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Locusts. Locusts have been known to be the scourge of mankind ever since the dawn of human civilisation. In certain periods, mass multiplication of the locusts takes place resulting in the production of vast swarms. These clouds of swarms cover vast distances through flight and invade areas placed far apart. As they descend, they destroy all vegetation they come across. A single visitation is enough to cause colossal damage to agricultural crops. Growing crops are blasted out of existence and the orchards reduced to barren stumps. The poor ryot is taken unawares and is absolutely helpless against a visitation of this kind. Fortunately for India there are only three kinds of locusts known to be definitely harmful; they are the *Desert locust*, the *Migratory locust* and the *Bombay locust*. The first named is the most serious and is confined to the desert regions of North Western India wherefrom it migrates to the adjoining fertile plains. The loss inflicted by this locust is enormous. Detailed investigations were started for the study of this pest by the Imperial Council of Agricultural Research in 1931 and continued up to the end of 1940. As a result it is now possible to locate with exactitude the desert areas which form the permanent breeding homes of this locust and to forecast well in advance the oncoming outbreaks from these areas. Fortunately for Madras, apart from very stray cases of its occurrence in the bordering districts of Bellary, Kurnool, Cuddapah, Ganjam and Vizagapatam as in 1890 it has not made any inroads into South India so far. The Migratory locust is known to exist in its solitary phase all over India but very seldom does it assume mass proportions in our Presidency. Except for a heavy attack recorded in the year 1878, when many districts like Tinnevely, Madura, Coimbatore, Salem and Nellore suffered from very heavy infestation, there has not been a recrudescence for sixty years and the prospects of its showing up again are rather remote. The Bombay locust breeds in the regions of the western Ghats and invades in some years certain areas in the Bombay Presidency and extends also into the Ceded Districts in small swarms. The last outbreak occurred as far back as 1910 and it has not been heard of subsequently. As none of these three locusts is known to lay eggs within the confines of the Madras Presidency the menace of Locust swarming in the province does not at present exist. Newspaper reports about the detection of locust swarms in the Punjab, Baluchistan, Sind, Rajputana and other areas in the extreme North, need not cause any anxiety in the minds of the Madras ryot. If, however, anybody should come across any suspicious

insect resembling the locust he will be well advised to communicate the news and send the specimen to the nearest Agricultural officer or to the Government Entomologist, Coimbatore, for confirmation.

The 'Project' system in Agricultural Propaganda. One important criticism levelled by competent observers against the work of the Agricultural department in India is that the knowledge gained by the research worker is not promptly conveyed to or adequately utilised by the Indian farmer, with the result that the gulf between the experimental stations and the farmer's holdings remains unbridged. That the truth of this criticism is being increasingly recognized by Provincial and State departments of Agriculture in India is evidenced by the trend of discussions which of late has centred round this theme at the meetings of the Imperial Council of Agricultural Research, Indian Central Cotton Committee and Provincial Agricultural Associations. There is a general consensus of opinion in the country that the 'Project' method which has met with marked success in the work of the Soil Conservation Service of the U. S. A. would be the most suited for Indian conditions. We are glad to note the Imperial Council of Agricultural Research has invited definite 'Project' schemes from the Provinces and constituent States and are planning to launch model schemes in the course of the next year.

The basic idea of a 'Project' is to select a group of contiguous holdings in which *all* the known agricultural improvements of proved value and suited to the area are applied simultaneously or in close sequence by the cultivators themselves, the department merely providing the advice and the essential assistance. The merit of an ideal 'project' lies in the planning of a system of land utilisation as a means of permanently improving the cultivator's land, his practices, his social environment and above all, his income. In this respect the 'Project' system is a departure from the time-honoured 'demonstrations' on a farmers' holdings where only one item of improvement was demonstrated at one time.

It is a matter of satisfaction to us that agricultural propaganda in Madras has undergone substantial reformation in recent years. The 'Central village' system adopted in 1930 is in essential features based on the 'project' method, though there is room for further improvement. To our mind, the 'Central village' system of the Madras Agricultural Department has been too narrowly agricultural. Schemes of improvement are almost exclusively confined to such aspects as the building up of soil fertility, conservation of manures, the adoption of improved methods of tillage and the use of superior strains of seed. 'Stock farming' as a balanced adjunct to 'land farming' has not received as much attention as it deserves. Subsidiary industries and organisation of social amenities in the Central villages are still in need of greater attention. Since, however, Madras has already gone halfway with the 'project' scheme, it should be easy to improve on the existing system and bring it in line with full-fledged projects, the success of which the shrewd Madrasi ryot will not fail to appreciate.

Cultivation of Sivapuri Tobacco

By C. S. KRISHNASWAMI, L. Ag.,

Agricultural Demonstrator, Chidambaram.

Sivapuri tobacco, is well known throughout South India and is considered as the best among the varieties grown for chewing. The same variety when grown in other places is not considered as good as the stuff grown in this village. This is attributed to the quality of the soil. Sivapuri village, is about two miles from Chidambaram Railway station and consists mostly of 'wet' lands irrigated by channels from the Coleroon river. Except for a limited area round about the village site, about 120 acres in extent, there are no other 'garden' lands, and the entire area is cultivated with this variety of tobacco.

Details of cultivation. (i) *Soil.* The soil is a sandy loam, become rich in humus due to heavy manuring every year with cattle manure and village and town rubbish. It is also rich in potash and the colour is grey. The cost of this type of land, ranges from Rs. 4000 to Rs. 8000 for an acre, but very few are willing to part with it, since they fetch a good amount Rs. 200 to Rs. 250 per acre when leased out. The assessment for such lands, however, varies from Rs. 2 to Rs. 3 per acre.

(ii) *Rotation.* In this area, tobacco is raised every year from November to April. No rotation is practised. The lands remain fallow during the remaining months. The cultivators are of opinion that if any crop other than tobacco is cultivated, the quantity and quality of the cured leaves will be affected.

(iii) *Seed bed.* Raising vigorous and healthy seedlings requires great skill and care. High level lands with good drainage are selected near a pond or a well for raising the nursery. It is dug to a depth of about 9 inches to 1 foot with *mammutties* twice or thrice till the soil attains fine tilth. About two cartloads of well rotten cattle manure are evenly spread and incorporated into the soil. The surface soil is levelled and small beds are formed. One to one and half *tolas* of good tobacco seed, collected from the previous year's crop is sown mixed with one pound of fine sand. The mixture is evenly sprinkled twice or thrice to ensure uniformity. The seed-beds are then pressed with the palm of the hand to compact the soil. Water is sprinkled by means of a rose can and the beds are covered with plaited coconut leaves. The seed beds are watered regularly, both in the morning and evening for a week. The seeds begin to germinate by that time and the shade is removed. For the next 24 days, the beds are watered once a day generally in the evening. The beds are carefully hand-weeded twice or thrice during this period. Sowings are generally done from the middle of October to the middle of November. The seedlings will be ready for planting in about 40 days, after sowing.

(iv) *Preparatory cultivation.* After the harvest of the tobacco crop in April, the fields lie fallow till next September. Not less than four or five ploughings are given with a fairly big sized country plough in September. In October or November, just a few days before planting, the land is thoroughly dug with *mammutties* to a depth of about 9" to 12".

(v) *Manuring.* Nearly 60 tons of well rotten cattle manure and wood ashes are applied to one *Kani* (1.33 acres) of land from April to September. Not less than Rs. 100 is spent in manuring alone. Ammonium sulphate and oil cakes were tried by a few ryots but were found to produce poor quality leaves.

(vi) *Planting.* After thoroughly preparing the land and just before planting, parallel lines 3' to 3½' apart are marked out both lengthwise and breadthwise. If the soil is rich, 3½' spacing is adopted. At the crossings of these lines holes are made with small tapering pegs, enough water is poured and vigorous, well grown seedlings are planted, one in each hole. Green leafy twigs are planted beside each seedling, to provide shade till it is established. Planting is done only in the evening after 4 p m. About 5000 seedlings, are required for one acre. Pot watering is continued for about 40 days, after planting.

(vii) *After cultivation and irrigation.* Within 40 days, four hoeings are usually given at intervals of about a week beginning from the second week. The first hoeing is given round the plants with a pointed bamboo stick. Other hoeings are given with *mammutties*. The soil is thus kept in a very fine condition entirely free from weeds. After the final hoeing, beds and irrigation channels are formed enclosing four to six plants in each bed. From the 40th day the crop is irrigated once every alternate day. When the plants are about 70 days old they put forth flowers. Only three to four plants for each *Kani* are allowed to flower and set seed while the rest are 'topped', leaving 12 to 14 leaves per plant. The side-suckers are regularly removed. Each plant is individually examined for insects and remedial measures are adopted as soon as they are noticed. Another *mammatty* hoeing is given about the 80th day. To avoid injury, the spreading leaves are tied round the stem with 'paddy straw twist' and hoeing given around the plants. The leaves are untied after the operation. For about 10 days after the final hoeing, irrigations are given daily and later the crop is irrigated on alternate days till it is harvested.

(viii) *Pests and diseases.* There are no serious fungus or other diseases affecting this variety. Plant lice (*Myzus persicae*) and tobacco caterpillars are the major insect pests invariably found every year. When plant lice make their appearance, a paste made of neem (*Aziderachta indica*) oil cake sweet flag (*Acorus calamus*) and chilli (*Capsicum annuum*) powder is smeared on the leaves with the aid of a crude coconut fibre brush. About 20 lbs. of neem cake, 3 lbs of chilli powder and ¾ lb. of sweet flag rhizomes are required for treating plants in one acre. Irrigation is withheld for the next

two days. The affected leaves wither along with the insects and the pest is thus kept in check. The leaf eating caterpillars are regularly hand picked in the morning before 8 a. m. No special labour is engaged for picking them or for applying the paste as the regular coolies engaged for the cultivation do these operations with-out any extra remuneration.

(ix) *Harvesting*. The crop is ready for harvest in about 120 days after planting. The drying of lower leaves and the appearance of the oval shaped spots called '*Mohar*' on the top leaves indicate that the crop is mature. The leaves are thick and gummy at that time. On any convenient day, not exceeding 125 days after planting, the plants are harvested in the evening about 4 p. m. by cutting the whole plants at the bottom of the stem. They are left in the field in an inverted position throughout that night till about 8 a. m. on the next day.

(x) *Curing*. The next morning the plants are collected, stored in small heaps and covered with straw till about 4 p. m. Again they are spread out in the field till next morning. This sort of sun curing is continued for a week. The plants are then removed and hung in the shade without touching each other. This method of shade and air curing continues for a week. At the end of the period the plants are removed and the leaves cut off with a portion of the stem attached to the leaves. The central core of the stem is generally rejected. While stripping, the leaves are carefully graded. The top four leaves are generally graded as "class I". The next three or four form "class II". The next three or four form "class III" and the remaining ones which are usually brownish and withered, form "class IV". The classification is generally based on the thickness and weight of leaves, and '*Mohar*' marks on them. Five leaves in each sort are tied together into a sheaf and 40 sheaves form a bundle.

These sheaves are arranged in the form of a rectangular heap in shade where there is not much draught. The bottom, sides and the top of the heap are covered well with dried tobacco leaves and pressed down with wooden logs and left undisturbed for a week to nine days. The heap is rearranged at the end of that period; and allowed to remain so for another week. The sheaves are then removed and allowed to dry in the shade for nine or ten days. The leaves will be sufficiently dry by then and will be ready for marketing. They are packed into bundles covered with mats and stored in a dry, cool place, till they are disposed. About 14 to 16 bundles with an aggregate weight of about 2000 lb. are obtained from an acre.

(xi) *Marketing*. The leaves are sold in terms of bundles only and not by weight. Each bundle contains 2400 leaves. A bundle of "class I" leaves weighs 150 to 170 lbs, "class II" 120 to 130 lbs, and "class III" leaves only 100 to 110 lbs, per bundle. The last class leaves are very poor in quality and do not weigh more than 70 to 90 lbs, per bundle. The chief market for the "class I" leaves is Chettinad. Merchants from Karaikudi and other towns in that area advance money to the cultivators and purchase the cured leaves in May-June. Till very recently there

was considerable demand for Sivapuri leaves. Of late, and especially during the last two years the market is dull. Tobacco leaves are being sold nowadays in small packets in retail. It is reported that tobacco grown in Sivapuri is adulterated with tobacco grown in other parts and sold in retail as 'Sivapuri' tobacco.

