quite young. Apart from these scanty references there are no publications concerning the control measures tried against this particular species. In foreign countries, however, some work has been done with the recent synthetic insecticides like DDT, BHC, Toxaphene, Parathion, etc., on various species of weevils like the cotton boll weevil *(Anthonomous grandis* Boh.), the apple blossom weevil *(Anthonomons pomoroum* L*)*, the plum curculio *(Conotrachelas nenuphar* Hbst.) and the sweet potato weevil *(Cylas formicarius*, Fb.*)*. The results have been encouraging and warrant the trial of these chemicals on the agathi weevil also. Since the earlier methods of control such as clipping of the attacked shoots, application of arsenical poisons, collection of adult weevils, etc., were not quite popular among the betelvine growers, some of the new insecticides consisting of Chlorinated hydrocarbons, Organophosphates, etc., were tested against

this pest in a few villages round about Coimbatore. The details of the experiments and the results obtained are furnished below.

The investigations were first initiated in October 1949 at Perur and Ramanathapuram (villages round about Coimbatore) from where frequent reports of the attack of this pest were being received. Three sets of trials were conducted with DDT (Dichloro-diphenyl-trichlorethane) and two proprietory preparations of BHC (Benzene hexachloride)–Gammexane and Hexyclan–which were the only insecticides available then The variants conststed of 5% dusts and sprays at 0·1 and 0·05% strength of the above chemicals. The first trial was taken up at Perur on an exploratory basis taking ten cents area under each treatment. All the formulations were found effective against the adult beetles. The concerned ryot was convinced about the efficacy of this treatment. The news rapidly spread to the other betelvine-growing areas round about Coimbatore with the result that a number of interested ryots sought the help of the Entomology Section for the control of this pest. Taking advantage of this opportunity the trials were repeated at Perur and Ramanathpuram with the same chemicals, but over a large area with suitable replications for confirming the earlier findings. The potentialities of the different chemicals were assessed by recording the adult population before and 24 and 48 hours after the treatments on a definite number of plants selected at random and working out the percentage of reduction in population. The details are furnished in statements I, II appended. All the formulations of BHC and DDT, both as dusts and sprays, were effective against the adults, causing their death in the course of 24 to 48 hours. But none of the treatments had any effect on the grubs located inside the stems. Thus the necessity for a chemical which would permeate into the plant tissues and kill the grubs was keenly felt. This objective was kept in mind in the further trials against this pest.

The investigations were resumed during 1952 at Podanur with the addition of a few other insecticides, like Pestox 3H and Parathion which are claimed to be absorbed by the plants and translocated through the medium of the cell sap, rendering it toxic to insects. A few other chemicals like Intox–8 (70% Chlordane), 'Product 1250' and Toxaphene were also tried. The area under each treatment was about five cents. Populalion data were gathered as usual before and after the treatments and the details are furnished in statement III. To note the action of the chemicals on the grubs, five plants at random were cut open under each treatment and examined at intervals of 48 hours, one week and a fortnight after the treatment. All the chemicals showed lethal action against the adults, varying from 56 to 100%, but none proved effective against the grubs. Trials with still higher concentrations of insecticides having a systemic action like Pestox 3H and Parathion were given up due to the extreme poisonous nature of these chemicals and the adverse effects on the plants.

No phytocidal effects were noted under DDT and BHC treatments. A certain amount of leaf-shedding was observed in the case of plants treated with Pestox 3H at 0·3% concentration. As regards tainting of the produce, a slight off-flavour was perceptible in the lots treated with BHC. Since the agathi leaves are plucked either for culinary or fodder purposes only from the grown-up plants, the question of tainting needs no serious consideration when young crop is to be treated.

Discussion: It is evident from the above investigations that none of the chemicals was effective against the grubs and hence the possibilities of controlling the pest lie only in the systematic annihilation of the adults even from the early stages of the crop. Among the various insecticides tried DDT, all the proprietory preparations of BHC, 'Product 1250' and Parathion (Ekatox 20) alone were effective against the adults, the percentage of reduction in population being uniformly more than 80 in the course of 48 hours. Parathion, being highly poisonous and dangerous cannot be recommended for adoption by laymen. 'Product 1250' is still in the experimental stage and hence the choice is only between BHC and DDT. The cost of application of these two chemicals worked out per acre as follows:

Name of the chemical	Quantity required per acre	Cost of the chemical per lb.	Cost of treatment per acre
		Rs.	Rs.
DDT 5% dust ..	20 lb.	1	20
DDT spray 0·05% ..	1 ,,	3	3
BHC 5% dust ..	30 ,,	-/4/-	7/8
BHC spray 0·05% ..	10 ,,	1/8/-	15

The above figures reveal the lower cost of treatment with DDT spray 0·05% and BHC dust 5%. As the damage is spread over a period of 3 to 4 months when the crop is young, two to three rounds of applications of these chemicals at intervals of about three weeks may be necessary to ward off the pest and help the crop to keep up its normal growth. Among these two treatments, BHC dust may be preferred as it controls the other common pests of agathi also namely—aphids and the pentatomid bug *(Coptosoma cribreria* Fabr.*)* The cost of two to three rounds of application of this insecticide works out to Rs. 15/ to Rs. 22/- per acre which is not at all high when the outturn of a paying crop like the betelvine is taken into consideration.

Summary: 1. The weevil—*Alcidodes bubo* Fabr.—is a serious pest of agathi which is used as a standard in betelvine cultivation.

2. The weevil causes serious damage to the young crop both in its adult and in its larval stage. The period of the life-cycle from egg to adult occupies about six to seven weeks.

3. More recent insecticides, viz., DDT, BHC, Product 1250, Parathion, Toxaphene, Intox-8 and the systemic poison — Pestox 3H were tested against this pest in a few villages round about Coimbatore. The first-mentioned four chemicals were effective only against the grubs.

4. The cost of treatment with DDT 0·05% spray and BHC dust 5% worked out to be cheaper than with other formulations.

5. BHC 5% dust is recommended since it also controls the other two serious pests of agathi viz., aphids and the pentatomid bug (*Coptosoma cribraria*, F). Two to three applications of this dust costing about Rs. 15/- to Rs. 22/- per acre may be necessary to save the crop from the ravages of the weevil.

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TABLE I

Results of control trials at Perur—1949.

Size of each plot: About 10 cents.
Replications: Nil.

Treatment	Adult population on 20 plants at random			Percentage of reduction in population in 48 hours
	Initial	After 24 hrs.	After 48 hrs.	
DDT 5% dust ..	39	2	1	97
DDT 0·1% spray ..	39	16	3	92
DDT 0·05% ,, ..	51	27	5	90
BHC (Gammexane) 5% dust ..	38	9	4	89
BHC do. 0·1% spray ..	49	—	1	98
BHC do. 0·05% spray ..	51	8	4	91
BHC (Hexyclan) 5% dust ..	28	7	2	93
BHC do. 0·1% spray ..	46	—	—	100
BHC do. 0 05% ,, ..	42	11	7	83
Control ..	51	40	45	12

TABLE II

Results of control trials at Perur and Ramanathapuram—1949

Size of each plot: About 5 cents.
Replications: Four.

Treatment	Experiments at Perur				Experiments at Ramanathapuram			
	Adult population on 20 plants expressed as average of four replications				Adult population on 20 plants expressed as average of four replications			
	Initial	After 24 hrs.	After 48 hrs.	% of reduction 48 hrs.	Initial	After 24 hrs.	After 48 hrs.	% of reduction 48 hrs.
DDT 5% dust ..	63	5	—	100	78	9	5	94
DDT 0·9% spray ..	50	5	—	100	68	15	2	97
DDT 0·05% ,, ..	47	5	—	100	68	15	2	97
BHC (Gammexane) 5% dust ..	54	4	—	100	93	11	9	90
BHC (Gammexane) 1% spray ..	49	—	—	100	99	4	3	97
BHC (Gammexane) 0·05% spray ..	58	1	—	100	89	12	8	91
BHC Hexyclan 5% dust ..	66	—	—	100	78	10	3	96
BHC Hexyclan 0·1% spray ..	56	—	—	100	109	6	1	99
BHC Hexyclan 0·05% spray ..	45	1	—	100	82	9	2	97
Control ..	49	33	39	23	70	78	55	21

TABLE III

Results of control trials at Podanur—1952

Size of each plot: 5 cents.

Replications: Four.

Treatment	Adult population on 40 plants at random		Percentage of reduction in population in 48 hours
	Initial	After 48 hours	
BHC (Hexamar) 0·1% spray ..	108	—	100
BHC (Gammexane) do. ..	136	5	96
Product 1250 0·1% spray ..	84	1	98
Parathion (Ekatox-20) 0 03% spray ..	106	17	84
Intox-8 (70% Chlordane) 0·1% spray ..	106	24	77
Toxaphone 10% dust ..	139	31	79
Pestox 3H—0·075% spray ..	163	72	56
Pestox 3H—0·3% spray ..	103	42	59
Control ..	83	83	6

Note: The reduction in population after treatment in the case of controls is more due to the repellent smell of chemicals like BHC.

Sentry : Halt! Who goes there?
Voice : Indian Citizen.
Sentry : Advance and recite the 'Jann Gana Mana'.
Voice : I don't know it.
Sentry : Pass, Indian Citizen.

N. R. T.

* * *

Before marriage a man yearns for a woman.
After marriage the Y becomes silent.

N. R. T.

Proper Time of Sowing Irrigated Millets in the Koilpatti tract — a preliminary study

By

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Introduction: Proper sowing time has a great bearing on the yield obtained in all the cultivated crops. Even a high yielding strain of a crop suiting the tract has failed to produce any yield when sown during very unfavourable seasons. The optimum time of sowing for the crops is known by various local names and in Tamil it is called "Pattam". This knowledge has been handed over from generation to generation for centuries past.

The introduction of new money crops and the anxiety to grow a grain crop out-of-season, has resulted in crop failures throughout the Madras State. Crops sown out-of-season have been found to be attacked by insect pests and diseases, stunted in growth and yield reduced. Some crops are shy to bear flowers and in extreme cases they may not flower at all. Constant enquiries were received from cultivators whether a particular crop can be grown at a particular month of which they had no previous experience. Since no systematic time of sowing trials, had been conducted so far, this preliminary study was undertaken on the important irrigated millet crops of the tract.

Materials and Methods: Five important crops viz., Vellai cholam, *(Sorghum subglabrascens)*, Periamanjal irungu *(Sorghum dochna)*, main season Cumbu *(Pennisetum typhoides* S. & H.*)*, *Kullan Cumbu* and main season ragi *(Eleusine coracana)* were experimented upon. In Vellai cholam, the local strain K. 2 was used. Selection A. S. 7081 of Coimbatore was tested as the Periamanjal Irungu crop. Local Cumbu strain K. 1 was used for main season Cumbu. Since there is no strain for the *Kullan Cumbu* local bulk was used. In ragi, the local ragi K. 1 and economic selection ragi K. R. 4 which is under trial on the cultivators' field were used. The experiment was laid out as a non-replicated trial, each plot occupying a net area of 0·30 cents and was manured with groundnut cake at 30 lb. N. level just prior to sowing. The crop was sown on the 15th of every month commencing from June 1951 and was continued for one complete year. The crops were harvested as they matured. The dry weight of grain and the green weight of straw were recorded. The height and duration were recorded in units of five. Since this study was only a preliminary one the other aspects have been omitted.

Observation: (a) *Cholam:* The yield data and other details are presented for Vellai cholam in table I and Periamanjal Irungu in table II.

TABLE I

Month		Calculated acre yield in lb.		Average height in cms.	Duration in days	Remarks
		Grain	Straw			
June	1951 ..	240	13,600	130	85	Calocoris attack.
July	,, ..	1,380	17,600	175	90	
August	,, ..	760	21,700	160	85	Rains at harvest reduced the yield of grain.
September	,, ..	1,420	20,000	200	85	
October	,, ..	380	11,400	195	85	
November	,, ..	210	9,400	130	85	
December	,, ..	80	5,800	110	105	
January	1952 ..	150	7,600	120	100	
February	,, ..	370	9,300	135	90	
March	,, ..	220	5,900	130	85	Heavy attack by mite.
April	,, ..	3,560	22,100	195	90	Vigorous and uniform crop.
May	,, ..	30	14,800	140	95	Heavy attack by mite.

From the above table the correct time of sowing of Vellai cholam is April 15th, which coincides with the 'Pattam' for the tract. The other months during which the crop can be grown with a fair amount of success are during the months of July, August and September. The 'Thai pattam' (January sowings) which is in practice in the neighbouring taluk of Sankarankoil is a failure under Koilpatti conditions.

TABLE II

Month		Calculated acre yield in lb.		Average height in cms.	Duration in days	Remarks
		Grain	Straw			
June	1951 ..	2,650	26,500	290	135	Good setting of grain.
July	,, ..	2,520	32,100	295	120	
August	,, ..	2,650	30,600	265	105	
September	,, ..	2,520	32,700	315	95	
October	,, ..	860	16,900	290	95	
November	,, ..	930	13,800	180	90	
December	,, ..	800	8,300	170	110	
January	1952 ..	470	14,500	190	100	
February	,, ..	670	19,300	245	110	
March	,, ..	350	27,200	230	130	
April	,, ..	370	44,500	215	150	
May	,, ..	410	17,400	170	140	Mite attack.

The above figures show that Periamanjal Irungu can be grown successfully from June to september. The crop records poor yields when sown during the other months. This is a new introduction (Ponnaiya and Anavaradham 1951) and hence this study has been very useful in the

case of this crop, to know the optimum time of sowing. The duration of the crop varied from 90 to 150 days. This indicates that the crop is "season-bound" and not "period-bound".

(b) *Cumbu:* The yield data of main season Cumbu is presented in table III and for Kullan Cumbu in table IV.

TABLE III

Month		Calculated acre yield in lb.		Average height in cms.	Duration in days	Remarks
		Grain	Straw			
June	1951 ..	930	35,900	225	100	
July	,, ..	1,230	36,900	235	80	Healthy and vigorous.
August	,, ..	520	28,300	195	85	
September	,, ..	720	23,000	220	75	
October	,, ..	270	10,400	230	80	
November	,, ..	240	10,100	160	85	The poor yield is due to poor setting of grain.
December	,, ..	10	10,900	140	90	
January	1952 ..	210	13,600	150	85	
February	,, ..	370	16,900	170	95	
March	,, ..	320	33,890	195	85	
April	,, ..	910	50,100	220	90	
May	,, ..	260	32,700	165	95	Poor setting.

The 'Pattam' for main season extends from June to September. But the crop recorded good yield when sown only during the month of June and July. The yields were poor when sown from October to March.

TABLE IV

Month		Calculated acre yield in lb.		Average height in cms.	Duration in days	Remarks
		Grain	Straw			
July*	1951 ..	2,100	23,400	150	70	Vigorous and uniform.
August	,, ..	260	12,300	135	70	Green-ear disease.
September	,, ..	310	8,300	100	65	
October	,, ..	—	—	—	—	
November	,, ..	150	7,200	95	75	
December	,, ..	50	4,000	85	80	
January	1952 ..	20	2,400	90	95	
February	,, ..	130	7,200	95	80	
March	,, ..	90	8,800	120	75	
April	,, ..	1,680	25,500	150	70	Uniform crop.
May	,, ..	960	17,600	130	70	
June	,, ..	970	10,600	120	70	

*Trial with this crops was commenced one month later by July 1951.

The above table shows that Kullan Cumbu can be successfully grown from April to July. Although it is a common belief that this crop can be grown throughout the year it was found that the crop gives good yield when sown only during the months mentioned above.

(c) *Main season Ragi:* The behaviours of the two Ragi types are presented in Tables V and VI.

TABLE V. *Ragi K. 1*

Month		Calculated acre yield in lb.		Average height in cms.	Duration in days	Remarks
		Grain	Straw			
June	1951 ..	2,160	34,600	100	160	
July	,, ..	2,309	30,100	100	140	
August	,, ..	1,700	27,700	130	125	
September	,, ..	360	15,900	100	125	
October	,, ..	130	7,600	55	110	
November	,, ..	—	—	—	—	The crop did not flower at all and the duration could not be exactly calculated. Throughout these months the crop had an attack of mosaic
December	,, ..	—	—	—	—	
January	1952 ..	—	—	—	—	
February	,, ..	—	—	—	—	
March	,, ..	—	—	—	—	
April	,, ..	—	—	—	—	
May	,, ..	—	—	—	—	

TABLE VI. *Ragi K. R. 4*

Month		Calculated acre yield in lb.		Average height in cms.	Duration	Remarks
		Grain	Straw			
June	1951 ..	1,450	31,400	100	160	
July	,, ..	2,680	28,200	105	150	
August	,, ..	2,500	27,600	130	130	
September	,, ..	950	19,000	120	115	
October	,, ..	640	11,700	80	110	
November	,, ..	130	2,500	55	120	
December	,, ..	—	—	—	—	Duration and height could not be calculated as the crop did not flower. Throughout the period the crop had mosaic attack.
January	1952 ..	—	—	—	—	
February	,, ..	—	—	—	—	
March	,, ..	—	—	—	—	
April	,, ..	—	—	—	—	
May	,, ..	—	—	—	—	

In the case of this crop the nursery was sown on the scheduled date and the crop was transplanted exactly twenty five days after the date of sowing. It will be seen that the best time sowing the nursery for both the cultures is July 15th. But the two though similar in duration differ in their response to the time of sowings. Ragi K. 1 has given good yield during June sowings where as the yield of K. R. 4 for the month has been only fair. For the August sowings, K. R. 4 has given a good yield while K. 1 has given only a fair yield. Ragi crop did not flower at all when sown between December to May and was a total failure.

Discussion: Three aspects have been studied for all the crops. The first is the grain weight and straw weight. As grain is the important factor the dry weight of grain has been taken into account. As it is only a preliminary trial only green weight of straw was recorded. The acre yield of grain has been normal. But the yield of straw has been high. This is due to the fact that the crop has been manured at 30 lb. N. level which is not followed by the cultivator. The second aspect is the height

of plants. From the study it is seen that the height bears a relationship to the yield of straw but its correlation with the yield of grain is not much. Regarding duration none of the crops studied, had uniform duration throughout the year. The variation was the least in *cumbu* and highest in the *Peria-manjal irungu*. The ragi crop failed to produce flower when sown in certain months.

Since grain yield is the most important factor the sowing time has been discussed in relation to it. Generally it is seen that the months of June and July seem to be the best sowing-time for the irrigated millets, except *Vellai cholam*, for which April sowing has recorded a very heavy yield. From November to March none of the millets studied have given good yield. For these months, other crops like sweet-potato, *Pani-varagu* etc., which are in 'Pattam' during these months are to be sown.

The preliminary study has thrown light on the following aspects. The cultivators' 'Pattam' coincides with the optimum time of sowing indicated by this trial. But the duration of the 'Pattam' has been clarified. It has also been brought-out that some crops can be sown during months falling outside the 'Pattam' recording fair yields.

Summary: A preliminary time of sowing experiment with millets was conducted. For *Vellai cholam* the optimum time of sowing is the month of April. It can also be grown fairly successfully during the months of July, August and September. *Periamanjal irungu* can be sown from Juue to September. It is a partial failure when sown during the other months. The main season *Cumbu* can be grown successfully during the months of June and July. Although *Kullan Cumbu* is reported to be grown throughout the year the optimum time of sowing is found to be from April to July. For *Ragi* the optimum time of sowing is during the months of June to August. The crop does not produce any yield when sown from January to May.

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Cashewnut—its Production, Processing and Marketing

By

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Introduction: *Anacardium occidentale* — native of South America — was introduced into India by the early Portugese settlers. It is now found growing also in other countries like Indonesia, Malay States, Ceylon, Madagascar, and Portugese East Africa. The Cashew kernel and shell oil industry remains, however, a virtual monopoly of India which handles more than 90% of the world trade in these commodities, the only other competitor for India in cashewnut production and trade being Portugese East Africa. Though the production there is about equal to that in India, the shelling industry has not developed so far, due to the dearth of cheap skilled labour required for this industry. The whole production amounting to fifty to sixty thousand tons of raw nuts is therefore exported at present to the West Coast ports of India like Mangalore, Cochin and Quilon for processing. As the present Indian production is sufficient to keep her factories going only for four to five months of the year, they are now depending on the imports from East Africa for a major portion of their requirements of raw nuts. As efforts are being made to set up shelling factories in East Africa itself, the exports from that country to India is bound to stop in course of time, leaving the Indian factories to depend entirely on the home production. There is therefore, an urgent need for at least doubling the production if this country is to retain her present dominant position in the world market or to prevent a partial breakdown of her factories which provide employment for several thousands of poor labourers including a large proportion of women.