Cultivation charges for one acre.

	Expenditure.		Per acre.	
			Rs.	As.
1. Nursery:—				
Preparing the nursery	0	8
Cost of 2½ cart loads of cattle manure	2	8
1½ tolas of tobacco seed	0	12
Pot watering for a month	0	12
2. Main field preparatory cultivation:—				
Ploughing with country plough, 4 times @ Rs. 1—4—0 per ploughing	5	0
Digging with <i>mammutti</i> to a depth of 1¼' 24 men @ 5 as.	7	0
3. Manures and manuring:—				
Carting 45 tons of cattle manure from Chidambaram and the neighbouring villages including carting charges @ Rs. 2 per ton	90	0
Spreading the manure evenly	3	0
Planting the seedlings in lines 3½' apart	10	0
4. After cultivation:—				
Hoing with <i>mammutties</i> at intervals, 4 times...	32	0
Suckering, topping and treating the affected plants	6	0
5. Irrigation:—				
Fitting up <i>Picottah</i> for irrigation	2	0
Renewing leather rope bucket etc.	4	0
Lifting water once in two days for 4 months	64	0
6. Harvesting:—				
Harvesting, curing and grading, 4 men @ Rs. 8 each	32	0
Rent for the land (one acre)	250	0
		Total expenditure	510	0

5 men on Rs. 8 per mensum are engaged for each *Kani* for about 5 months. All the above mentioned operations including the curing are done by them. No casual coolies are engaged for any of the operations.

Receipts.

The value of the cured leaves is:—

10 bundles of "class I" leaves @ Rs. 60 per bundle	Rs. 600	0
2 " " "class II" " " Rs. 30 " "	Rs. 60	0
1 " " "class III" " " Rs. 20 " "	Rs. 20	0
1 " " "class IV" " " Rs. 10 " "	Rs. 10	0
	Total Rs.	690
		0

Net gain per acre Rs. 180.

The Place of Advertising in the Activities of the Agricultural Department.

By R. RATNAM, B. A.

Introduction. Criticisms on the usefulness of the Agricultural Department are frequently heard sometimes from the educated men of our Province often due to unfounded notions or lack of adequate information on the various activities carried on by the Department. These criticisms are properly answered when they reach the ears of the departmental officers and the critics are almost invariably converted on being furnished with sufficient information. However, there is the danger of such unfounded criticisms passing on from person to person and thus acting as a potential source of prejudice against departmental activities. To avoid the spread of such an evil germ which, if not checked at the proper time may gain undue momentum, adequate measures have to be taken, and the Department has to pay special attention to the dissemination of sufficient information to the public. At present the Department is holding exhibitions and lectures and distributing leaflets and pamphlets and issuing press notes. While they educate the public on agricultural improvements, they also serve to correct these wrong opinions and to create a more favourable public opinion. But one has to seriously consider whether these comprise the maximum effort that the Department could put forth and whether the Department cannot do anything more. In the following pages the scope of proper advertising in all its aspects as a remedy for this evil is indicated.

What is to be Advertised ? With the Department is available not only some commodities such as seeds, implements, books and publications, but also a lot of service information in respect of agricultural practices. It appears reasonable to classify such services and commodities to be advertised into the following groups :—

1. *Policy and Programme of the Department.* In this group can be included the information contained in the administration report of the Department issued every year. The information is in respect of investigations in progress with the Department on its research branch, and also a resume of the work carried out by the propaganda wing. The progress achieved during a given year in various fields of research and propaganda as compared with similar progress during the previous year is also included. At present these particulars are contained in the publication entitled *Report on the Operations of the Department of Agriculture* which is available to the public and is priced about eight annas. The Government's review of these operations is appended to this publication. This review also appears in the Press. Unfortunately the public does not seem to be keen on purchasing this publication, its interest rarely going beyond a perfunctory perusal of the Press Review. Being an annual review, the activities of the Department are often lost sight of by the public. There seems to be an

imperative need to recount to the public the activities of the Department more often than once a year, say, at least every three months. An advertisement through a proper medium seems to be urgently called for in this regard.

2. *Recommendations for improved cultural, manurial and other practices.* Data on these aspects are accumulating with the Department as a result of investigations made year after year. Departmental leaflets, pamphlets and other priced bulletins contain a wealth of information in this regard. These are distributed to the public mainly through the agency of the Agricultural Demonstrators. Still there seems to be a feeling with the public that their distribution is not adequate. Moreover, as advertisers in commercial fields do, it appears necessary to write leaflets to flatter the reader into believing that he was badly in need of the agricultural improvement which is the subject matter of the publication and that the investigation is just the thing that the reader wanted badly. In this group of advertising matter, may be included all the recommendations of the Department such as preservation of cattle manure, prevention of soil erosion, control of pests, proper grading and marketing of produce etc.

3. *Stimulating internal consumption of agricultural produce.* The present war has created some very distressing situations in the internal economy of our country which is predominantly agricultural. Our erstwhile markets in Europe and other western countries for our produce, particularly for our oilseeds, cotton etc., have been cut off. The need for stimulating internal consumption of some of these products and their by-products in industry has become urgent. Here is a fertile field for propaganda activity. The agriculturists are too poor and ignorant to be vociferous enough to stimulate internal consumption. The Department may take up their cause and by proper advertising in this respect relieve the distress of the agriculturists at least to some extent.

4. *Agricultural planning.* While propaganda in respect of group (3) relates to the present and immediate future, perhaps the Department has on its anvil some kind of agricultural planning with a view to divert where possible the area under one crop to another crop which is already grown in the Province or to some new crops which could be grown. For instance, so far as existing waste lands are concerned, the Department is already advocating cashewnut cultivation in them. Further, the shortage of coconuts in India calls for the extension of cultivation of this crop wherever possible. Such recommendations need considerable advertisement.

5. *Sale of seeds, implements and books.* At present the sale of these articles is effected through the agency of the Agricultural Demonstrators. There has been very little advertising for many of these, and as such their existence is not known to a vast majority of the public. If it is felt that the total quantity of seeds multiplied at Government farms is inadequate to meet the demands for seeds from all over the Province, it may be necessary

for the Department to run seed farms. The hearty co-operation of some of our enlightened ryots is badly needed in this line. Effective advertising would help the Department a great deal.

Medium of Advertisement There are several media through which advertisements may be issued and notice will be taken of the following:— (1) Newspapers, (2) Magazines, (3) Direct mail, (4) Radio, (5) Sign-boards, and (6) Films. The merits of each from the point of view of the Department are discussed below:—

(1) *Newspapers.* Since the purpose of advertisement to be issued by the Agricultural Department is intended not only to educate the general public as to what is happening in the Department but also to instruct such of the cultivators as are literate about the recommendations of the Department, newspaper may serve as a very good medium. This form of advertisement would reach the largest number of people. The five groups of advertisements mentioned earlier could well be fitted into newspapers. The advertisements may be crisp and short at the beginning. Press notes and leaflets may be issued later detailing some of the investigations of the Department. For instance, the following types of advertisement are useful.

YOUR WASTE LANDS SHOULD GIVE YOU PROFIT

Grow *CASHEWNUTS* and have a sure return

Seeds can be had from your Agricultural Demonstrator

YOU'LL LIKE IT

GROUNDNUTS for munching

A substantial food—Rich in proteins

Eat more GROUNDNUTS

It may be necessary to have not only these advertisements effectively displayed in an important position of the paper but to have more than two insertions for each.

2. *Magazines.* Magazines command a very limited circulation in our country and cater only to particular tastes. Except a few Indian language journals, the others have very limited scope as advertising media for our Department.

3 *Direct Mail.* By direct mail, letters, cards, folders, booklets, leaflets etc., are posted to selected individuals. A proper mailing list of enlightened people who are agriculturally inclined can be drawn up by the Department by taking stock of the enquiries from private parties received by the various offices of the Department. This mailing list may be classed into various groups according to the nature of the crop grown in each tract wherein each addressee resides or owns lands. Such a grouping would

enable the Department to select the literature that should go to each addressee. The flexibility and selectivity of direct mail advertising are unsurpassed by any other medium. This line of advertising deserves special notice as its appeal to the public is direct and effective. Although its chief drawback in the Department is its relatively high cost by way of postage yet such literature could be mailed to selected addresses.

4. *Radio.* The possibilities of using radio as an aid to advertising has gripped the imagination of many. But its limitations, particularly in our country, are several-fold, more particularly on account of the multiplicity of languages. Moreover the number of receiving sets in our Province is few, and therefore the number of radio listeners is negligible compared to the population of the Province. Studies conducted in western countries indicate that appeals made through the sense of hearing are more lasting and effective than appeals made through the visual sense. Nevertheless, in our country what is gained in quality by radio advertising is lost by the paucity of the number of people who receive the message. In this Department there seems to be an imperative need to think of numbers rather than quality. At present advertisements of the Department are relayed by means of music, drama, and dialogues, for about 15 minutes every day between 6 and 7 p. m. Despite present defects, radio propoganda is becoming increasingly effective and should be continued.

5. *Signboards.* It appears that showy signboards and posters are not being used in this Department in any extensive manner though a few posters exist and some are put up at exhibitions. The possibility of a very much larger use of posters deserves to be seriously considered. The advantages of poster advertising are severalfold. Signboards are mobile and can reach any place. They concentrate attention very easily by virtue of their position, size and perhaps striking colours. They should be as simple in design as they are sure of attention. Signboards can be put on roadsides, on railway platforms and in trains, while those on motor buses ensure novelty and attention. Signboards in such places as Sub-treasuries, Registration and Judicial Offices would attract considerable attention from a large number of people from villages.

6. *Films.* The role of films as a medium of advertising has been fully recognised in all countries. A carefully planned set of short films which can be thrown as interludes before the usual programmes will go a long way to ensure popularisation of the work of the Department.

The foregoing discussion would indicate that the Department could consider the feasibility of taking to some of the above media more extensively for advertisement purposes. From the point of view of effectiveness, it is perhaps correct to state that at present signboard advertising would come first followed by newspaper advertising and lastly direct mail, though the last mentioned would entail perhaps relatively more cost merely by way of postage. It seems desirable to chalk out an advertisement programme spread over three or more years and watch the results carefully.

Educate the young. The need for creating an agricultural bias even with school children has been realised by our educationists for quite a long time and in a few schools agriculture is included in the curriculum of studies. It is desirable that this principle is extended for the use of Departmental propaganda as well.

There are about 700 High Schools in the Province. Every year about eight to nine thousand pupils pass their S. S. L. C. or Matriculation. These young men are the citizens of tomorrow and there is no reason why Departmental propaganda should not start with these high school leaving pupils. The free supply of a handsome copy of the Bible or the Gita when one takes a degree of a University may be copied, and attractively bound copies of the *Villagers' Calendar** may be supplied to high school leaving pupils. The *Villagers' Calendar* would serve as a good advertisement with the boys' families as well. Perhaps this would result in future increased sales of the *Villagers' Calendar*.

In addition to the distribution of literature, it is necessary that agricultural exhibitions are held in High Schools also. The Demonstrators may deliver popular lectures on some topical subjects to the students. A programme of various subjects may be drawn up, and different subjects may be dealt with in different tracts. The subjects may be changed every year, and the results watched. Experiences of Demonstrators dealing with a particular subject may be pooled together after the close of the lectures, and the gist of the lectures perfected as much as possible before passing the subjects on to the next demonstrator. This may be a new experiment and the results require to be watched after execution.

Financial considerations. The following estimate with slight modifications may be adopted as probable expenditure.