Cashew crop in India receives very little attention from the owners at present, manuring and intercultivation of this crop being practically unknown. There is therefore, good scope for increasing the production from existing plantations, by adopting improved cultural methods to which this crop responds well, as seen from the results of preliminary trials conducted so far. There is also a vast scope for extension of the area under this crop, especially on the extensive waste lands and sub-mountane regions of the West Coast. Planting of selected seed-nuts and giving proper spacing between trees would also tend to increase the yield from this crop to a considerable extent.

Though cashewnut was not, for a long time, considered to be a crop worthy of cultivation, and was even looked upon with a certain amount of prejudice, it has in recent years come to occupy an important position in the foreign trade in India, especially in earning the much needed dollar exchange. Its comparative importance in this field with the other important products of the West Coast namely tea

and pepper, can be seen from the following statement of dollars earned by these commodities during the past four years.

	Dollars earned by			
year	Casbewnut	Tea	Pepper	Total
1948	12,644,329	14,804,712	7,741.861	35,190,902
1949	13,661,138	17,043,460	16,295,079	46,969,677
1950	15,520,460	19,845,199	36,837,840	72,203,499
1951	19,192,471	15,692,126	95,007,260	129,891,851

Exchanges earned in other foreign currencies are in addition to the above. They are also considerable in the case of cashewnut as it is exported to several soft currency areas as well. It will also be readily admitted that cashewnut cultivation does not receive a fraction of the attention or expenditure bestowed on the other plantation crops like tea, pepper or rubber.

Cultivation: As already mentioned this crop thrives well in almost any kind of soil and at elevations ranging from sea level to 3,000 feet, provided there is fair drainage and a rainfall of atleast 50 inches per annum.

Planting of cashew is usually done with the first rains in April–May on the West Coast. Seednuts, selected from heavy and regular bearing trees are dibbled in pits, one foot cube dug ten feet apart, at 2 nuts for each pit. Germination is usually complete in about 15 days and a combined operation of thinning and filling up of gap is done 25 to 30 days after planting leaving one healthy seedling in each pit. In some parts, the germinating seedlings are damaged by crows and field rats who cut the tender seedlings and eat away the fleshy cotyledons. In such places raising of nurseries under protected conditions and transplanting when the seedlings are one month old are advocated.

Further field operations after the planting are very few, the most important ones being prevention of cattle trespass for the first two or three years, and a gradual thinning out of the growing trees to be completed in about five years so as to leave only about 100 trees to an acre. Stray trees begin to flower in the third year after planting and the plantation begins to yield small returns from the fifth year onwards. Full bearing is reached, however, only in about ten years unless the soil and rainfall conditions are exceptionally favourable. An average plantation can be expected to yield one third to half ton of raw nuts per acre per year after the tenth year.

The life of the garden depends mainly on the drainage and depth of the soil. Where the soil is deep and well drained, the trees continue to grow and yield up to 60 or 70 years, growing almost to the size of

banian trees, while in the rocky and sandy areas, the growth is rather stunted and the trees are easily uprooted by the high winds. The normal life of trees in such plantations can be expected to range only from 30 to 40 years.

It will thus be seen from the above account that cashewnut plantations can be raised with comparatively less care and attention than the other plantation crops like tea, pepper, coffee or rubber; but the cashew at the same time compares well with these crops in the matter of returns in terms of money.

Production and Imports: The present size of the Indian cashew nut crop is estimated to be round about 50,000 tons of nuts in shell per year distributed among the different regions as indicated below:—

West Coast Area:		**Northern Circars:**	
Travancore Cochin	12,000 tons	Nellore, East Godavari, Guntur and Visakhapattinam districts	5,000 tons
Malabar	12,000 ,,		
South Kanara	8,000 ,,		
Ratnagiri (Bombay State)	8,000 ,,		
Coromandel Coast:			
Tiruchirappalli, Tanjore and South Arcot districts	5,000 tons	Total	50 000 tons

In addition to the above Indian production, about 50–60 thousand tons of raw nuts in shell are annually imported from East Africa for processing in the factories at Mangalore and Quilon. The Indian production and imports for the past five years as estimated by reliable trade interest are furnished below:

Estimates of Nuts in Shell in Tons

Year	Indian Crop	Imports	Total
1948	45,000	38,500	83,500
1249	38,000	47,500	85,500
1950	60,000	65,000	125,000
1951	56,000	52,000	108,600
1952	54,500	52,000	106,500
Average per year	50,820	51,000	101,820

Raw nuts yield 20 to 22 % by weight of kernels and 12½ by weight of shell oil which is a very valuable by-product of the cashew shelling industry.

Processing of Cashew Kernels: This operation mainly consists of (i) roasting (ii) shelling, (iii) extraction of oil, (iv) peeling (v) grading and (vi) packing.

Roasting of rawnuts is an operation aiming to facilitate easy shelling. It is done by one or the other of the following methods. In the smaller factories it is done in an open pan mounted over an oven and is called the 'Open pan method.' This method involves huge waste of shell oil. In the bigger factories roasting is done either (i) in a rotating cylinder heated by a jet fire with arrangements to collect oil as it emerges from the nuts in the course of heating or (ii) by the 'Oil immersion' method, where the nuts are put into a bath of cashew shell oil kept at 180–200°C. for 2 to 5 minutes. In the latter process, the oil which comes out of the nuts due to heating mixes with the oil in the bath and over-flows the bath, when it is collected.

The latest approved method is to extract the kernel from the raw nut itself. In this method there is no heating of the nuts in shell or of the oil and hence better quality of kernel and oil are obtained and the vitamins in the kernel remain intact. The nuts are split open by women in most factories with the aid of a pedal operated machine, their hands being protected from corrosive action of the shell oil by a liberal application of either castor or linseed oil.

Peeling: The kernels with the parchment covering on, are carefully separated from the split shells with the aid of small bamboo sticks. They are then dried in a hot chamber at 48·9°C. for 6 hours. On removing from the hot chamber and cooling, the parchment covering becomes loose, hard and brittle facilitating easy peeling. In the latest factories peeling is done purely by hand using only the finger nails for breaking the peels with a view to preserve the natural glossiness of the kernels.

Grading: After the peeling the highly discoloured, immature and shrivelled kernels are discarded and sold as pig or poultry food at 4–5 annas per pound. From the rest, the entire kernels which have not become split are separated as 'wholes.' These 'wholes' which are free from stains are next separated and graded into six grades having 210, 240, 280, 320, 400 and 450 whole kernels per pound. The stained wholes are classed separately as "scorched wholes". The broken and split kernels are then separated and classified as standard and scorched pieces, splits, butts, small pieces and desserts and each grade is separately packed with the respective grade designation. The present price of whole kernels range from Rs. 3—8—0 down to 2—12—0 per pound according to the grade. The cost of broken ones range from Rs. 2—4—0 down to 1—8—0. On an average 9,700 pounds of raw nuts yield one ton of kernels made up of 70% 'wholes' 20% pieces 8% inferior grades and 2% rejects.

Packing: Packing for the foreign markets is done in tins by the "Vita pack" method where the air in the tins are completely sucked out and recharged with carbondioxide gas before they are sealed air tight.

The tins used are of standard size each holding 25 lb. nett and are properly labelled showing the grade name, weight of the contents, and the name of the factory. The tins are then packed in mango wood cases each case holding two tins. These are then secured with iron bands and are also properly labelled. They are then ready for export.

Cashew Shell Oil: Cashew shell oil is a by-product of great value. It exudes from the shell in the process of roasting and is separately collected as explained above. Where there is no roasting done as a preliminary to the shelling the oil in the shell is pressed out by the use of hydraulic expellers. This oil, as mentioned already, is superior to the one obtained through the roasting of the nuts. After it is roughly filtered the oil is packed in 40–60 gallon steel barrels for export. It is made up of 90% anacardic acid ($C_{22}H_{32}O_3$) and 10% cardol ($C_{32}H_{52}O_4$) with traces of other materials. It has a specific gravity ranging from 0·95 to 0·97. It is highly corrosive to human skin, being phenolic. The main uses to which the oil is put at present are: (i) Preparation of wood preservatives (ii) drying enamels (iii) water-proof coating for cement and brick flooring (iv) oil soluble dyes for use in tinting hair-oils, linoleum cloth, etc. (v) manufacture of printing inks, paints and varnishes (vi) manufacture of bakelites and plastics.

Marketing: The United States of America and England purchase more than 80% of the cashew kernels exported from India and the rest is shared by other countries like Canada, Australia and several European continental countries. The shell oil is mostly exported to United States, England, Germany and Japan. The statement below shows the export in tons of cashew kernels and shell oil, from the port of Cochin which handles the major portion of the export trade, for the past 5 years.

	1947–48	1948—49	1949—50	1950—51	1951—52	Average
Cashew kernels	20,030	19,801	20,153	28,398	26,657	23,008
Cashew Shell Oil	1,600	1,661	2,338	4,266	5,568	3,097

Quilon, Mangalore and Kozhikode are the other exporting ports though of lesser importance.

The American purchases reached their peak level in 1951 as compared with the previous years. The actual increase in the volume and value of the American offtake from 1950 to 51 can be seen from the following comparative statement for exports to America for the first 8 months of the two years:

Period	Exports in tons.	Value in rupees.
April to December 1950 (9 months)	12,781	3,81,61,657
do. 1951	17,781	7,25,16,447

Though the potential capacity for production of shell oil of the Indian Cashew shelling industry, which handles over 100,000 tons of raw nuts per year is about 12,500 tons, the maximum annual production so far has not exceeded 6,000 tons, the rest being wasted by the inefficiency and poor equipment of the small factories. This difference between the potential and actual production only reveals a great wastage of the potential wealth of the country, especially in view of the present high ruling rates ranging from 300 to 310 dollars per ton of oil. The price of this oil was the highest in 1951 when it went up to 350 dollars per ton.

The fluctuations in the local prices of raw nuts at Mangalore during the past 4 years are furnished below:

Prices of raw cashewnuts at Mangalore per Imperial Maund of 82 $\frac{2}{7}$ lbs. (in whole rupees).

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1949	14	16	13	13	13	11	11	15	13	13	16	16
1950	29	17	14	16	16	17	16	23	23	22	20	20
1951	23	23	22	23	28	28	25	25	29	29	29	29
1952	29	29	29	35	29	29	34	34	34	34	—	—

Other useful products from Cashewnut Tree: The Cashew apple, the production of which can be safely estimated at double the weight of raw nuts is at present practically wasted. The juice of cashew apple containing plenty of sugar and valuable vitamins can be used in the production of beverages, the manufacture of which is impeded by the presence of tannin and other unpalatable ingredients. Though the Biochemist at the Fruit Research Station, Kodur, has succeeded in preparing a fairly delectable beverage, eliminating the unpalatability caused by the objectionable ingredients to some extent, much more work remains yet to be done to make such preparation a commercial success. There is also scope for the preparation of power alcohol from cashew apple juice. This aspect deserves full investigation in a country like India where petrol is very much in short supply.

Cashew leaves make fairly good green manure for paddy and also make good compost for application to other crops. The stem is very useful for fuel and is therefore, always in good demand. The cashew shell left over after the extraction of the oil also yields a cheap fuel for the poor people in the neighbourhood of the factories. There is thus no part of the tree which is not of economic importance to man.

Suggestions for Improvement: The following are some of the ways in which the Government can help the expansion of the cashewnut industry.

(1) Preferential assignment of waste lands to intending planters.
(2) Encouraging large scale planting of cashew over extensive areas by

stretching the prize system under the Tree Planting Campaign to cover Cashew plantations also. (3) Organizing large scale subsidised distribution of selected seed material at less than cost price as in the case of coconuts. (4) Evolution of new and high yielding types of trees as a result of the Research work to be done at the Cashew Research Station newly started. (5) Conducting propaganda for better cultivation, proper spacing and manuring of trees wherever conditions warrant. (6) Organising Producers' Co-operative Societies and Unions and offering crop and produce loans to help the growers and rescue them from the clutches of the wholesale dealers and the agents who are at present appropriating a lionshare of the profit in the industry. (7) Providing for regulated markets under the Commercial Crops Markets Act, including the dissemination of market intelligence and thereby protecting the producers from the exploitation by wholesale exporting agencies. (8) Ensuring quality control by arranging for the inspection and proper treatment of the material intended for export to foreign countries.

Acknowledgement: The data for this article have been collected from the following sources supplemented by detailed enquiries with important producer and trade interests.

(1) Annual reports of the chambers of Commerce at Cochin Kozhikode and Mangalore. (2) Weekly plantation letters published from time to time in the Hindu and the Madras Mail. (3) Report on the Marketing of Cashew nuts in India. (Govt. of India Marketing Series No 47—1944). (4) The article on the "Cashew nut industry and utilisation of Cashew shell oil" by Sri H. R. Kamath, M. Sc., M. Ch., in the Souvenir (1952) of the Malabar Produce Merchants Association, Kozhikode. (5) Article on Cashewnut: Its cultivation and marketing on the Malabar Coast by Sri A. H. S. Sarma, B. Sc., Ag, in the Madras Agricultural Journal, June, 1932. (6) My special thanks are due to the various individuals and institutions like the chambers of Commerce, who have so readily placed the information and commercial data available with them at my disposal.

On the Dryage of Pepper

By

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Introduction: The dryage of an agricultural produce may not be the same from year to year. It may vary according to differences in variety, nutrition and season. In a garden of perennial crop like pepper, varietal and nutritional factors remain more or less the same. But seasonal factors influencing dryage may be considerable since the period from flowering to harvest of pepper covers as much as six months from June to December which are the active periods of the two monsoons South-west and North-east. Such fluctuations in dryage were actually observed in the records maintained at the Agricultural Research Station, Pattambi, by the audit staff of the Accountant General, Madras, in May 1952. They suggested that "data showing the standard percentage of dryage may be fixed for the crop". Accordingly data relating to fresh and dry weights of pepper for the past 24 years were gathered for finding out the extent of variations from year to year. Variations from vine to vine were also determined for 1952 – '53 season, taking 66 vines at random out of the 130 vines on the station after eliminating those yielding less than eight ounces of spikes. The results of these studies are presented in this paper.

According to Kidavu and Venkateswaran (1929) 500 Madras measures of green pepper give 300 lb. of dry pepper. The reports of Agricultural Research Station, Taliparamba (1929 – '30), give that one Madras measure of green pepper weighs on an average 2·56 lb. On this basis, the above figures give a recovery value of 23·44% with a dryage of 76·56%. Yegna Narayana Iyer (1950) states that 100 lb. of green pepper would give 75 lb. of dry pepper. The dryage here is only 25% which appears to need confirmation. In a Note Book of Facts and Figures (1952) published by the Department of Agriculture, Madras, it is stated that one Madras measure of green pepper weighs one pound when dry. Taking the weight of one Madras measure of green pepper to be 2·56 lb. the percentage recovery works out to 39·1 with a dryage of 60·9%.

Observations: *Seasonal variations:* Fresh and dry weights of berries recorded every year for the past 24 years at this station are given in table I. It will be seen from the results that the recovery values range between 27 and 40%, the mode falling between 30 and 34%. The mean recovery works out to 32 55% with a standard error of 0·72 and giving a co-efficient of variability of 2·21%.

Vine to vine variations: In an experiment conducted in 1952 – '53, spikes from 66 vines (out of a total of 130 vines) were harvested and

threshed individually. The weight of spikes, weight of berries and weight of dry berries (after drying in the sun to constant weight) were determined for each. From these, the percentage recovery of green berries on threshing and percentage recovery of dry berries over green berries and over spikes were calculated. The results are presented in table II.

The results show that green berries form 85·2% by weight of spikes while the percentage recovery of dry berries over spike is 28·5 with a standard error of 0·42. Green berries on drying gave 33·5% (S. E., 0·47) of dry pepper, the mode falling within the values of 30 and 37%. The range of variation is rather wide, the maximum and minimum values being 43% and 27% respectively. When gross totals are taken into account the percentage recovery of berries over spikes works out to 85·2, that of dry berries over green berries to 31·6. This gross recovery value of 31·6% shows a decrease of about two percent. It may also be mentioned here that when the total wet and dry weights of berries from all the 130 vines are taken into account a recovery value of 30·26% alone is obtained.

From the foregoing results, one may put down the dryage of pepper as 67 to 68% or roughly to 2/3 the fresh weight of berries with a recovery of 1/3 the weight. From the seasonal figures given in table I the fluctuations in recovery are found to be as much as 27 and 40%. In vine-war recoveries also (Table II) the values fluctuate between 27 and 43%. But it must be noted that recovery values below 30% occur only in four out of 24 years as in table I and II out of 66 vines as in table III.

Normally, both seasonal factors and vine to vine differences contribute to fluctuations in dryage. Vine to vine variations, it will be noted, are themselves considerable, to add to which are the atmospheric changes obtaining during the period from flowering to maturity. In order to assess the influence of these factors, it is necessary to study the various microclimatic influences on selected vines for a number of seasons.

It would also be interesting to find out if the same vines give low percentage of recovery from year to year and to determine how far such variations are genetically controlled. If they be genetical, the annual percentage of recovery may rise or fall according as the yields from the "low recovery" vines are smaller or greater.

While a value of 33⅓ per cent may be taken as recovery of dry pepper on a modest estimate, anything from 30 and 37 per cent is likely even in normal years. It must, however, be possible to record special reasons for a value of less than 30 per cent through close observation of climatic variations in that particular season.

Summary: 1. The dryage of pepper berries was determined in two sets of experiments.

2. From the figures relating to bulk dryage for the past 24 years, the recovery values were found to range between 27 and 40% giving an average of 32·6%.

3. Percentage dryage of berries on the weight of green berries and weight of spikes from 66 vines was determined individually. Incidentally the proportion of green berries to spikes was also determined.

4. Green berries form 85·5% by weight of spikes and 100 lb. green berries give 33·5 lb. dry pepper showing a dryage of 66·5%. Percentage of dryage on the fresh weight of spikes is found to be 71·5.

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TABLE I.

Seasonal Variations in Dryage.

	Weight of berries in lb.		Percentage of recovery
	Green	Dry	
1929—30	30	12	40·0
1930—31	181½	60	33·1
1931—32	224	80	35·7
1932—33	88	35	39·8
1933—34	316	118	37·3
1934—35	294	98	33·3
1935—36	774	213	27·5
1936—37	291	92	31·6
1937—38	535	183	34·2
1938—39	418	136	32·5
1939—40	460	146½	31·9
1940—41	650	208	32 0
1941—42	673	215	31·9
1942—43	570	172	30·2
1943—44	452	144	31·9
1944—45	618	206	33·3
1945—46	199	48	28·4
1946—47	357	111½	31·2
1947—48	231	64	27·7
1948—49	372	100	27·9
1949—50	1047	328 9/16	31·4
1950—51	376¼	136	36·2
1951—52	204	80½	33·3
1952—53	945	286	30·3
		Average ..	32·55±0·72

TABLE II

Vine to Vine Variations

Vine No.	A	B	C	Vine No.	A	B	C	Vine No.	A	B	C	Vine No.	A	B	C	Vine No.	A	B	C
1	84·4	36·4	30·7	15	87·4	36·2	31·6	29	81·1	36·6	29·7	43	88·8	40·9	36·4	57	87·0	35·9	31·2
2	84·6	35·8	30·3	16	84·4	31·0	26·2	30	86·7	27 4	23 8	44	87·4	37·7	32 9	58	87·3	40·5	35·4
3	87·2	30·5	26·6	17	87·3	29·1	25·4	31	79·9	27·2	21·7	45	86·3	37 3	32·2	59	86·8	34·5	29·6
4	88·5	40·7	35·9	18	77·6	33·7	26·2	32	81·1	27·6	22·2	46	88·1	35·5	31·3	60	88·2	34·7	30·6
5	74·5	30·8	22·9	19	79·3	32·8	26·3	33	87·7	32·2	28 3	47	77·8	36·8	28·7	61	84·9	29·6	25·1
6	85·3	33·0	28·1	20	87·8	31·4	27·6	34	88·5	36·5	32·3	48	82·5	33·3	27·8	62	88·7	33·6	29·8
7	85·3	31·5	26·9	21	91·0	35·0	31·8	35	89·1	36·1	32·2	49	86·5	31·4	27·1	63	87·8	31·8	27·9
8	83·2	32·4	27·0	22	75·0	37·0	29·8	36	88·9	25·7	22·9	50	86·1	35·0	30·1	64	85·9	30·9	26·5
9	85·0	39·2	33·3	23	86·9	27·1	23·5	37	86·7	26·7	23·1	51	84·4	33·5	28·3	65	82·7	38·5	31·8
10	88·5	37·8	33·5	24	82·7	30·5	25·2	38	94·9	28·4	27·0	52	87·1	32·1	27·9	66	81·1	27·2	22·8
11	86·6	43·0	35·6	25	76·4	36·8	28·1	39	88·9	26·9	23·9	53	85·5	32·7	28·0	Average		33·5	28·5
12	89·4	31·9	28·5	26	84·4	32·1	27·1	40	85·2	34·5	29·2	54	87·8	32·4	28·4			±	
13	79·9	35·2	28·1	27	85·1	33·4	28·5	41	84·1	34·8	29·3	55	82·9	33·9	28·1			0·47	
14	80·6	30·4	24·5	28	86·9	35·5	30·8	42	83·1	35·7	29·7	56	85·6	36·1	30·9				

A: Percentage weight of fresh berries over spike.
B: Percentage weight of dry berries over green berries.
C: Percentage weight of dry berries over fresh weight of spikes.