Expenditure per year.	Rs.
Preparation and printing posters and erection of signboards ...	10,000
Newspaper advertising	3,000
Cost of <i>Villagers' Calendar</i> for distribution to pupils ...	750
Cost of printing folders, new literature etc. ...	750
Other miscellaneous charges	500
Rs. ...	15,000

At first sight the sum of Rs. 15,000 provided for an advertisement programme may appear fabulous. In fact it works out only to about 0.7 per cent of the total expenditure of the Department. It is estimated that on the propaganda side the Department incurs not less than 4 lakhs of rupees and perhaps much more, and the estimated advertisement charges would amount to less than 4 per cent of this sum.

It may be asked whether success for this advertising programme is assured particularly when the percentage of literacy in our country is so low. The Department appears to have benefitted the ryots by the distribution of leaflets in spite of the large percentage of illiteracy in our country.

* A publication of the Madras Agricultural Department, priced one anna.

The advertisements envisaged in the foregoing pages merely make the appeal to ryots more intensive and extensive, and is to be followed up by the increased use of leaflets and press notes.

What other Government and quasi Government departments do. It does not also appear that the advertisement programme chalked out above is novel or revolutionary. There are a number of other Departments (particularly under the Government of India) which are utilizing advertisements to aid Departmental activity. The products of the Kerala Soap Institute, Calicut are well advertised. The Posts and Telegraph Department advertises its services with remarkable efficiency. The Imperial Council of Agricultural Research issues a number of posters and folders for advertising its publications. The Imperial Bureau of Plant Genetics in England has also issued a number of posters and mimeographed bulletins advertising its publications. *Indian Information* published by the Government of India is another example of how journalism has been harnessed for purposes of Departmental propaganda. Its flashing headlines and attractive summaries are an object lesson for Government advertisers. The Broadcasting Stations at Madras and Trichinopoly give a summary of a week's programme ahead of time through the medium of the newspapers.

A Central Agency for issuing popular publications and compiling advertisements. Departmental leaflets are intended as media for conveying information about particular recommendations made by the Department. Their prime object is to instigate cultivators to follow the recommendations made in the leaflets. The message contained in the leaflets should be couched in simple language, and end with a definite plea asking the reader to do a particular thing. Headlines in the leaflet should be catchy and the entire message should retain the reader's attention.

The present day manner of editing newspapers reflects the tastes of the public. Flashing headlines summarising news and reports are the order of the day. The very first sentence or paragraph of the news usually summarises the gist of the news. The compilation of such headlines and summaries no doubt requires some skill and special training. Similarly compilation of advertisements has become a special science. Separate technique for editing effective advertisements has been evolved. The Department has to take note of these facts also before launching an advertisement programme.

The practice at present obtaining in the Department seems to be that the author of every investigation writes his own leaflets. This appears to have resulted in numerous leaflets, each having a differing degree of appeal to the public proportionately to the skill of the author in writing popular leaflets. If the leaflets are to be effective, it appears necessary that the scientist should combine in him the qualities of the journalist as well. It is for consideration whether the Department cannot have a small trained Central Agency for editing popular literature and posters with the

material furnished by the investigating officer. Commercial concerns always seek the help of special advertising agencies for writing their advertisements. This would relieve pressure on the time of the scientist. After editing by the Central Agency, the draft of the popular publication or advertisement may be sent back to the author for approval before releasing it to the Press.

Co-operative Marketing of Sathugudi Oranges.

By T. K. VISWANATHAN, B. Sc. Ag.

The Kodur Fruit Growers' Co-operative Society, Rajampet.

The production of Sathugudi oranges in South India is at present concentrated in parts of Cuddapah, Chittoor and North Arcot Districts. But nowhere has it attained such a great commercial importance as in Rajampet taluk of Cuddapah District, particularly in and around Kodur town. It has been estimated that out of a total area of about 13,000 acres under 'tight jacket' orange, about 4,000 acres are spread out in a small valley in Rajampet taluk bounded by the Velikonda hills on the East and South and Seshachalam hills on the North and West. This tract is favoured by a fertile soil of considerable depth and good texture, a plentiful supply of sub-soil water suitable for irrigation, freedom from cyclonic winds and proximity to markets, factors eminently suitable for making this valley so renowned as the leading orange belt of South India.

The estimated production of oranges in this tract is at present of the order of 50,000 railway maunds, of which well over 45,000 maunds are believed to be exported annually outside the district, primarily to Madras city. This production represents the crop of only about 40 per cent of the planted area, as the rest of the orchards are yet young and in a non-bearing stage. With the present trend for rapid extension of orange plantings and the consequent increase in the bulk of marketable oranges from such new plantations in the near future, the problem of profitable disposal of the crop is bound to assume very great importance. Already there are complaints that the price of oranges is showing an abnormal tendency towards deterioration, so much so that the fruit is being quoted during the peak season in retail market at Madras at about Rs. 2 per hundred as compared to Rs. 4 to 5 during the corresponding season about three years ago. To attribute this alarming fall in price to over-production will be a travesty of facts, for the Presidency is not only a big importer of 'Santra' oranges from Coorg and Nagpur, but is also suffering from an under-supply of *Sathugudi* or allied type of 'tight jacket' oranges in most of the mufussal markets and almost all towns other than Madras. The haphazard method of distribution and defective system of lease of orchards and of marketing of fruits are believed to contribute mainly to the prevailing slump. Such features serve only to accentuate the ills and hasten the ruinous condition of the orange industry as the younger plantations continue to add increasing quantities of saleable produce every year.

The Sathugudi-growing valley of Rajampet taluk is also reputed for the production of a number of varieties of mangoes and also limes. The total area under mangoes in the taluk is estimated to be about 10,000 acres. Unlike oranges, however, the major portion of mangoes produced in this tract finds its way to Hyderabad (Dn) and Northern India markets instead of to Madras city which, because of their proximity, is naturally fed by the mango plantations in Chittoor district. Despite the absence of any clash of interests between the marketing problems of Sathugudi and mango, it is however found that the methods of assembling, financing the crop and its transport, methods of sale of standing crop and of disposal at the primary markets and place of production are almost identical in these two fruits, so that any improvements effected in the marketing of one fruit are bound to react favourably on the other as well. This fact necessitates the adoption of a co-ordinated policy in any effort for the profitable disposal of all fruit crops in this intensively fruit-growing tract.

A noticeable feature of fruit production in Rajampet taluk, as perhaps in the rest of the Presidency, is that the orchards comprise of small holdings of an average size of half-an-acre. The orange orchards in the taluk are therefore owned by a large number of small peasant farmers and a few well-to-do ryots. The former class of people is proverbially indebted, while a good number of the latter class has also to depend for temporary financial assistance on extraneous sources at least during the harvesting periods. In a perennial crop like fruit which involves several years of patient waiting for returns, an injudicious grower is apt to overlook the golden principle of "cutting one's coat according to the cloth". Consequently, after about 10 years of nursing the young non-bearing orange plantation, the grower is usually faced with a pile of debt which he hopes to clear with the sale of his crop during the bearing period, commencing from about the eleventh year. Even during the latter period he should have ready capital for meeting the high annual cost on irrigation, manuring, watching and also on packing and transportation. After he has cleared the various loans borrowed for meeting these sundry annual expenditure, it is very rare that he has a surplus balance for clearing his original debt contracted during the non-bearing period of the plantation. Thus the average Sathugudi planter is anything but a contented person.

The aforesaid peculiarities provide a most profitable ground for giving full play to the wits and ingenuities of some unscrupulous middlemen and their dishonest commission agents. The writer does not suggest that all middlemen and commission agents are unscrupulous enemies of the grower; as a matter of fact, many growers acknowledge with gratitude the considerable financial help received from this class of financing businessmen in times of their dire need and but for which the growers would not have been able to tide over their acute periods of distress and even convert their plantations to veritable sources of profit in due course. Notwithstanding such instances, the fact cannot be gainsaid that, the fruit industry in Rajampet

taluk has come to what it is, almost entirely due firstly, to lack of suitable system of financial assistance, secondly, to individualistic efforts of the growers and thirdly, to the chaotic method of disposal of the produce in primary markets.

The disorganised state of the fruit industry in the taluk stimulated thought among some of the leading growers and drove them to adopt concerted efforts for bettering their lot. The inception of a Fruit Research Station at Kodur during 1935 helped a great deal in providing the growers with suitable advice at this period and in guiding their efforts through right channels. During 1935 and 1936, a number of meetings were convened at Kodur when several proposals for improvement of fruit industry through co-operative effort were discussed by some of the leading growers and the Government Officials of the Co-operative and Agricultural Departments. Ultimately on 17-4-1937, the Kodur Fruit Growers' Co-operative Society saw the light of the day and was officially inaugurated by the Collector of the District.

Since its inception in 1937, this society has been able to claim a very great and all round progress, so much so, that it is now recognised to be a unique and the only successful body in the line in the whole of India. A measure of its achievements cannot be adequately presented in the purview of a small article like this, but nevertheless, the following figures will serve to give a brief idea of the progress achieved during its short existence.

TABLE I. Quantity of fruits marketed.

Year.	Oranges.	Mangoes.*	Limes.	Sapotas.	Total No. of baskets.
					(in baskets)
I. 1937-38.	9,258	651	364	...	10,273
II. 1938-39.	20,376	1000	704	85	21,165
III. 1939-40.	30,823	292	399	104	31,618

TABLE II. Progress of the Society from date of starting.

Year.	N ^o . of members.	Share capital paid up.	Borrowing from Cuddapah Central Bank.	Loans issued.	Value of fruits exported.	Profit or loss.	Commission earned.
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1936-37	25	1,535	Nil	Nil	Nil	53 (loss)	Nil
1937-38	108	2,795	35,115	42,635	30,004	853	1,405
1938-39	173	4,325	49,889	62,025	83,175	1,800	5,270
1939-40	230	6,156	27,559	32,405	89,775	(not audited)	5,610

The Society has got its headquarters at Rajampet and a branch at Kodur. Ungraded fruits are at present consigned to the Madras Provincial Co-operative Marketing Society at Madras, which after grading disposes off

the fruits quickly. The Marketing Society also despatches oranges by arrangement to various centres in Southern districts such as Trichinopoly, Tanjore and Madura according to demand. A commission of Rs. 0—1—0 is charged for every rupee of gross sale by the Fruit Growers' Society, of which one-fourth of the commission is paid at present to the Provincial Marketing Society.

The Society has been able to exploit new markets and thus widen the distribution of Sathugudi oranges, and by this means has been rendering a very valuable benefit to the orange industry as a whole. Paid representatives are now posted by the Society at (1) Anantapur, (2) Hindupur, (3) Hyderabad (Deccan) and (4) Bangalore. Through posters, hand-bills, articles and advertisement in the press, a vigorous drive towards popularisation of oranges in the daily diet of the people has also been taken up.

Grading of fruits was tried and the result has been sufficiently encouraging as to enable the adoption of the sale of graded fruits in a number of South Indian markets. The society has achieved a big success in creating a demand for graded fruits from moffussil co-operative societies. It was only after the society was started that grading of oranges was taken up. Now the demand from moffussil centres is only for graded and standardised oranges. The society intends starting grading stations with orange grading machines at important fruit producing areas in Rajampet Taluk, and consign such graded oranges directly from production centres to consuming areas, which seems to be the most logical and economical way of marketing oranges. Through this innovation and wide publicity, the consumers have been educated to demand more and more graded fruits of standardized quality.

Two spraying machines have been ordered by the society for meeting the demand of its members for controlling pests and diseases in their orchards. Co-operative purchase of growers' requirements, particularly in the matter of purchase of fertilizers is being attended to. With the loan of the services of a Junior Inspector who is a graduate in Agriculture, for a period of 15 months during the initial stages of work of the society, advisory work in the maintenance of orchards has formed a useful line of activity. This officer serves also as a link between the Fruit Research Station, Kodur and hundreds of fruit growers. In due course, a number of other useful lines of works for the effective improvement of growing and marketing sides of Sathugudi orange industry are also expected to be undertaken.