D. Total weight of spikes: 861·2 lb.
E. do. green berries: 733·9 lb.
F. do. dry berries: 232·1 lb.
% E over D: 85·2
do. F over D: 26 9
do. F over E: 31·6

Off-season Peaches at the Agricultural Research Station, Nanjanad

An illustrated note on the off-season bearing of plums at this Station was published in The Madras Agricultural Journal, Vol. XXXIX, August, 1952. A similar phenomenon has been observed this year in the case of the peaches and is now reported. The peach varieties concerned, *Killikrankie* and *Flat Chtna*, were introduced in October, 1941. It was noted in the winter of the year 1951 (November–December) that two plants in each of the above varieties developed stray blossoms. Again, in November, 1952, there was good flowering and setting of fruits, which started coming to harvest from January, 1953. The crop is expected to average about 200 fruits per plant.

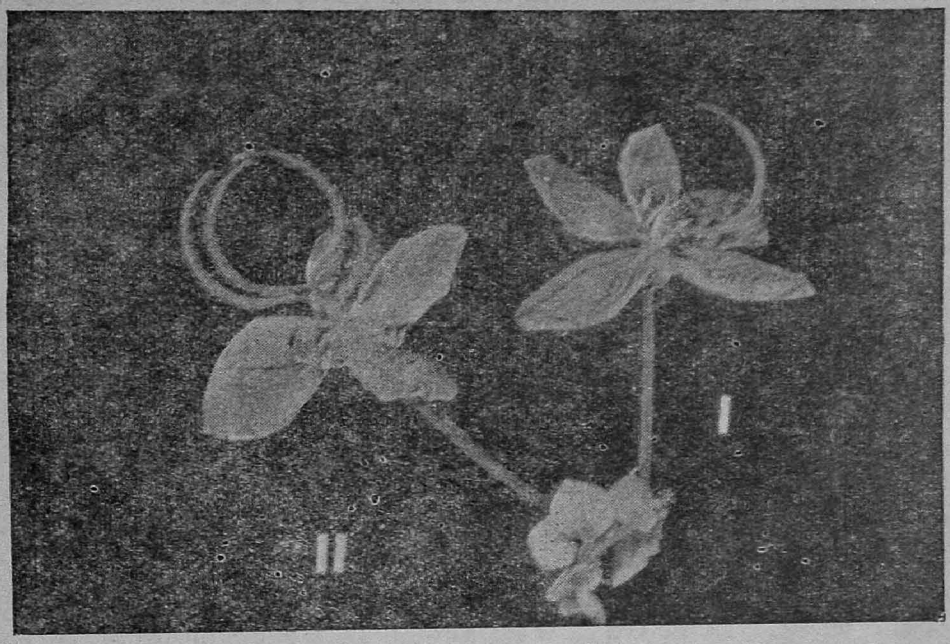
On the Nilgiri hills, the normal season for bearing of peaches and other hills fruits is during the spring months of May–June. In winter (November–January) they are generally in their dormant stage. This is the first year of bearing and further observations on cropping for the following seasons will be undertaken in due course.

Agricultural Research Station, Nanjanad.

K. SAPTHARISHI,
K. RADHAKRISHNA ALWA.

A Note on a Multicarpellary apocarpous Pistil in Cassia reningera, *Wall.*

There is on record a few instances of abnormal floral variations in *Caesalpineae*. Joshi (1932) in a short note mentions the occurrence of 2 – 4 free carpels in the flowers of *Poinciana regia*, Boj. *(Delonix regia*, Raf.,*)*. Raghavan and Venkatasubban (1934) have placed on record the abnormal flowers found in *Cassia fistula*, L. The flowers in the above species showed floral proliferation, suppression of stamens and polyphylly. Rao (1942) has recorded the occurrence of an abnormal flower in *Cassia occidentalis*, L., which exhibited phenomena of phyllody, proliferation and suppression of petals.



Normally in flowers of the natural order *Caesalpineae* the pistils are monocarpellary (fig. I). But while identifying the ornamental *Cassias* it was observed that in a flower of *Cassia renigera*, Wall., the gynaecium was peculiar and consisted of three free carpels (fig. II) instead of one, and these were equal in size besides being normal. The other whorls of the flower viz. petals, sepals and stamens were fully represented without any suppression. Evidently the tricarpellary apocarpous pistil was not the result of transformation of any part of the flower. It is the intention of the author to record this abnormality, which deviates from the normal floral character of the family and no reasonable explanation can be given for this abnormality.

Botany Section,
Agri. Res. Instt.
5—10—1953.

H. SUNANDA KAMATH.

1. Joshi, A. C. 1932, Multicarpellary apocarpous pistils in *Poinciana regia* Curr. Sci. Vol. 1. p 104; 2. Raghavan, T. S. and Venkatasubban, K. R. 1934, Abnormal flower of *Cassia fistula*. Curr. Sci. Vol. 3. p. 256. 3. Rao, A. R. 1942, An abnormal flower of *Cassia occidentalis*. Curr. Sci. Vol. 11. pp 405 – 406.

Economics of Chemical Control of Weeds—Control of Portulaca quadrifida Linn. in West Godavari District

Portulaca quadrifida Linn. a garden land weed, occurs widely in the plantain and citrus gardens of Narasapur taluk of the West Godavari district. It is a prostrate fleshy herb locally called "Pavalakura" in Telugu. Broken bits of these plants are capable of striking roots at the nodes and propagating themselves, and flowers in such broken bits left undestroyed, produce viable seeds.

A citrus garden in Zinnur village (Narasapur taluk) badly infested with this weed was selected for observations on the economics of chemical control as against the usual method of employing labour for weeding. Hormone weed killers were first tried. Application of 0·4% Sodium 2. methyl 4. chloro-phenoxy acetate—(Agroxone of Imperial Chemical Industries (India) Ltd., 6 ½ oz. in one gallon of water) and 0·25% Sodium 2, 4-Dichloro phenoxy acetate (2, 4—D) (Fernoxone of Imperial Chemical Industries (India) Ltd., ½ oz. in 1 gallon) were tried. But they failed to control the weed. Later 0·2%, 0·4% and 0·8% strengths of 4—6 Dinitro-ortho-cresol (Extar Sandoz A containing 4% DNOC) were tried. The 0·8% strength gave a complete control—the weed turning yellow in three days and completely drying up in seven days after spraying—while the other two strengths were ineffective. This corroborates the findings of Thomas and Srinivasan[1]. In order to find out the quantity of spray fluid required, 50, 100 and 200 gallons per acre of the 0·8% DNOC were tried in Maruteru in a plantain garden containing the weed. The control afforded by the first two treatments was only partial while the 200 gallons per acre was satisfactory. But even in this a few left-overs had to be sprayed again. So two sprayings are needed for a complete control although the second spraying needs only about 20 gallons of the spray fluid.

Extar Sandoz A is a wettable powder containing 40% 4—6 Dinitro-ortho-cresol marketted by Messrs. Shaw Wallace & Co., Bombay and sells at Rs. 3—2—0 per lb. The cost of giving two sprays at 44 lbs. of the Extar Sandoz in 220 gallons comes to Rs. 137—8—0 while the cost of weeding by manual labour comes to only Rs. 30/- (at three weedings with 10 men for each weeding, each man at Re. 1/-) per acre. Therefore it is concluded that although the chemical controlled the weed, it is not economical to use it unless the cost is reduced to atleast one fifth of its present level.

[1] Thomas K. M. and Srinivasan, A. R. 1949. Weed killers. Indian Farming. Vol. X No. 3.

30—10—1953.

P. GOVINDA RAO & S. RAMANJANEYULU.

EXTRACTS & GLEANINGS

The Chisel Plough. The Ploughman no longer "homeward plods his weary way" in the same sense to-day as the poet Gray had in mind when he penned that line in his famous elegy. Farm machanisation has altered the ploughman's gait. But, despite the advent of the tractor and a vast array of agricultural implements to attach to it, many formers still plough their fields in "traditional" fashion. More advanced agricultural practice casts some doubt, however, on the validity, at least for cetain types of soils and under some conditions, of the maxim that what was good enough for grand-father is good enough for me". Louis Bromfield, of Malabar Farm, commented drily on this philosophy – "It isn't and, in fact, it was never good enough for anybody".

This latter philosophy led, indirectly, to the introduction of what is known to-day as the chisel-type plough. The story goes that in Texas, one day in 1936, a road construction contractor sought permission to take some heavy road-building machinery across a farmer's fields to save him the trouble of dismantling a whole lot of gear which he otherwise would have been obliged to do, without using this short cut. The farmer agreed and said casually to the contractor, "I am going to plough up that field soon in any case so as return for going across the field you can drag that scarifier behind your tractor on the way over and break the soil up for me".