Co-operation in relation to fruit growing and marketing is novel, in so far as this province is concerned. It is therefore not surprising that the success achieved by the Kodur Fruit Growers' Co-operative Society has attracted wide attention and several requests for the bye-laws of the Society and for advice on the organisation of similar societies elsewhere have come in both from within the province and outside. The following extracts of the bye-laws of the society may therefore be not without interest.

Objects.

Bye-law 2. The objects of the society are :—

1. To encourage self help, thrift and co-operation among members,
2. to act as agent for the joint purchase of agricultural requirements of the members,
3. to teach members improved methods of cultivation of fruits and to supply seed material, manure, nursery plants, grafts, implements etc. for growing fruits,
4. to arrange to sell the fruits grown by members to the best advantage
5. to undertake such other activities as are incidental or conducive to the development of fruit growing by demonstrations propaganda etc., and
6. to give to the members advances to afford facilities to members to the growing and marketing of fruits grown by them.

Business of the Society.

Bye-law 39. It shall be the duty of the board of directors to arrange for the sale of the fruit or other products of members to the best advantage at places of consumption. Any member who fails to transact his produce through the Society shall be liable to a fine in the first instance which the Board of Directors may impose. If the failure is persistent the member is liable for expulsion by the general body.

Loans.

Bye-law 43. Temporary advances may be given at the rate of not exceeding $6\frac{1}{4}$ per cent as determined by the Board of Directors from time to time when necessary for a period of 12 months to afford facilities to members to grow and market fruits or to liquidate petty debts previously incurred for that purpose. Every such advance must be supported by the pledge of the standing crop belonging to the member together with the collateral security of at least one solvent surety. The amount of advance shall not exceed 40% of the then market value of the estimated out-turn. When the return of the advance is not made within 12 months the Board of Directors shall take steps to recover the amount irrespective of the above period at any time if such a step is deemed necessary by taking action as laid down in bye-law 51.

Bye-law 44. Loans may also be given to members on the security of their deposits, on the security of Government securities, or on the mortgage of un-encumbered immovable properties of the members up to 60% of their value when such loans are required for such useful purposes that will improve the growing of fruit trees. Interest on such loans shall be charged at $7\frac{1}{2}$ %.

In the organisation of this Society and in every branch of its activity the Co-operative and Agricultural Departments (particularly the Marketing Section and Fruit Research Station, Kodur) have undoubtedly played the leading role. Among the members, the moving and dynamic spirit for the success of the Society has been that of the Secretary, Sri. V. R. Satyanarayana and the President, Sri. P. V. Pattabhi Rama Reddy.

SELECTED ARTICLE

The Manufacture of Humus.

By H. M. L.

It has been the lot of the present writer during the last few years, and with greater emphasis, perhaps, during the last few months, to draw attention to the importance of humus in the agricultural cycle. If, in so doing, he may appear to have strayed from the relatively restricted field of sugarcane cultivation into the wider field of general agriculture, apology for such errantry will hardly be needed. The reasons are two; in the first place, the problem of the maintenance of soil fertility here involved is itself a general one, common to all crops; in the second, the tendency, if there be such in the sugar industry, is away from the humus and in the direction of a growing use of artificials. It has been necessary, therefore, to derive examples mainly from the experience obtained in the cultivation of other crops.

In these references there has, perhaps, been too great an acceptance of the fact of the existence of a substance termed humus and too little attention paid to what humus is and how it is prepared. That omission it is here proposed to remedy in as far as so complex a subject can be dealt with adequate brevity.

Humus, then, is not a chemical entity capable of being described and defined in a chemical formula showing so many atoms of the different elements within a characteristic molecule. It is an aggregate of different chemical compounds varying widely from sample to sample, but an aggregate of which all the samples having these points in common; a common mode of origin and certain common physical and chemical properties. The residues of living organisms, in the process of decomposition, pass through a series of natural changes which result, in the production of a relatively stable body, and it is to this body that the term humus is applied. A halt is thus called in the passage of these residues from the highly complex organic substances of the body immediately after death to the simple inorganic substances, water, carbon dioxide, nitrogen and nitrogenous salts and so on, which form the ultimate products of decomposition. It is this natural halt which plays such a vital role in the maintenance of fertility. The more important properties characteristic of this relatively stable product are, on the chemical side, and acidity which cause it to react with the mineral elements of the soil and which is responsible for the liberation of potential plant food, and a carbon nitrogen ratio of approximately 10:1. On the physical side, humus has a high retentive capacity for moisture, acts as a cement causing the smaller soil particles to form aggregates and thus aids the movement of both water and air in the soil. But it is on the biological side that its properties may be found to have the most important effect through the mycorrhizal association which has only recently been recognized as of general occurrence.

From the above description of the nature of humus it follows that, since all living organisms ultimately die, the source of humus is as varied as organic nature itself. Herein lies the first difficulty in offering a concise series of instructions on the lines of Mrs. Beeton for the preparation of humus; the raw material ranges from the highly nitrogenous residues of the animal carcass to plant residues consisting of almost pure carbohydrate, cellulose and lignin. A second difficulty lies in the fact the conversion to humus is a biological reaction, the work of fungi and bacteria. These, being themselves organisms, require for their vigorous growth and action that, the conditions shall lie within certain

broad limits particularly in regard to humidity, temperature, air supply and acidity of matrix. Further the process of preparation consists of a series of steppings-down, from one stage in the descending scale of organic complexity to a still lower stage, and each step is broadly speaking the work of some specific organism each with its own specific optimum environment to a greater or less, and in some cases greater than less extent differing from the optimum of the remaining organisms. In this respect the art of preparation consists very largely in bringing the natural environmental conditions into line with the optimum for the particular stage of the preparatory process. These difficulties may impart an ambiguity to any description of the method of manufacture which may further induce a condition similar to that of the centipede on being asked by the toad which leg moved after which. The process is not, however, so full of obstacles as that implies; all process involving fermentation are "tricky" and incapable of exact definition. That has not prevented them from being adopted on a large scale, and they form, in fact, the foundation of many large industries, such as brewing, the preparation of cacao, and the curing of tobacco. Here, as in these other cases, practice is far better than precept.

First, then as regards the raw materials; the bulk of these in an agricultural setting consists of plant residues which for the most part are composed of carbohydrates of varying resistance to the action of the attacking organisms. These like all other organisms, require a certain supply of the essential plant foods, and in the case of the more resistant tissues there is usually a deficiency of nitrogen. To make up for this deficiency some nitrogenous substance should be added to give a carbon nitrogen ratio of approximately 33:1. Success will also depend on the mechanical state of the material. Woody tissues are protected by bark, which requires to be broken down so that the organisms of destruction may have ready access. Such woody material may be broken down on the farm roads where an adequate traffic of farm vehicles occurs.

The farm also supplies suitable nitrogenous material in the form of urine and the droppings of animals. The advantage of the use of these rests not only in their availability on most farms but on the fact that such natural products are found to contain a not readily definable something which gives to them a superiority over nitrogenous materials of inorganic origin. It is a something which acts apparently through the mycorrhizal association above referred to, for, apart from the obvious increased vigour and freedom from disease which characterizes plants grown on a natural humus, a study of the root system shows a strong development of mycorrhiza. Humus, it is true, whatever its origin, possesses a certain value as a supplier of plant food calculable in terms of N, P and K; but the value derived from this at present illdefined something transcends these more readily determined values. Chemical analysis, in fact fails as a yard measure of this latter value, and actual use may not improbably reverse the verdict of the laboratory. Until the nature of these elusive constituents of the animal residues is better understood, such residues will form a necessary raw material of an effective and sound system of agriculture.

With these two raw materials available it is now necessary to consider the conditions required if fermentation of the combined mass is to proceed along the lines which will yield the maximum of the desired product. As the fermentation proceeds, the mixture soon becomes acid, a condition inimical to the action of the micro-organisms it is desired to render most active. This acidity must be neutralized. Wood ashes, in that they supply additional potassium are very suitable for this purpose; but if these are not available calcium in the form of powdered chalk or limestone (but not quick-lime, which is too fierce) serves the purpose well and these bodies may be diluted with earth.

With these three materials to build up the matrix all the essentials for the preparation of humus are present. It now remains so to handle the mixture that the fermentative process proceeds along the lines which will result in the maximum yield of high quality product. For this purpose not only must the three constituents be sufficiently mixed for a uniform growth of the organisms concerned, but the environment must be adopted to suit their particular needs. Of the major factors of the environment, temperature may be omitted from consideration. As is well known a very considerable heat is developed in the course of the fermentative activity and this can be left to look after itself. What has to be regulated is the supply of air and moisture. The latter is required during the whole of the period of production; and abundant supply of air (the natural source of oxygen) is required only during the early stages. The reason for this is that the organisms responsible for these early stages, the decomposition of the more resistant carbohydrates, cellulose and lignin, are aerobic (operate only in the presence of ample supplies of oxygen). It is in these early stages that control is most difficult for a balance has to be struck between the amount of water and air occupying the interstitial spaces of the mass. The ideal that should be aimed at is a condition similar to that of a pressed-out sponge. In practice the tendency is in the direction of an excessive amount of water.

The need for an adequate air supply raises another point. The action of the organisms results in an absorption of the oxygen and the evolution of carbon dioxide. Unless, therefore, matters are so arranged that a sufficiently rapid interchange of gases can take place with more oxygen replacing the carbon dioxide as fast as this is formed the activity of the organisms will be slowed down. In practice it is found that adequate percolation of air into such a matrix as has been indicated proceeds only to a depth of some 18 to 24 inches.

One further point must be attended to. In whatever form of heap the matrix may be built, uniform conditions cannot be maintained throughout; the outer layers being more exposed to the air, will be subjected to more variable conditions of humidity, air supply and temperature. This has to be adjusted by intermittent turning of the heap so that the exposed material becomes buried.

The preliminary fermentation is primarily the decomposition of the non-nitrogenous carbohydrate residues and is mainly the function of aerobic fungi, for the activity of which the deficiency of nitrogen is made good by the addition of the nitrogenous substances. The decomposition of nitrogenous residues is the work of anaerobic bacteria for which special measures for the aeration of the mass are not necessary.

These are the main principles underlying the successful production of compost; they must guide the practical steps, and the Indore process, now so widely adopted, is based on them and takes into consideration also the economic considerations, which are of almost equal importance. In this the heap is conveniently 30 ft. long by 14 ft. wide, with the material piled to a depth of 3 ft. The pit is divided into six sections of which the second from one end is first charged, the end section being reserved for turning. The vegetable wastes are laid across the section to a depth of 6 in. and on this a layer of 2 in. of animal wastes, on which is sprinkled a mixture of urine-earth and wood ashes as a thin layer. The process is repeated till the maximum depth is reached. If the depth is greater than 2 ft. and it may be as great as 5 ft. vents must be made (conveniently done by working a crow-bar), say three to a section. The third and subsequent sections are then built in like manner. The amount of water to be sprinkled on each layer is at once the most important and difficult of the operations concerned as it will depend on the nature of the material; experience is here the best guide. Later regulation of the water supply, depending

as it does on the climatic conditions, is also a matter best learned from experience. A decision is here required whether the material should be heaped or pitted and after construction, whether additional watering should be given. If correctly charged the heap will show active fungus growth in three days, and in a few days the depth will decrease from 5 ft to 3 ft.

A first turn should be made after two to three weeks, and again, after some five weeks, in the reverse direction when the aerobic stage will be approximately complete. Opportunity can be taken at each of these to regulate the humidity of the heap. A guide to the efficiency of the process is given by the temperature, which should quickly reach approximately 150°F. and fall to some 85°F. after 90 days, with intermediate rises after the turn.

The first stage, which continues up to and shortly succeeding the second turn, is the preliminary aerobic stage, and it is followed by the anaerobic stage in which the active organisms are bacteria. It is during this stage that fixation of atmospheric nitrogen takes place, and the gain of nitrogen may be considerable, for if the process is efficiently conducted there is little loss of original nitrogen in the heap that is absorbed into the body of the agents of decomposition.

After some 90 days the process slows down and the relatively stable condition of the material, to which the name humus is applied, is reached. It is now ready for the land. But complete stability is never reached. Oxidation continues, nitrification will set in, and the nitrates formed may be lost by leaching, or if carelessly stored, de-nitrification may lead to the loss of the nitrogen which so many pains have been taken to secure. Immediate application to the land is the best safeguard against such losses; if this be impossible, it should be kept under cover and turned from time to time. It is an asset which it will pay to conserve.

It is a curious fact that while some of the tropical agricultural industries notably tea and sisal, are increasingly turning their attention to the preparation and use of compost, the reverse process is taking place in the sugar industry. In those countries the West Indies and Mauritius where a long established procedure based on pen manure existed, this material is giving way to the employment of artificials. The explanation lies largely in the economic sphere; the development of the tractor has rendered the head of cattle previously kept uneconomic when considered merely as a source of power. In those newer areas Cuba, Hawaii and so on, a virgin fertility has been fortified by artificials from the commencement. It may well be asked whether a stable industry based on what is, in practice a mono-culture, can be possible in the case of sugarcane alone among crops, if the precepts of nature are so lightly regarded.

The main factors which militate against a return to organic manures are the intractability of the major residues of the crop, cane trash and bagasse, particularly the former since a large proportion of the latter is consumed as fuel, and the supposedly inadequate supply of nitrogenous wastes consequent on the reduction of the stock carried. The problem of how these wastes can be economically converted into compost has yet to be seriously tackled. The general lines are clear. It is a general experience that mixed vegetable residues are more readily decomposed than a uniform residue such as trash and it may be found economic to grow a green crop for the purpose of admixture. The other factory wastes, filter press cakes and molasses, with distillery wastes will also help in this direction as well as in supplying a mass of readily decomposable material. The nitrogenous activator if an adequate supply cannot be secured from the stock kept might well be looked for in any suitably installed sanitary

system for the labour lines which are usually a feature of sugar estates. The Indore process can be readily adapted for the handling of habitation wastes under hygienic conditions. A preliminary attack on the problem has been made in South Africa by Dymond, who has shown that trash requires to be weathered a little before composting, and by Tambe and Wad in India.

(*The International Sugar Journal* 42 (1940) : 341-343.)

ABSTRACT

Composts and Soil Fertility C. N. Acharya, *Indian Farming* : 1 (1940, 66-68). The importance of maintaining a satisfactory level of organic matter in the soil is now generally accepted by scientists and farmers alike. The maintenance of a high level of organic matter is far more difficult in the soil of the tropical and sub-tropical regions than in that of the temperate zones. Hence, if the fertility of the tropical or sub-tropical soil is to be maintained, the application of bulky organic manures almost every year becomes quite necessary. Farm yard manure, one of the most important organic manures, is of course in largest use in this country. While the average supply of farm yard manure is about a ton per acre, the average demand is about 5 to 10 tons per acre of land under cultivation. To make up the above deficiency, composts come in quite handy as a suitable and efficient substitute. The Chinese have been adepts in the method of composting since very ancient times. There is need to copy the Chinese example, and to utilize all our resources, if the productivity of our land is to be maintained, if not improved, in view of the ever-increasing population in our country. A great many methods have been recently suggested for composting waste organic materials. The 'Adco' process developed at Rothamsted, the Indore process developed by Howard and Wad and its subsequent modifications, the Madras method worked out at Coimbatore, the Activated Compost process evolved by Dr. G. J. Fowler, the Hot Fermentation process worked out at the Indian Institute of Science, Bangalore, are some of the most important. The essential features more or less common to all the above are the following:—

(1) The basic material for composting is the bulky organic refuse, e. g. leaves, weeds, stubbles, stalks, husks, etc. (2) A suitable starter is added—organic nitrogenous substances, such as night-soil, urine, sewage, activated sludge, or inorganic nitrogenous compounds such as Adco, ammonium sulphate, sodium nitrate, calcium cyanamide, etc, which serve to promote the rapid development of the necessary micro-organisms, which effect the decomposition. The amount of the starter required for decomposition depends on the amount of nitrogen initially present in the refuse. The addition of phosphorus compounds to the "starter" in the form of rock phosphate, basic slag, bone meal or super phosphate, help to improve the quality of the manure though it does not ordinarily increase the rate of decomposition. Another function of the "starter" is to act as an inoculant carrying a vigorous micro-flora for decomposition. The addition of an inoculum, such as actively fermenting compost (used by Dr. Fowler in his Activated Compost method) dung, night soil or sewage, shortens the time of composting. (3) The maintenance of an optimum moisture level in the compost heap—usually 50% of the wet heap—with the reaction at the natural or "slightly alkaline range is insisted on. In the Hot Fermentation method the loss of moisture by evaporation is prevented by covering the heap with earth and mud paste (4) A proper physical condition or body in the compost heap is necessary to start with. Woody materials such as cotton stalks may be broken down under the feet of cattle or under the wheels of carts (5) The rise of temperature in the compost heap destroys weed seeds, fly maggots, worms and pathogenic organisms. The points of difference between the various methods of composting at present in use are the following:— (1) The majority of methods are "aerobic"

The intensely aerobic method of treating the ordinary mixed farm wastes may shorten the period of composting, but will lead to heavy losses of organic matter and nitrogen. It is found advantageous to stop the aerobic treatment after about a week, as in the Hot Fermentation process, and allow further decomposition to take place anaerobically. (2) The refuse decomposes more uniformly and results in a better quality of manure if made in pits or trenches than in heaps overground. (3) The degree of disintegration of the final manure varies in the different methods. The aerobic methods aim at carrying the process to a stage till the material becomes powdery involving heavy loss of organic matter and nitrogen and greater labour and watering charges. The Hot Fermentation method overcomes the disadvantages of the aerobic method. (4) If losses of nitrogen are to be avoided, the aerobic treatment has to be stopped at the proper stage, especially when mixed farm refuse containing dung and urine is used. The addition of inorganic nitrogenous compounds as 'starters' increases the loss of nitrogen. Intense aerobic treatment will be found advantageous if large amounts of refuse poor in nitrogen are to be composted. (5) A simple system like the Hot Fermentation method would suit the Indian ryot better than the aerobic systems requiring several turnings and waterings like Indore process. The beneficial effects of the application of organic matter to the soil can be classified under three heads:— (i) improvement of the physical condition of the soil, (ii) supply of plant nutrients and (iii) biological factors and supply of plant hormones. If the Indian ryot hopes to get a reasonable profit by application to his land, of the composts prepared by him, he must take into consideration the following factors, viz., the nature of his soil, the assuredness of enough water supply for irrigation purposes, the quality of his manure, the nature of the crop to which he is applying it and other points such as his ability to supplement the compost with small doses of inorganic fertilizers.

P. A. V.

The growth of the rice seedling (*O. sativa*, Columba variety No. 42) in salt solution of different H ion concentrations. R. E. Cooper and D. V. Sohoney. *Jou Ind Bot. Soc.* 19 (1940): 299—310. Dustur and John (1937) had previously established that the most favourable pH for the growth of rice seedlings is between 6.0 and 7.0 and that solutions of ammonium sulphate and ammonium phosphate produce better growth than potassium nitrate. They did not, however, employ culture solution of higher pH value than 7.0. The present authors grew seedlings in salt solutions varying in pH from 6.0 to 8.0 with a gradation of 0.2. The salts used were the sulphates of sodium, potassium, ammonium and magnesium; nitrates of sodium, potassium, ammonium, calcium and magnesium and phosphates of sodium, potassium and ammonium. Knop's and Tottingham's culture solutions were also used in addition to the above. The growth of the seedlings was estimated from their dry weights. The important conclusions arrived at from the investigation are as follows:— (1) The most favourable reaction for the growth of rice seedlings was found at pH 7.0 and 7.2 for all salts and culture solutions. (2) The maximum increase in dry weights amongst the nitrates was obtained in the ammonium nitrate and potassium nitrate solutions the two salts being equal in their effects. (3) The minimum increase in dry weight was obtained in the calcium nitrate solutions. (4) The maximum increase in weight was obtained in ammonium nitrate solution at pH 7.0, while in the potassium nitrate solution it was at pH 7.2. (5) The maximum increase in dry weight of the rice seedlings amongst the phosphates was obtained in ammonium phosphate and potassium phosphate solutions, both being equal in their effects. (6) The maximum increase in dry weights of the rice seedlings amongst the sulphates was obtained in the magnesium sulphate solution at pH 7.2. (7) In general, phosphates were found superior to nitrates and sulphates,

as the greatest increase in dry weights occurred in the phosphate series. This is probably due to very small growth made by the seedlings in calcium and magnesium nitrate. If these two are not taken into account the nitrates of ammonium and potassium are superior to phosphates of the same two kations. But sodium phosphate on the other hand has given greater increase in dry weight than sodium nitrate. (8) There is a greater fall in dry weight in the nitrates than in the phosphates of different kations as the pH of the solution increases from pH 7.2 onwards. If the solutions of all the pH values are considered together, the average increase in the dry weights in the ammonium and potassium nitrate solutions are lower than in the phosphates of the same kations. Thus for the rice seedlings the range of favourable reaction is wider for the phosphates than for the nitrates. (9) The superiority of magnesium sulphate for the growth of the rice seedlings over the sulphates of the potassium and ammonium has been wholly unexpected and it is difficult to explain it at present. (10) The interaction of kations with pH was highly significant, indicating that the effect of each kation on growth was modified by the pH of the salt solution.

K. R.

Earthing up of Sugar-cane. Sethi R. L. *Indian Farming* 1 (1940) : 166—169. Earthing up of canes is a common practice in many important tracts throughout India. It may either be done early in the season when the plants do not exhibit any internodes above ground or later during growth when plants are well above the ground level and have formed a few internodes. In Mysore, earthing has proved valuable in lessening the borer attack. There, earthing is done much earlier in the season when the plants are small and are susceptible to the borer attack and is different from the final earthing done later to give mechanical support. It is when the cane shoots are almost a foot in height (i. e., about the time when the crop is almost four weeks old) that the young larvae of the pest bore into the shoots at the base and by eating up the tissue cause "dead hearts". Earthing up the canes before the 'dead hearts' are formed keeps off the borer larvae from getting into the cane shoots and thus saves the crop from the attack of the pest. If the earthing up is done later i. e., when a fairly large number of "dead hearts" are visible, the fresh tillers appearing from the diseased shoots are saved from an attack of the pest as the larvae in the diseased shoots are enveloped by the soil heaped up at the base of the shoots by the earthing and thus prevented from moving on to the healthy shoots. Removal of "dead hearts" at this stage is not advocated, as by doing so the young caterpillars which would otherwise remain plugged in the dead cane shoots would find their way out to attack healthy shoots. The fall in the percentage of attack by borers as a result of this earthing and green manuring with sunnhemp is as below:—

Variety.	Normal.	Lessened after earthing and green manuring.
Batjan	70	9
POJ. 2878	55	8
POJ. 100	60	10
Co. 281	68	8

The results of experiments at Padegoan, however, are at variance with those obtained at other stations. These have indicated a definite tendency towards higher yields in crops grown in unearthed conditions. This is mainly ascribed to the presence of a large number of millable canes at harvest time in this treatment owing to the development of late tillers which are otherwise smothered by the operation of earthing.

Experiments in different centres have shown that earthing up at the later stages has the effect of improving the purity, increasing the sucrose contents at the time of harvest, though not earlier. M. A.

Report on the Marketing of Coffee in India. (Issued by the Agricultural Marketing Adviser to the Government of India). *Historical.* The original home of the coffee plant is believed to be Abyssinia from where it was first introduced into Arabia in the 5th century A. D. Introduction of coffee on a commercial scale to the rest of the World dates from the 16th century A. D. and it was in this century that it was introduced in India at the Baba Budan hills in Mysore.

Varieties. Coffee belongs to the genus "Coffea" under the natural order Rubiaceae, in which are included other economic plants like Cinchona and Ipecacuana. There are some fifty species and sub-species of coffee which are shrubs or trees under 30' in height. However, the economic types are *C. arabica*, *C. robusta* and *C. liberica*.