He recalled this incident some months later when he became conscious of the fact that in his wheat field was a clearly defined swathe about six feet wide standing about a foot to eighteen inches above the level of the rest of the crop, carrying well developed ears of grain, and following the path which the road scarifier had taken across the field. He conferred with a neighbouring farmer and, being convinced that the soil ripping had contributed to this phenomena, they devised a type of plough based on the principle of the road ripper This they used to advantage in preparing their fields in subsquent seasons. Out of this incident developed the chisel plough which has replaced the old type mould-board plough over large areas in the Unitet States and Canada.

The chisel plough is a type of large harrow with curved teeth capable of ripping the ground to a depth of up to sixteen inches. The curved shanks are made of super quality special heat-treated nickel-alloy spring steel, mounted on coiled springs on a frame of three heavy high carbon steel beams welded together with four cross channel irons. Each beam carries a row of steel shanks about three feet apart and which can be adjusted and spaced by clamp bolts. A series of self-sharpening plough tools are bolted to the end of the shanks. The implement can be adjusted to allow the ripping of the soil to be done to any desired depth. The double spring action creates an oscillation effect at the digging point in the soil, creating a jack-hammer like effect as the spikes are drawn through the earth, and this effectively shatters any "hard pan" and so restores drainage to the soil. A "hard pan" is a layer of compacted soil which, after several years ploughing over land, develops at average ploughing depth, preventing absorption. Where heavy rains and high winds may be expected a "clean"–tooled surface may frequently create a "hard pan" of soil which, on one hand, will prevent water draining down and, on the other, during hot, dry months, allow high winds to whisk away precious top soils in disastrous dust storms.

When a chisel–type plough is run through a recently harvested field the earth is ripped up and the straw and weeds worked into the top soil itself. A second cutting of the soil at right angles or diagonally will open and loosen the soil to a depth of 10 ins. to 16 ins. so that in subsequent rains the water will sink deep into the earth instead of running off a dusty, clean tooled surface. The

subsoil is not brought at any time to the surface, it is prepared to hold moisture. Moreover, the rubbish left on top acts as on insulator against evaporation of moisture both by the hot sun and by the hot winds. Maximum use is made, as a result, of the whole of the moisture which falls on the soil. With land ploughed or ripped in such fasion an annual rainfall of 11 ins. to 12 ins. may well prove just as useful to a subsequent crop as will a 17 in or 18 in rainfall on comparable soil conditions but where the surface had been ploughed and prepared under traditional methods. This factor has important implications for land use in New South Wales and the probability of successful dry-farming in areas where annual rainfall may be considered inadequate for particular purposes.

Experience so far seems to suggest that the optimum depth for ripping is no more than double the depth of the top soil but no doubt, a good deal more careful investigation will need to be done on various soil types before any general principles in this respect can be established. Under certain conditions, use of the chisel plough will effect substantial savings too in the number of man hours required to prepare a given area-and this could mean considerable economy in kerosene or oil consumption and wear and tear on tractors. (From Australian Govt. Trade Information Service, A. E. N.—428.)

The activities of the two Research Stations in the Belgian Congo: The work comprised (A) the selection and improvement of the following crops:— i. Food plants, sorghum. A collection of 217 forms belonging to the region of Ruanda-Urundi was under comparative trials. The improved local varieties proved superior to the introduced, ii. Maize, iii. Eleusine, iv. Paddy-one culture Ca. 446 gave an yield of about 4,000 Kg/ha under irrigation, v. Beans, vi. Cowpea. vii. Groundnut-in the main season an yield of 4,000 to 2,000 Kg/ha and 400 to 700 Kg/ha of grain in the second season were obtained. The selection A-65 does well in the plains also giving 2,000 Kg/ha of grains under irrigation, viii. soybeans, ix. Sweet potato-for high altitudes the introduced and acclimatised variety Norten Sam proved best. The variety Carolina Lea gave 26,000 Kg/ha and has proved suitable for the plains also, x. Potatoes, xi. Tapioca, xii. Bananas, xiii. Other oil producing plants like *Elaeis guineensis.* (B) Agronomic experiments like manuring and soil recouperation, rotational etc. (of 13 years duration 1936-1949. Cyperus, *Acacia decurrens*, pennisetum and leguminous crops forming one cultural rotation. The pennisetum-Acacia was superior, the acacia giving an added advantage of yielding the tannin bark. The cyperus was worst. (Another rotation tried was cotton, cotton and tapioca.), (C) Industrial crops (a) Coffee-introduced from Kenya, 17 years old plantations gave in 1952 Kg/ha-moka-1815, Jackson hybrid-1,710, Blue Mountain-1.209, Mysore-1125, Bourbon—1,124 and Kent 998. Moka and Jackson hybrid are being multiplied for eventual distribution, (b) Cotton-the Selection No. 14-125 with a fibre length of 28·61 mm. and ginning% of 86·80 gave a yield of Kg/ha 939 of seeds and 332 lint; (c) Cinchona; (d) Pyrethrum; (e) Fibre plants-*Urena lobata, Abroma augusta, Abutilon, Pavonia, Crotolaria juncea;* (f) castor varieties-Ruanda 4,331 gave 2,000 Kg/ha of beans with an oil content of 43%. The other activities include improvement of livestock, dairying etc. (Bull.d' Inform. Inst. National. Agronom. Congo Belge. vol. II, No. 4. 1953). N. K. S.

Storage of Lemons:— Lemons can be stored up to six months with less than 5% loss by dipping immediately on harvest in a solution of 500 parts per million of 2-4 D plus O. 25% of the proprietary fungicide Shirlan 'W. S.' Dipping in 2-4 D alone reduces stem-end-rot wastage from 50 to 5% with 85% keeping healthy. For this the trees should have received the routin Bordeaux "Scab control" field spray at half petal fall. (Agric. Gazette. N, S. W. 1953, p. 486). N.K.S.

Malaria can be cured by Milk :— This discovery in the Liverpool School of Tropical Medicine was described by B. G. Maegarith in a recent British Association Meeting. Milk diet supresses malaria in rats and monkeys (and probably in man). Addition of paraquinine-benzoic acid to the milk results in the reappearance of the disease in rats and monkeys. (Abstracted from Chem. & Eng. News. vol. 31, p. 3830, 1953) A. M. K. [It is a common practice among medical practitioners in the Mysore State to prescribe diet of buttermilk or rice with buttermilk for malarial patients. Editor].

Objectionable odour in fertilizers of animal origin :— To remove the objectionable odour from fertilizers of animal origin Fritzsche Bros. Inc. New York, have put out a product called Neurolium a O. 1% solution of which when sprayed takes away the odour from dried animal fertilizers (Abst. from Chem. & Eng. News. vol. 31, p. 4220, 1953.) A. M. K.

CROP AND TRADE REPORTS

Cotton Raw, in the Mndras State : The receipts of loose cotton at presses and spinning mills from 1st February 1953 to 4—12—1953 amounted to 247,917 bales of 392 lb. lint. The receipts in the corresponding period of the previous year were 311,360 bales. 368,770 bales mainly of pressed cotton were received at spinning mills and 'nil' bales were exported by sea while 1959 bales were imported by sea during the week ending 4—12—1953. The progressive totals being 9618 bales exported and 77022 bales imported during 1—2—1953 to 4—12—1953. (Director of Agriculture, Madras).

Crop Statistics : Intermediate condition report—1953-54—Madras State. Gingelly : Owing to inadequate rains in the early stages the yield per acre is expected to be below the normal in the districts of Nellore, Chittoor, Chingleput and Tanjore and normal in Srikakulam, Guntur, Kurnool, South Arcot, Coimbatore, Madurai, Ramanathapuram, Malabar and South Kanara districts. It is too early to report on yield of the crop in Tirunelveli district. The wholesale price of gingelly seed per standard maund of 82 2/7 lb. as reported from important market centres on 21—11—1953 was Rs. 35—0—0 in Tirunelveli, Rs. 32—1—0 in Vizianagaram, Rs. 31—8—0 in Tuticorin, Rs. 31—1—0 in Salem, Rs. 29—15—0 in Tiruchirapalli, Rs. 28—13—0 in Cuddalore, Rs. 27—10—0 in Kakinada and Rs. 27—8—0 in Rajahmundry. Compared with the prices which prevailed in the corresponding period of last year, these prices reveal an increase of 27·7 percentage in Vizianagaram and a decrease of 9·6 in Cuddalore, 9·1 in Tiruchirapalli, 5·2 in Kakinada, 4·4 in Tuticorin, 2·7 in Rajahmundry and 1·1 in Tirunelveli.

Groundnut : The winter crop of groundnut is reported to have been affected by inadequate rains in the early stages in the districts of Chingleput and Guntur and parts of Madurai district. The yield per acre in these districts is therefore expected to be slightly below the normal. In Coimbatore district the yield per acre is expected to be above the normal. The yield in the other districts comprising the Andhra State and the residuary State of Madras is reported to be generally normal. The wholesale price of groundnut (machine shelled) per standard maund of 82 2/7 lb. as reported from important market centres on 21—11—1953 was Rs. 25—7—0 in Erode, Rs. 23—4—0 in Salem, Rs. 22—8—0 in Cuddalore, Rs. 21—6—0 in Guntur, Rs. 21—5—0 in Nandyal, Rs. 21—4—0 in Vizianagaram, Cuddapah and Vellore and Rs. 16—12—0 in Adoni. Compared with the prices which prevailed in the corresponding period of last year, these prices reveal a percentage increase of 10·3 in Erode, and 3·3 in Vizianagaram and a decrease of

32·5 in Adoni, 14·5 in Cuddapah, 13·3 in Nellore, 12·3 in Salem, 11·9 in Nandyal, 11·6 in Guntur and 10·4 in Cuddalore.

Ragi: The area sown with ragi upto the 25th September 1953 is estimated at 891,100 acres (328,100 acres in the Andhra State and 563,000 acres in the Residuary Madras State) Compared with area of 807,000 acres (314,500 acres in the Andhra State and 492,500 acres in the Residuary Madras State) estimated for the corresponding period of the previous year, this is an increase of 10·4 per cent. The increase is due generally to favourable season this year. The estimated area is the same as that for last year in the districts of Malabar and South Kanara. A decrease in area is estimated in the districts of Srikakulam and Chingleput and an increase in all the remaining districts The condition of the standing crop at the time of the report, is generally fair in all the districts. The early sown crop in the districts of West Godavari, Nellore, Chittoor, Coimbatore, Ramanathapuram, Malabar and the Nilgiris has been harvested and the outturn of these harvests is reported to be normal in all the districts except Ramanathapuram.