C. arabica is a king of the Coffee tribe. The plant flourishes on elevations between 2,500'—5,000', grown under heavy shade. Yield varies from 100—1,200 lb. per acre.

C. robusta. The original home is Congo. It is a much larger plant than arabica, grows at elevations 1,000—2,000' lower than those considered essential for the cultivation of arabica. It is a more prolific bearer, resistant to pests and diseases. Average yield 450 lb. to 675 lb per acre. Beans are small and round.

C. liberica is a native of tropical west Africa and is a larger and sturdier plant than arabica, but the quality of the beverage is inferior. It can be grown in hotter climates. It is vigorous in growth, disease-resistant and a bumper yielder. The bean is large with a pronounced flavour.

Climate and soil A temperate climate in a tropical zone is most suitable for coffee cultivation. Coffee grows best in well-drained soils, rich in humus, moist and friable. A mean annual temperature of 70°F with an average minimum of 55° and an average maximum of 80°F is generally suitable. Coffee cannot withstand frost. It grows at altitudes ranging from sea level to 5,000'. However an altitude of 2,500—5,000' with suitable soil and shade produces a very good quality of bean. The annual rainfall should be about 70"—evenly distributed.

Yield and longevity in coffee. Coffee begins to bear from the 3rd to 5th year. Coffee trees are generally in full bearing capacity between the age of 10 to 30 years. The life of a coffee plant depends mostly on the care and proper management of the estate. It is up to 80—90 years.

Area under different species of coffee in 1937—38 in India.

<i>Arabica.</i>	<i>Robusta</i>	<i>Liberica.</i>
189,370 acres.	19,770 acres.	50

About 90 % of the area is under arabica and 10 % under robusta.

Average acreage and production in 1932--37 in India.

	<i>Acreage.</i>		<i>Production.</i>
Mysore.	50.2 %	...	45.3 %
Madras.	26.5 %	...	24.0 %
Coorg.	19.5 %	...	26.6 %
Travancore.	3.8 %	...	2.9 %
Cochin.	0.9 %	...	1.2 %
Other parts.	0.1 %

The area under coffee in 1936—1937 in the World was 12,768,000 acres.

Brazil.	...	8,555,000	..
Colombia.	...	885,000	..
Haiti.	...	350,000	..
India.	...	190,000	..

Production in 1936—1937. The world production was 49,888,000 cwt.

Production in Brazil was	31,042,000 cwt.
„ Colombia	5,256,000 „
„ Haiti	488,000 „
„ India	304,000 „

Area under coffee in Madras, Coorg and Mysore.

	Madras.	Coorg.	Mysore.	Total.
1913—1914.	48,785	42,991	105,539	197,315
1933—1934.	52,009	40,586	103,206	195,801

The annual World export of coffee was about 30 million cwt. in 1930—1934. The U. S. A. takes about 50 % of the world imports or equivalent to 25 times the production of India. France is the next biggest consumer taking 3.6 million cwt. and Germany takes 3 million cwt.

Supply. The value of annual production of coffee in India is estimated to be 1½ crores of rupees and the plantations provide employment to nearly a lakh of persons.

The personal attention bestowed on small plantations neutralises to a certain extent, the effects of primitive methods of cultivation. About 37,000 acres are under small plantations and the entire crop from these small plantations is 'cherry dried' which sells at a cheaper rate than 'parchment' (plantation) and hence the smaller producers suffer and fare worse than the bigger producers. It would be better if the small producers, pool their resources and put in the market, a fairly uniform and standard quality product. This is of importance in Madras, Travancore and Cochin where small holders are numerous.

The average yield per acre of *arabica* and *robusta* for the years 1932—36 was 217 and 453 lb. respectively. *Robusta* is becoming increasingly popular with small planters on account of its disease resistance qualities and prolific yield.

The percentage of 'plantation' and 'cherry' in the quinquennium ending 36—37 was 52 and 48 respectively. The production of 'cherry' is high in small holdings as the preparation of coffee as 'parchment' depends on water facilities in the estate. Large number of estates in Mysore have no proper water facilities. It is clearly detrimental to the producer to prepare his entire coffee as 'cherry'. Better facilities for assembling, pulping, and water supply are urgently called for.

It would be in the interest of the growers to have all their coffee cured and properly graded. In 1935—1936, only a third of the total produce was cured. On the whole about 55% of the estimated production of 'parchment' (plantation) coffee and about 18% of 'cherry' passes through the curer. The percentage under different grades are as follows:—

A grade	...	52%
B grade	...	26%
C grade	...	5%
Peaberry	...	9%
Triage	...	8%

The harvesting period is normally from October to March. 'Parchment' (plantation) starts coming into the market earlier than 'cherry' and it begins from December. 'Cherry' is ready in January—February. The harvesting season in Brazil is found to be from the middle of March to middle of September and coincides with the off-season in India.

About 10,000 cwt. of chicory valued at about Rs. 1,30,000 are imported into India every year. About 60% of the imports are from Holland, 30% from Belgium and the remainder from United Kingdom and Germany.

India exports annually about 32% of her coffee valued at about 1 crore of rupees. The United Kingdom and France have been India's best customers and more than 50% of her exports are absorbed between them. India's leading position for quality coffee was almost unchallenged before the Great war, but competition has since been keen from Costa Rica, British East Africa and Colombia. Shipments to the United Kingdom, consists nearly of 90% A grade "Plantation" coffee and are usually concentrated in the months January-- May, while those to France start from September and go on to June. Shipments to Norway are spread over all the months.

The net available market supply in India was about 435,340 cwt. in 1935—1936. The per-capita consumption in India for 1935—1936 may be reckoned at 0.137 lb.

Demand. About 96% of the coffee available for consumption in India is consumed within Madras, Coorg, Mysore, Travancore and Cochin, the rest of the country consuming only about 4%.

The per capita consumption in the non-producing areas is about 0.006 lb and in the producing areas about 0.7 lb. If the rate of consumption could be increased by even 0.15 lb. per head, the entire coffee produced in India could be easily absorbed in this country.

Ceylon and the poorest consuming areas in Europe like Hungary and Rumania take about 4 times the quantity that is consumed per head in India. In United Kingdom the consumption is 5 times more than in India. It is a matter of considerable significance, that although India produces some of the best quality coffees of the world, her consumption ranks so low as compared with other countries. The Indian coffee cess committee constituted by the Government of India in 1935 has, however, made a beginning with market propaganda to tap the potential internal demand.

On an average 340,000 cwt. of *arabica* as against 50,000 to 60,000 cwt. of *robusta* are consumed every year the demand for the former being mostly from the producing areas. Coffee consumed in India is sold in the following form.

Raw beans	...	90%
Freshly ground	...	6%
In tins & tablets	...	4%

Figures of consumption for 1933—34 and 1937—1938 show that except in Bombay, United provinces, Punjab, North-West Frontier and Delhi, there is an appreciable increase in consumption of coffee in all other areas of North India are slowly taking to coffee. Well directed propaganda should speed up this process. In Madras and Mysore, the coffee drinking habit is spreading from urban to rural population and from the upper to middle class.

The United Kingdom imports only quality coffee from India, but the continental countries mostly take "cherry" and "monsooned" coffee.

The Ottawa preference came into force in 1933 and while the share of imports from India rose from 7.5% in the quinquennium ending 1933 to 9.7% in the following quinquennium, the share of Empire countries rose from 43 to 47% and E. Africa fell from 38 to 35.9%.

Ceylon imports cheap *robusta* coffee mostly from Java and the possibility of introducing Indian *robusta* as against Java *robusta* into Ceylon should be explored, particularly when India has lost the Ceylon market—her exports to Ceylon having fallen from 13,400 cwt. to 200 cwt. a year.

Prices. Coffee has a larger range of quality than many other agricultural products. The quality varies in the same type, variety, and season from district to district and from plantation to plantation.

Brazil holds the key to world prices. The world price of coffee and the demand in South India are the chief factors that influence the course of prices of Indian coffee. Statistics reveal that the price of coffee is below the average prices of 1931 unlike that of tea and tobacco. This is a significant and serious problem facing coffee producers in the country.

Prices are generally above the average in January and below the average from April to December.

The market information available at present for the planters and the trade is very scanty. The Curers' Association in Mangalore is the only organised body which issues weekly bulletins for its clients. The Indian coffee cess committee at Bangalore started in 1938 is issuing a monthly bulletin, containing a review of world position and summary of market reports of a few important centres.

Arrangements to broadcast from Madras and Trichinopoly, a brief resume of the salient feature of the market, on fixed days, would be useful.

Preparation for the Market. The quality of coffee depends to a considerable extent on the method of preparation of the produce. Even the best crop can be spoiled by crude methods of preparation.

The two methods in India are the "dry" (native) method and the "wet" (washed) method. Coffee prepared by the former method is known as "Cherry" or "Native" and that by the "Wet" method as "Plantation" (or Parchment). In the case of cherry preparation, the berries are stripped from the branches, ripe, over-ripe, and green altogether, whereas for "plantation" (Parchment) only fully ripe berries are picked. The smaller plantations usually prepare the produce by the dry method.

Detailed information given on pulping, curing, drying, peeling, grading, garbling and monsooning are worth reading.

K. S. S.

Agricultural Jottings.

TRANSPORT FACILITIES FOR FRESH FISH FROM THE WEST COAST TO THE MADRAS MARKET

The fishing season in the West Coast usually lasts from September to April. Practically all the stations in the West Coast like Tirur, Tanur, Badagara, Calicut, Pantalayini and Parappanangadi export fish, and the quantity of wet fish sent to Madras City alone amounts annually to about 20,000 Railway maunds. Marketing as wet fish is more profitable to the fishermen as compared to cured fish. At present a lot of fresh fish is cured for want of facilities to market as fresh fish.

With a view to provide better facilities for traffic in fresh fish, the marketing staff arranged this season, through the kindness of the South Indian Railway, to run an insulated van as an experimental measure for the transport of fresh fish from the West Coast to Madras city. In order to demonstrate to the trade the advantages of the insulated van, comparative tests were made during September and October 1940, using the ordinary van as the control. The object was to find out whether in the insulated van there was (1) improvement in condition of fish and (2) saving in the quantity of ice used for packing as compared to transport by the ordinary van.

Although due to disturbed weather conditions, the catches were very poor this season, it was possible to arrive at some indicative results. Usually about 10 lb. of ice is used for packing one case of fish like the shark weighing in all about one Railway maund. In this case, the loss of ice in the insulated van ranged from 15 to 20% as against 80 to 100% in the ordinary van. In the case of small and more perishable types of fish, as pomfret, prawns etc., much larger quantities of ice as 30 to 40 lb. are used per case. The loss of ice in such cases ranged from 35 to 70% in the insulated van as against 40 to 80% in the control. It would appear therefore that a saving of ice by use of the insulated van can be effected, the exact quantity depending on the type of fish.

Apart from the saving of ice, the condition of fish transported in the insulated van was found distinctly better on arrival at Madras. The fish in this case was quite fresh and turgid, while in the non-insulated van, it was dry and about to go bad. The trade in Madras expressed satisfaction at the better condition of fish transported in the insulated van, and some reported better prices. These considerations should serve as an inducement to fishermen and exporting merchants to utilise the insulated van with advantage. The South Indian Railway has agreed to charge the same rate as that obtaining now for transport of fresh fish by the ordinary van.

The Marketing Staff have met fishermen on the West Coast and have arranged to establish business connections between them and the merchants in Madras city. Efforts are also being made through reliable businessmen in Madras to arrange for auction sale of fresh fish at different centres in the Madras city. To relieve the small exporter of the difficulty in having to pay railway freights in advance and thus enable him to book large quantities of fresh fish, arrangements are afoot to advance the amount at the despatching stations by the local bankers of the importing merchants at Madras.

As has been pointed out already, there is considerable saving in the amounts of ice required for packing fish when transported in the insulated van. It has been found that when the van was fully loaded the temperature showed a fall so low as 20°F. It is therefore necessary that exports should be made in large quantities, in order to derive the fullest benefits from the insulated van. Due to poor catches this season and low supplies, the running of the van could not be continued longer. Whenever the catches are satisfactory, it is up to the trade to see that the fullest use is made of the facilities offered by the insulated van. The van can also be used advantageously for the transport of fruits, vegetables, etc.

Crop and Trade Reports.

Cotton—1940-41—Fourth forecast report. The average of the areas under cotton in the Madras Province during the five years ending 1938-39 has represented 9.7 per cent of the total area under cotton in India.

The area under cotton up to the 25th January 1941 is estimated at 2,320,600 acres. When compared with the area of 2,102,900 acres estimated for the corresponding period of last year, it reveals an increase of 10.4 per cent. 446,300 acres have been reported as sown since the last December forecast was issued. This extent comprises chiefly 265,600 acres under Tinnevellys including Karunganni in Coimbatore, 75,000 acres under Cambodia, 54,000 acres under Westerns, 33,000 acres under white and red Northerns, 16,300 acres under Warangal and Cocanadas, 1,400 acres under Salems and 1,000 acres under other varieties. The area sown in December and January is greater than that sown in the corresponding period of the previous year by 123,700 acres or by 38.3 per cent.

The increase in area in the current year as compared with the area in 1939-40 occurs in all the important cotton growing districts of the Province outside Kurnool, Nellore, Ramnad and Tinnevely. The variations are marked in Guntur (+23,900 acres), Coimbatore (plus 89,700 acres), Madura (plus 29,700 acres), Ramnad (minus 43,300 acres) and Tinnevely (minus 42,400 acres). The area estimated in respect of Coimbatore is the highest reported in recent years while the area estimated in respect of Nellore is the lowest reported in recent years. The area under irrigated cotton, mainly Cambodia, is estimated at 280,900 acres as against 180,900 acres for the corresponding period of the previous year, an increase of 55.3 per cent.

Pickings of the *mungari* or early sown cotton crop in the Deccan have concluded. The yield was slightly below normal due to untimely rains. The crop was affected to some extent by the heavy rains of November in the districts of Nellore, Coimbatore, Ramnad and Tinnevely and by the attack of insects in Kistna, Coimbatore and Tinnevely. Normal yields are reported from all the districts except Kistna, Kurnool, Anantapur, Cuddapah, Nellore, Coimbatore, Ramnad and Tinnevely (un-irrigated cotton only) where the yield is reported to be below normal.

The seasonal factor for the Province as a whole works out to 96 per cent of the average as against 97 per cent of the previous year. On this basis, the total yield is estimated at 513,200 bales of 400 lb. lint as against 435,400 bales for the corresponding period of the previous year. It is, however, too early to estimate the yield with accuracy as the harvest has not yet commenced in the major portion of the area and much will depend upon the future weather conditions and the toll taken by insect pests.

The estimated area and yield under the several varieties are given below:—

Area in hundreds of acres, i. e., 00 being omitted; Yield in hundreds of bales of 400 lb. lint, i. e., 00 being omitted.

Variety.	Area from 1st April to 25th January.		Corresponding Yield.	
	1940-41. Acs.	1939-40. Acs.	1940-41. Bales.	1939-40. Bales.
Irrigated Cambodia	2,639	1,684	1,591	1,034
Dry Cambodia	2,384	1,828	499	378
Total, Cambodia	5,023	3,512	2,090	1,412
Uppam in the Central districts.	172	258	27	41
Nadam and Bourbon	263	201	12	10
Total, Salems	435	459	39	51
Tinnevellies *	6,483	6,438	1,550	1,499
White and red Northerns	1,830	1,930	217	241
Westerns	8,160	7,600	1,004	951
Warangal and Cocanadas	1,190	1,017	221	191
Chinnapati (short staple)	85	73	11	9
	23,206	21,029	5,132	4,354

* Includes Karunganni cotton grown in the Coimbatore District and Uppam, Karunganni and mixed country cotton grown in the South.

The average wholesale price of cotton lint per imperial maund of 82 2/7 lb. equivalent to 3,200 tolas as reported from important markets on 3rd February 1941 was about Rs. 13-3-0 for Cocanadas, Rs. 16-12-0 for white Northerns, Rs. 16-7-0 for red Northerns, Rs. 17-9-0 for Westerns (*Hingari* crop),

Rs. 13—2—0 for Westerns (*Mungari* crop), Rs. 28—13—0 for Coimbatore Cambodia Rs. 27 per Coimbatore Karunganni, Rs. 25—2—0 for Tinnevelly Karunganni, Rs. 25—1—0 for Tinnevellies and Rs. 20—12—0 for Nadam cotton. When compared with the price published in the last report i. e., those which prevailed on 7th January 1941, these prices reveal a rise of about 20 per cent in the case of Tinnevellies, four per cent in the case of Tinnevelly Karunganni and two per cent in the case of Westerns (*Mungari* crop) and a fall of about six per cent in the case of Cocanadas and Coimbatore Cambodia, five per cent in the case of Nadam, two per cent in the case of Coimbatore Karunganni and one per cent in the case of Westerns (*Hingari* crop), the prices remaining stationary in the in the case of white and red Northerns.

(From the Director of Industries and Commerce, Madras).

Cotton Raw, in the Madras Presidency. The receipts of loose cotton at presses and spinning mills in the Madras Presidency from 1st February to 7th March 1941 amounted to 31,918 bales of 400 lb. lint as against an estimate of 410,400 bales of the total crop of 1940-41. The receipts in the corresponding period of the previous year were 17 157 bales. 47,224 bales mainly of pressed cotton were received at spinning mills and 3,185 bales were exported by sea while 31,784 bales were imported by sea mainly from Karachi.

(From Director of Agriculture, Madras).

Correspondence.

Rotation and mixed crops with Sorghum.

To

The Editor, The Madras Agricultural Journal.

Sir,

With reference to the interesting contribution on "Rotation and mixed crops with sorghum" published in the February 1941 issue of the *Journal*, I shall be grateful, if you can publish the following observations of mine.

I. Rotation of Sorghum with other Crops. In Guntur district, sorghum is an important crop not only by itself but also in rotation with commercial crops like tobacco, chilli and groundnut. As regards tobacco, both the Virginia cigarette type and the Country or *natu* types are grown to a large extent on the black cotton soils in the district under rainfed conditions. The reactions of the two types of tobacco to sorghum in rotation are different. In both the cases, sorghum is grown in the preceding *Fyru* or cold weather season from October to March and the land is fallowed with frequent interculturing till the next October when the tobacco, is planted.

Virginia tobacco following a crop of sorghum under these circumstances has been found to be earlier for harvest than after crops of maize or *variga* (*Panicum miliaceum*). The leaves at the time of harvest attain the desired greenish yellow colour earlier in the case of sorghum than with the other two cereals. The rate of maturity of leaves on the tobacco plant is found quicker and the quality of the flue-cured leaf is noted to be better with a preceding crop of sorghum than with the others.

But in the case of country or *natu* tobacco, a preceding crop of sorghum has been responsible for a thin-bodied leaf with less of oily, gummy, and resinous substances which are necessary for good quality *natu* tobacco. After a crop of *variga* the *natu* yields very good quality tobacco.

Tobacco is a very sensitive plant and is even said to be a good indicator of the soil conditions. In the case of Virginia tobacco, the early and quicker ripening nature of the crop might be due to (1) low nitrogen (2) high phosphoric acid and potash or (3) a low N/P_2O_5 ratio in the soil resulting from growing of sorghum. Though almost equal dry matter yields of sorghum and maize are obtained, it is quite possible that sorghum reduces the level of nitrogen more than those of phosphoric acid and potash in the soil, while maize may do just the reverse. This explains also the fact of poor quality *natu* leaf resulting from low levels of nitrogen after a crop of sorghum. Usually heavy bodied *natu* leaf is obtained by heavier doses of nitrogen. It is thereby indicated that sorghum in the *pyru* season in Guntur district is a heavier feeder of nitrogen than maize.

Chillies are also grown unirrigated in the black cotton soils of the district. Generally more fertile fields are planted with this crop. It is grown either without rotation or is closely rotated with *variga*. Chilli and *variga* require highly fertile lands. But if by any chance sorghum is grown on the land, the succeeding chilli crop yields shyly; the fruits are of a paler colour and of poorer pungency. This experience also helps to confirm that sorghum might be a heavier and quicker feeder of soil nitrogen, lighter and slower feeder of phosphoric acid and potash than maize and *variga* in the *pyru* season.

II. Effect of Leguminous Crops on the Succeeding Money Crops. Bearing in mind the recorded conclusions of the Cotten Breeding Station, Coimbatore namely, "The after effects of growing leguminous crops on cotton are not alike. Cluster beans have been found most beneficial in the case of irrigated *cholam*," while lablab and cowpea seem to do good to rainfed *cholam*. Soybeans, greengram, and cowpea do more harm than good when they precede Cambodia cotton in summer. *Pillipesara* (*Phaseolus trilobatus*) likewise depresses the yield of Karunganni cotton that follows it.", it is hoped the following observations will be of interest in this connection.

When the leguminous crops immediately precede cotton or tobacco and when the land has very little rest between the two crops, low yields are usually to be expected for the following reasons.

The available nitrogen might have been very much exhausted by the preceding pulse crop. The money crop of tobacco will then have a poor start, which results, to a large extent, in poor yields.

The fixed nitrogen left behind by the pulse crop might gradually become available after considerable fermentation of the organic matter, probably at a time when the vegetative phase of the crop has passed, and also at a time when the soil moisture gets reduced to such a critical level to be of no use to fresh reinforcements of plant food.

The leaves, usually shed from the leguminous crops, and the root residues might utilise a large amount of soil moisture for their fermentation and conversion into soil humus; and thus the resulting low level of soil moisture might limit production.

These points are illustrated in an experiment conducted to study the effect of three cereals and one legume,—1. sorghum 2. maize, 3. *sajja* (*Pennisetum typhoideum*), 4. groundnut. In June, all the four crops are sown each on about 25 cents in one field of black cotton soil (Guntur Dt.) and they are harvested by the end of September. Immediately afterwards, the land is ploughed harrowed and is divided across into three portions. One portion is manured with farmyard manure at 5 tons per acre; to another portion is applied a mineral mixed with 20 lb. N, 60 lb. P_2O_5 , and 75 lb. K_2O per acre and the third portion is unmanured. Virginia tobacco is planted in the middle of October in the field.

* Sorghum,

Against expectations, the tobacco crop after groundnut is found to be very slow-growing as compared to that after cereals. Among the cereals, the tobacco crop after *sajja* is the best, followed by those after sorghum and maize respectively. Similarly in each preceding crop area, in the portion receiving the mineral mixture, the tobacco crop is found to start off well, while the growth of the tobacco crop on the farmyard manure strip is slightly larger than that in the unmanured plot.

In particular reference to the groundnut crop, the tobacco crop on the area that is not manured is slow-growing and poor, probably because the available plant foods are at a low level. The crop on the area receiving farm yard manure is slow to grow as the soil moisture might have been utilised for the germination of previous crop residues and for the reordering of the farm yard manure applied. The reaction to these fertilising sources is in evidence only too late during the decline of the soil moisture. On the area that received the mineral manure, the tobacco is seen to start off well and yield a good crop both in quantity and quality.

In the above observations are contained some very instructive lessons of Nature about the rotational value of sorghum and groundnut in the economy of commercial crops. The rotational value of a preceding crop on the quickness of start, the yield, and the quality of the succeeding crop remains to be determined for almost all the commercial crops. In order to give a 'good fit' for the money crops, this study is particularly of immediate importance in the unirrigated areas, for a 'misfit' cannot be so easily rectified as in the case of irrigated areas by irrigation and top dressing of chemical fertilisers. Much more urgent is the study in the case of millets and fodder crops, the main stay of the poor. Not only is it required in the interest of the ryot, but it is equally essential to the State, if only the soil is reckoned as the State Bank.