Sugarcane crop Intermediate condition: The condition of the standing crop is reported to be generally satisfactory except in the districts of East Godavari,, Chittoor and North Arcot- In parts of East Godavari district the crop was affected to some extent by the Godavari floods. It was affected by inadequate water supply at the time of planting in parts of Chittoor, Chingleput and North Arcot districts. However recent rains have benefitted the crop in North Arcot district. The yield per acre of sugarcane is expected to be above the normal in the districts of Tiruchirapalli and Ramanathapuram.

The average wholesale price of jaggery per standard maund of 82 2/7 lb. or 3,200 tolas as reported from certain important markets on the 5th December 1953 was Rs. 26—7—0 in Mangalore, Rs 26—5—0 in Cuddalore, Rs. 23—0—0 in Adoni, Rs. 20—4—0 in Erode, Rs. 19—8—6 in Vellore, Rs. 18—6—0 in Salem, Rs. 18—5—0 in Rajahmundry, Rs. 18—4—0 in Chittoor, Rs. 16—15 -0 in Visakhapatnam, Rs. 13—14—0 in Kakinada and Rs. 13—9—0 in Coimbatore. Compared with the prices which prevailed for the corresponding period of the previous year these prices reveal a percentage rise of 69·4 in Rajahmundry, 56·7 in Mangalore, 33·2 in Cuddalore, 27·3 in Adoni, 24 9 in Visakhapatnam, 24·7 in Kakinada. 13·5 in Vellore, 12·2 in Salem and 10·6 in Chittoor and a fall of 23·0 in Coimbatore and 7·4 in Erode.

Potato Third and Final Report: The crop is grown mainly in the Nilgiris district and to a small extent in Salem and Madurai districts. The area for the year 1952—'53 is estimated at 19,990 acres (4,260 acres under winter and 15,730 acres under summer crop. Compared with the final area of 18,630 acres in the previous year and an average area of 17,550 acres calculated for the five years ending with 1951—'52 this is an increase of 7·3 and 13·9% resectively. A decreasee in area is estimated in the districts of Salem and Madurai and an increase in the Nilgiris district.

The Seasonal Factor for the state as a whole works out to 89% of the normal for winter and 90% for a summer crop as against 78% and 80% respectively in the previous year. On this basis, the total yield works out to 63,730 tons (13,350 tons under winter and 50,380 tons under summer crop). Compared with the estimated production of 46,490 tons in the previous year and an average estimated production of 46,410 tons calculated for the five years, ending with 1951—'52 the present estimate shows an increase of 37 1% and 37·3% respectively. The wholesale prices of potato per standard maund of 82 2/7 tolas (or 3,200 tolas) at Mettupalayam on the 10th October 1952 was Rs. I5—0—0. Compared with the price of Rs. 19—8—0 for the corresponding period of the previous year this is a decrease of 23%.

(Director of Statistics, Madras).

ESTATE AND COLLEGE NEWS

(1) Madras Agricultural Students' Meetings :

Prof. T. S. Sadasivan, Director of Botany, University Laboratory, Madras addressed the members of the Union on 10—11—1953 on "Recent Trends in Plant Pathology". Dr. N. Krishnaswami, the Editor, Madras Agricultural Journal, presided. Dr. T. S. Sadasivan gave a very learned and interesting lecture on the effect of different antibiotics on the fungus disorders of plants with special reference to the work that are being done in his laboratory.

Sri. N. K. Natarajan, Ford Foundation Farmer-Scholar, gave a talk on 11—11—1953. Sri. M. R. Balakrishnan, Government Agricultural Chemist, presided. Sri. Natarajan gave a very interesting account of his life with the Farmers of America.

(2) College Social Service League :

The Night School was closed for the term with a small prize distribution to the boys by the Principal, Sri. R. Balasubramania Iyer. The School will open with the re-opening of the College after the holidays.

(3) Arts College Centenary :

The Coimbatore Government Arts College celebrated the Centenary this month. A full week programme was arranged by the College which was very interesting and instructive. Many local Institutions took part in the celebrations. Learned lectures were arranged to be delivered by experts and a number of old students of the College. It is the motto of the College, "Sapere Aude" or "Dare to be Wise" that has made it celebrate the event. We wish the Institution many more centenaries.

NOTICE.

In spite of repeated requests a few members who are in arrears have not paid their dues yet. They are requested once again to clear-off their arrears immediately. If the arrears are not cleared before the end of December 1953, the members are informed that the despatch of further issues of the Journal will be stopped. The annual subscription for the Journal is Rs. 4/- for the members from the Madras Agricultural Department (Non-Gazetted Officers) and Rs. 6/- for all other subscribers.

Secretary,
M. A. S. U.

Weather Review — For the month of November 1953.

RAINFALL DATA

Division	Station	Total rainfall for the month in inches.	Departure fromnormal in inches	Total since 1st January in inches	Division	Station	Total rainfall for the month in inches.	Departure fromnormal in inches	Total since 1st January in inches
Orissa & Circars	Gopalpur	7·0	+3·0	50·0	Central Contd.	Vellore	1·7	— 6·0	29·9
	Calinga-patnam	0·9	—2·5	45·2		Gudiyatham*	2·5	— 1·9	26·5
	Visakha-patnam	0·3	—4·4	34·4		Salem	1·3	— 2·5	51·1
	Arakuvalley*	..	..	..		Coimbatore (A. M. O.)*	1·6	— 2·9	31·6
	Anakapalle*	..	..	..		Coimbatore	1 1	— 2·9	30·7
	Samalkot	0·7	—2·4	38·2		Tiruchirap-palli	4·6	— 2 4	41·1
	Kakinada	0·7	—4·9	40·7					
	Maruteru*	..	..	..	South	Naga-pattinam	14·5	— 3·0	33·9
	Masuli-patnam	0·0	—5·8	39·6		Aduturai*	6·8	— 3·2	25·9
	Guntur	0·0	—1 9	24·7		Pattukottai*	13 1	+ 4·7	34·5
	Agrl. College, Bapatla	0·0	—3·8	34·6		Madurai	6 5	+ 0·8	45·1
						Pamban	12·0	+ 0·3	28·7
	Agrl. College, Farm, Bapatla*	..	..	..		Koilpatti*	5 6	— 0·3	25·7
						Palayam-cottai	10·7	+ 3·3	26·8
	Renta-chintala	0·3	—1·6	32·6		Amba-samudram*	11·8	+ 1·9	35·9
Ceded Districts	Kurnool	0·0	—1·2	33·5	West Coast	Trivandrum	7·8	+ 0·8	74·1
	Nandyal	0·0	—1·3	30·4		Fort Cochin	7 0	+ 0·3	111·8
	Hagari*	..	..	..		Kozhikode	1·0	— 6·4	98·0
	Siruguppa*	..	..	..		Pattambi*	0·8	— 4·2	80·5
	Bellary	0·2	—1·8	28·1		Taliparamba*	tr	— 4·5	104·8
	Cuddapah	0·1	—3·4	19·5		Wynaad*	1·4	— 2 6	87 8
	Kodur*	..	..	..		Nileshwar*	0·5	— 4·4	126·2
	Anantapur	0·0	—2·4	34·1		Pilicode*	tr	— 4·6	113·3
						Mangalore	0·1	— 3·8	113·9
Carnatic	Nellore	2·5	—9·2	28·8		Kankanady*	0·1	— 0·1	118·0
	Buchireddi-palem	1·1	—10·1	28·2	Mysore & Coorg	Chitaldrug	1·0	— 2·6	20·1
	Madras (Meenam-bakkam)	5·2	—8·8	36·2		Bangalore	1·0	— 2·7	47·1
						Mysore	0·0	— 2·7	37·1
						Mercara	0·0	— 3·0	129·0
	Tirur-kuppam*	3·5	—6·5	37·4	Hills	Kodaikanal	2·0	— 7·7	61·5
	Palur*	4·1	—7·8	37 6		Coonoor*	3·5	—10 8	58·5
	Tindivanam*	3·3	—4·0	30·4		Ootacamund*	2·1	— 3·2	60·5
	Cuddalore	4·3	—11·2	38·8		Nanjanad*	0·8	— 3·6	73·5
Central	Arogyavaram (Chittoor dt.)	2·1	—2·0	34·0					

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

2. Average of ten years data is taken as normal.

3. Tr = 1 to 4 cents of rain-fall.

Weather Review for November 1953

During the commencement of the month a well marked low existed in the north Andaman Sea and the adjoining Bay of Bengal. This concentrated into a depression on 3 – 11 – 1953, centred at 08-30 hours I. S. T. within half a degree of Lat. 11°N, Long. 91½°E which concentrated further unto a deep depression on 5 – 11 – 1953 situated at about 600 miles east off Madras. This moved further towards north-west and became a cyclonic storm of small core on 7 – 11 – 1953 with its centre about 300 miles to the south-east of Visakhapatnam; but this weakened shortly and lay as a low pressure area over the Orissa-Circars coast on 11 – 11 – 1953 and became less marked. Under its influence rainfall occurred at a number of places in coastal Andhradesa on 9 – 11 – 1953 and 10 – 11 – 1953. Dry weather prevailed over Tamilnad from 3 – 11 – 1953 to 10 – 11 – 1953

A low pressure wave was moving across the south-east Arabian Sea on 12 – 11 – 1953. On the same day another low pressure wave was moving across the extreme south Andaman Sea. The former moved away west-wards two days later while the latter moved across south Ceylon on 15 – 11 – 1953 and moved away west-wards across the Maldives on the very next day leaving a shallow low pressure area over the south-east Arabian Sea, which also moved away west-wards on 18 – 11 – 1953. Rainfall and thundershowers occurred at a number of places in south Tamil Nad from 13 – 11 – 1953 to 19 – 11 – 1953.

On 17 – 11 – 1953 a low pressure wave was moving into the south Andaman Sea causing unsettled conditions, which concentrated into a depression on 23 – 11 – 1953 with its centre near about 500 miles east of Nagapattinam. This further deepened on 24 – 11 – 1953 and approached the coast near Nagapattinam but weakened rapidly and crossed the coast between Nagapattinam and Pamban on the evening of 26 – 11 – 1953 and passed away west-wards as a low pressure area in the south-east Arabian Sea on the last day of the month. Under its influence rainfall was fairly widespread in Tamilnad, from 26 – 11 – 1953 upto the end of the month.

The noteworthy rainfalls and the Zonal rainfall for the month are furnished hereunder:

Note.worthy Rain-falls for the Month

S. No.	Date	Name of Place	Rain-fall for the past 24 hours
1	15—11—1953	Trivandrum	2·4″
2	18—11—1953	Pamban	4·0″
3	20—11—1953	Fort Cochin	2·1″
4	26—11—1953	Madras (Meenambakkam)	3·1″
5	do.	do. (Nungambakkam)	2·4″
6	27—11—1953	Palayamcottai	3·7″
7	28—11—1953	Nagapattinam	2·8″
8	—	Pattukkottai	5·24″

Zonal Rainfall for the month

S. No.	Name of zone	Average for the month	Departure from normal	Remarks
1	Orissa and Circars	1·10″	— 2·70	Far below normal
2	Ceded districts	0·06″	— 2·20	do.
3	Carnatic	3·43″	— 8·23	do.
4	Central	2·16″	— 2·94	do.
5	South	10·13″	+ 0·56	Just above normal
6	West Coast	1·87″	— 3·20	Far below normal
7	Mysore and Coorg	0·25″	— 2·45	do.
8	Hills	2·33″	— 6·23	do.

C. B. M. & M. V. J.

Departmental Notifications

GAZETTED SERVICE

Postings and Transfers

Madras State:

Name	From	To
Abdul Samad	S. D. O., Vellore	Paddy Specialist, Coimbatore
Alagiamanavalan, R.	D. A. O. (on leave)	Block Dev. Officer, Panruti
Brahmachari.	Asst. Entomologist (on leave)	Asst. Entomologist, Civil Supply, Coimbatore
Doraiswami, S. V.	D. A. O., Coimbatore	Lec. in Agrl. Economics, Coimbatore
Francis, T. S.	Addl. D. A. O., Pattukottai	D. A. O., Ootacamund
Natarajan, K.	Asst. Agrl. Eng. Madras	Asst. Agrl. Eng. (Tractor Work shop) Coimbatore
Natarajan, T.	Cane Dev. Officer (on leave)	Gazetted Asst. to Hq. Dy. D. A., Madras
Srinivasan, K. V.	Asst. Mycologist, (Ergot Scheme), Ootacamund	Mycologist, Sugarcane Breeding Institute, Coimbatore
Sulaiman, S. M.	D. A. O., Ootacamund	Block Dev. Officer, Tiruppur
Sivaswami, E. G.	Spl. D. A. O. (Crop sampling) Tanjore	Block Dev. Officer, Kadambathur
Srinivasan, V.	Asst. in Pulses, Coimbatore	S. D. O., Vellore
Uthaman, P.	Supdt. A. R. S., (on leave), Pattambi	Supdt. A. R. S., Aduthurai
Venkatasubramaniam, P. S.	Addl. D. A. O., Tanjore	Spl. D. A. O. (Crop sampling), Tanjore
Andhra State:		
Sambasiva Rao, I.	D. A. O., Guntur	Spl. D. A. O., Bellary

UPPER SUBORDINATES

Postings and Transfers

Madras State:

Name	From	To
Arasamani, T.	A. D., Amabasamudram	Extension Officer, Kurivikulam
Ayyaswami Iyer, T. V.	A. D., Kumbakonam	A. D., Srivaikuntam
Balasubramaniam, M.	Spl. A. D., Tiruturaipundi	A. D., Ootacamund
Doraiswami, K.	Addl. A. D. Cuddalore	Extension Officer, Panruti
Edwards, J. J. D.	P. P. A. (Ent.) Trichy	,, ,, Musiri

Name	From	To
Govindarajan, M.	Spl. A. D. Peravurni	Paddy Asst., Palur
Herbert Adiseshiah, S. D.	Asst. Guindy	Extension Officer, Kadambathur
Korukutty, C. K.	Spl. A. D. Kodavasal	A. D., Mayavaram
Kalyanaraman, A. V.	Addl. A. D. Tiruvellore	Extension Officer, Tiruvellore
Kuppuswami, V. N.	A. D. Krishnagiri	,, ,, Krishnagiri
Kunhimohamad K. P.	A. D. Perintalmana	Extension Officer, Payyanur
Kasiviswanathan S.	A. D. Madurai	,, ,, Kurichipadi
Lakshminarayanan S.	Spl. A. D. Rajapalayam	Spl. A. D. Srivilliputhur
Mutharasan G.	A. D. Mayavaram	Extension Officer, Tirumangalam
Muthuswami K.	A. D. Tanjore Dt.	,, ,, Vedaranyam
Muddanna Shetty H.	Fruit Asst. Mangalore	,, ,, Maniswar
Muthuperumal V.	Spl. A. D. Srivilliputhur	Spl. A. D. Rajapalayam
Narasimalu K.	A. D. on leave	A. D. Arkonam
Ramachandran T. K.	Spl. A. D. Kulithalai	Extension Officer, Kallupatti
Ramasubramanian S.	A. D. Srivilliputhur	,, ,, Srivilliputhur
Ramanujam C.	A. D. Arupukottai	,, ,, Sivakasi
Rangaswami Reddiar S.	A. D. Srivaikundam	,, ,, Sankarankoil
Ramachandran M.	A. D. Athur	,, ,, Athur
Raman A.	A. D. Badagara	,, ,, Kangayam
Rajagopalan V.	A. D. Alathur	,, ,, Sullia
Ramanathan N.	Spl. A. D. Mannargudi	A. D. Tiruvellore
Raghava Panicker K.	Addl. F. M. Wynad	Extension Officer, Tellicherry
Sadasivam Shetty	F. M. Koila	A. D. Koondapur
Seethapathi S. P.	Spl. A. D. Orthanad	To Salem Dt.
Subramaniam S.	A. D. Peravurni	Extension Officer, Tiruturaipoondi
Subramanian N.	A. D. Trichi	,, ,, Perambalur
Sankaran C.	Addl. A. D. Trichy	,, ,, Karur
Shanmugavelu	A. D. Tiruvannamalai	,, ,, Tiruvannamalai
Syed Muhamad	A, D. Omalur	,, ,, Tiruppur
Srinivasa Rao N. R.	A. D. Ootty	,, ,, Ootty
Srinivasan S.	Spl. A. D. Mayavaram	Addl. A. D. Tiruvaiyaru
Seetharaman P. N.	Spl. A. D. Madurai	S. D. A. Sathur
Swaminathan S.	A. A. D. Tiruvayaru	A. A. D. Srirangam
Thiruvenkatachari	A. D. Tirukoilur	Extension Officer, Chinna Salem
Venkataswami S.	A. D. Tirupathur	,, ,, Usilampatti
Veeraraghavan V.	A. D. Arni	,, ,, Kalasapakam
Vaidyanathan M.	A. D. on leave	P. A. to D. A. O. Tanjore
Venugopal P. R.	Spl. A. D. Chidambaram	Spl. A. D. Cuddalore
Vaidyanathan R.	A. A. D. Tiruvayaru	A. D. Madurai
Viswanathan T. K.	Marketing Asst. (on leave)	A. A. D. Walajah

UPPER SUBORDINATES

Postings and Transfers

Andhra State:

Name	From	To
Anjireddy	Asst. in Chemistry, on leave	Asst. in Chemistry, Anakapalli
Abdul Hameed	A. A. D. Kandukur	S. D. A. Anantapur
Bhaskhara Rao, K.	Spl. A. D. Bellary	A. D. Repalle
Dharma Rao, C.	Asst. in Chemistry, Anakapalli	Asst. in Chemistry, Bapatla
Gopalaratnam, C.	Spl. A. D. Bobbili	Spl. A. D. Peddapur
Jaganatha Rao, E.	Spl. A. D. Chittor	Asst. in Sugarcane, Anakapalli
Mohd Abdul Rahim Baig	Spl. A. D. Gudur	A. D. Pulivendla
Narayana, K. L.	Spl. A. D. Kovvur	Asst. in Ento. Bapatla
Narasimhamurthy, D.	Fruit Asst. on leave	A. D. Nugur
Narasa Reddi, I.	Spl. A. D. Atmakur	A. A. D. Kandukur
Picheswara Rao, M.	S. D. A. Masulipatam	Librarian Agrl. College, Bapatla
Prasada Rao, D. M. V.	Spl. A. D. Kovvur	Asst. in Chemistry, Bapatla
Rama Mohan Rao, K.	P. A. to D. A. O. Srikakulam	A. D. Narasannapeta
Raghunatha Rao, N.	A. D. Nagur	P. P. A. Mycol. Kakinada
Rangaswami Iyangar, K.	Spl. A. D. Nellore	Spl. A. D. Chandragiri
Raghaviah, G. V.	P. A. to D. A. O. Anakapalli	A. D. Visakapatnam Dt.
Raghavendra Rao, G.	A. D. Repalle	Spl. A. D. Bellary
Srinivasan, K.	A. D. G. L. Puram	Spl. A. D. Bobbili
Subbaya, J.	P. P. A. Myco. Kurnool	Asst. in Mycol. Bapatla
Sankariah, M.	Spl. A. D. Nellore	A. A. D. Kovvur
Seetharamiah, D.	Spl. A. D. Kandukur	A. D. Kavali
Seshagiri Rao, M.	Spl. A. D. Kavali	P. P. A. Mycol. Bapatla
Seetharamiah, K.	Spl. A. D. Sullurpet	Dairy Manager, Bapatla
Shaik Immam	A. A. D. Kovvur	A. D. Cuddapah Dt.
Srinivasalu, K.	S. D. A. Nellore	Asst. in Paddy, Bucireddipalam
Srinivasa Rao	Asst. A. R. S. Buchiredipalam	S. D. A. Nellore
Satyanarayana Rao, G.	A. D. Chittoor	Tech. Asst. to D. A. Andhra
Subbarao, A.	A. D. Koiikuntala	A. D., E. Godavari
Vasudeva Rao, S.	A. D. Narasannapeta	A. D., G. L. Puram
Venkata Reddy, T. C.	P. P. A. Myco. Kakinada	Asst. in Mycol. Bapatla
Viswanathan, Y.	A. D. Rajahmundry	P. P. A. Mycol. Kurnool
Venkiah, N.	P. A. to D. A. P, Anantapur	A. D. Vijag Dt.