Based upon this consideration, the U. S. A. has launched detailed Soil Conservation Projects, in which the State encourages, not only by propaganda but also by monetary remuneration, the adoption of approved methods of conserving soil fertility, preventing soil erosion and building up soil reserves. In view of the age-long depletion of the soils in India, Soil Conservation Service should be organised in every Department of Agriculture at the earliest opportunity.

Old Secretariat, Delhi, }
March 7, 1941

Yours etc.,
C. V. Saravayya Chetty.

Mofussil News and Notes.

Chidambaram. An agricultural exhibition was held during the local *Arudra Dharsanam* festival at Chidambaram from the 6th to 12th January 1941. It attracted more than 8000 to 10,000 visitors from the rural areas of the neighbouring taluks. Paddy and rice samples of the important strains of Aduturai, Palur and Coimbatore Agricultural Research stations, groundnut, gingelly and castor selections from Tindivanam station, graft and budded citrus and mango plants from Kodur Fruit Research station, were exhibited. Sugarcaue varieties, fodder grasses and plantain varieties from Palur and Aduturai were on view. Improved implements for tillage and interculture, cream jaggery and malt samples appliances and chemicals used in the control of pests and diseases were also among the exhibits. Illustrated Tamil posters detailing all the improvements advocated by the Department were a feature. Two lantern lectures and several ordinary lectures were delivered to the interested ryots by the local Agricultural Demonstrator and the plant pathological Demonstrator of the division.

M. A.

College News & Notes

Students' Corner. *Students' Club Day.* The Thirty-second Annual Club Day was celebrated on 22nd February 1941 with great interest and enthusiasm. It was a day of merriment and unbounded happiness for one and all the students. The happy function commenced with 'Tea' at 4 p. m. in which about one hundred guests and all the students participated. The fancy dress competition evoked great merriment among the large gathering. After 'Tea' the guests and the students adjourned to the taste-fully decorated Freeman Hall where a meeting was held with A. R. C. Westlake Esq, District Collector, Coimbatore, in the chair. After reading of the reports of the literary and games sections for the year 1940-41, by the respective secretaries, prizes were distributed by the president to the winners of the several competitions. This was followed by a variety entertainment which included the following interesting items.

(1) Opening song by M. Ramalingam (2) The 'College rag' (3) The irony of a nick name—a farce in Telugu (4) Black Magic (5) 'To be or not to be'—a farce in English (6) The 'Village School Master' (7) 'From the frying pan to the fire'—a farce in Tamil and (8) Snake charmer. The 'College rag' provided great amusement to the large gathering. The pleasant function terminated with the presidential address followed by a vote of thanks to the Chairman proposed by Rao Bahadur G. N. Rangaswami Ayyangar, Principal of the College.

Cecil Wood Tennis Cup. In the finals of the annual singles tournament for the Cecil Wood cup, M. Hegde of the final year B. Sc Class came out victorious defeating D. Narasimhamurthy. M. Hegde was also awarded the college 'colours' in Tennis.

Farewell Tea. A 'Social' to bid farewell to the out-going students of the final year class and the short course in Agriculture was arranged on 17-3-41 by the first and second year classes in the Freeman Hall. After 'tea' and music, speeches were made on behalf of tutors, coaches, and lecturers bidding farewell to the out-going students. The representatives of classes I and II next spoke in appreciative terms of the help, cooperation and guidance which they had had from the final year students. The representatives of the third year class and the short course made suitable replies. With the Principal's speech giving advice and wishing the outgoing classes all success and prosperity in their life, the function terminated.

Madras Agricultural Students' Union. A general body meeting of the resident and student members of the Union was held on 6th March 1941 with Rao Bahadur G. N. Rangaswami Ayyangar, President of the Union, in the chair, to consider the letter from Sri. N. Balakrishnan (an ex-student) setting forth the grievances of the unemployed agricultural graduates. The letter and memorandum which Mr. Balakrishnan submitted to the Director of Agriculture were read before the house. The letter pointedly drew attention to G. O. No. 1655 Public Services dated 3rd September 1940 which excluded the B. Sc. (Ag) degree as the qualification for employment in the Provincial and subordinates services in all departments except agriculture and (2) for admission into Madras University diploma course in cooperation.

The President explained at length what he had done for furthering the cause of the unemployed graduates of the college before and after the receipt of the letter from Mr. N. Balakrishnan. He said that possibly the Director of

Agriculture had already addressed the Government regarding the employment of agricultural graduates in departments other than Agriculture, and that it would be premature to take further steps till the decision of the Government is known. After some discussion in which senior members like Rao Bahadur V. Ramanaatha Ayyar, Mr. K. Unnikrishna Menon and Mr. K. M. Thomas took part, the members resolved upon the following:

1. To wait on deputation (after obtaining the previous permission of the Director of Agriculture) upon the heads of departments such as Co-operation, Registration, Revenue, Education and Panchayats with a view to convince them of the special aptitude of the B. Sc. (Ag) degree holders for service in their departments.

2. To entrust the working committee of the Union with the arrangements for the deputation with powers to form sub-committees and also to co-opt suitable members.

3. To make specific requests to the Registrar of Co-operative Societies, and the University of Madras to consider the case of the B. Sc. (Ag.) for admission into diploma course in Cooperation.

In connection with the financial assistance to the *Madras Agricultural Journal* the following resolution proposed by Mr. K. M. Thomas was passed unanimously.

"This General body meeting of the Madras Agricultural Students' Union authorises the president of the Union to address the Government of Madras, praying that a subvention of Rs. 600 be granted to the Union for enlarging the scope and increasing the utility of the *Madras Agricultural Journal* as a medium of educative propaganda in agricultural matters pertaining to the province."

The meeting terminated with a vote of thanks to the chair proposed by the Vice-president Sri. C. R. Srinivasa Ayyangar.

Academic Council. Sri. T. S. Ramakrishnan, M. A. of the Mycological Section was elected as a member of the Madras University Academic Council to represent the teaching staff of the college in the seat vacated by Sri. S. N. Chandrasekhar Ayyar.

Estate Committee. Sri. T. R. Naganatha Ayyar was elected unopposed as a member of the Agricultural College Estate Committee in the place of Sri. K. Sanjiva Shetty whose term expires by 31st March 1941.

Officers' Club. The following office bearers for the year 1941 were elected: President: Sri. H. Shiva Rao; Vice-president: Sri. S. Ramaswami Raju; Secretary: Sri. C. Balasubramaniam; Treasurer: Sri. S. V. Parthasarathy. Committee members: Sri. P. Krishna Rao, Sri. V. Gomathinayagam Pillai, and Sri. C. V. Nagaraja Rao.

Fieldmen's Association. At the general body meeting held on 10-3-41 the following office bearers for the year 1941-42 were elected. President: Sri. A. Raju Pillai; Secretary: Sri. C. S. Narayanaswami Ayyar; Asst. Secretary and Treasurer: Sri. V. Mahadevan; Committee members: Sri. D. Devasirvatham Pillai, Sri. C. R. Venkataraman, Sri. V. Narayana Ayyar, and Sri. B. Rangaiyah Pillai.

Personal. We are glad to learn that Rao Bahadur M. R. Ramaswami Sivan Retired Principal of the Coimbatore Agricultural College has been appointed Director of the Agricultural Institute, Anand (Gujarat). The choice of Mr. Sivan for this post is a fitting testimony to the active interest he has displayed in matters of vital importance pertaining to agricultural problems both in Madras

and elsewhere. We offer our felicitations to the Rao Bahadur and wish him a long and useful career at Anand.

Kamala Nehru Hospital Fund. The Students of the Agricultural College, collected a sum of Rs. 117-8-0 towards Kamala Nehru Hospital Fund and forwarded it to the headquarters through the Manager of *The Hindu Madras*.

OBITUARY

We regret to record the demise of Mr. T. V. Narayana Rao, retired Farm Office manager of the Central Farm, Coimbatore. Born in 1870, Mr. Narayana Rao was one of the earliest products of the Saidapet Agricultural College. He passed out of the Agricultural College at the young age of 20 and joined service as a clerk in the office of his principal Mr. Kees. In this position his merits commanded attention and he was drafted on as a member of the teaching staff at the College of Agriculture. In the early days of agricultural education when specialisation was not so advanced as in the present day, Mr. Narayana Rao was entrusted with the teaching of a wide range of subjects like agriculture, agricultural engineering and veterinary science, though under less pompous names. Though it was not his good fortune to rise very high in his official career, he had the satisfaction that several generations of his students did adorn the highest ranks in the Agricultural department. Mr. Narayana Rao was very popular among all classes of people and his long career of 35 years in the department was characterised by his great devotion to duty, scrupulous honesty and spotlessly straight dealings. His photograph which hangs on the walls of the Farm office where he spent the closing years of his official position, is a lasting inspiration to several younger generations of Farm managers who have since worked in that office. Mr. Narayana Rao was a devoted member of the Madras Agricultural Students' Union and was the editor of the Journal in 1916. He passed away peacefully at the ripe age of 71 at the residence of his son Mr. Narasinga Rao. We convey our sympathies to the members of the bereaved family.



Rao Bahadur Sri K. T. Alwa.

RETIREMENT

Rao Bahadur K. T. Alwa.

Kodialbail Thimmappa Alwa was born in 1886 in a well-to-do Bunt family owning lands in an interior village of Mangalore taluk. Born and brought up in rural surroundings and in a community with hoary agricultural traditions, young Thimmappa showed very early aptitude for the age-long family profession, so that when he passed his Matriculation examination and started struggling with mathematical problems of the old F. A. University course, his parents decided that he should take up a career in scientific agriculture at the newly instituted Agricultural College at Coimbatore. In 1908 the shy Bunt youth joined the first batch of students at the Agricultural College at a time when the building now housing the Research Institute was only nearing completion and lecture classes were held in odd places including an adjacent residential bungalow. Alwa showed early promise in a course of study best fitted for his early environment and took the L. Ag. diploma with distinction in Agriculture and winning the Robertson gold medal. Early in 1912 he was offered an appointment in the Madras Agricultural Department as Assistant Farm Manager, Palur Farm. The initial salary of the post in those early days of the department was far from attractive, but by his perseverance, stamina for hard work and dint of character young Alwa rose in the course of nine short years from the position of the in-experienced Assistant Farm Manager to an Assistant Director of Agriculture. During this period Mr. Alwa saw service as Assistant Farm Manager, Taliparamba; Teaching Assistant at Coimbatore; Agricultural Demonstrator, Mangalore; and Demonstrator on special duty for the enforcement of the Cotton Pest Act in Coimbatore District. Mr. Alwa once confided to the writer of this note that the two most trying periods in his official career were those in which he served as Teaching Assistant under that famous disciplinarian Cecil Wood when the misdeeds of the back-sliders in the strenuous practical classes evoked the unrelenting ire of the Principal, and the period of Pest Act duty when he had to muster all his ingenuity and tact to get a potentially paying money crop pulled out within a statutory date without enraging the shrewd, but none the less uncompromising Gounden ryots of the Coimbatore district. Young Alwa's success in these two capacities revealed to his departmental superiors those rare qualities of adaptability, resourcefulness and tact which he possessed and this recognition paved the way for a promotion to the much-coveted gazetted rank in the service. For a period of 16 years from 1920 to 1936 Mr. Alwa saw service in almost every part of the province either as Assistant Director or Deputy Director of Agriculture. During this period, he acted for about 14 months in the Indian Agricultural Service and was placed on special duty on two occasions; the first in 1920—21 for six months to write a course of studies for the newly started Agricultural Middle Schools in the province and the other in 1927—28 to

investigate cotton marketing conditions in the Ceded districts and to recommend ways and means of financing the cotton growers of this famine-visiting tract.

Simple in his habits, with a smile and a kind word for every one, honest and straight-forward in his dealings, Mr. Alwa won the confidence of his superiors and the respect of his subordinates. Devoted to his duty, loath to interference in other people's affairs, and above all, endowed with human sympathy and kind feelings for fellow-beings in all walks of life, Mr. Alwa proved a great success in his official contacts. As a propaganda officer, his motto was "one thing at a time and that done well". His name is associated with several propaganda activities of the Department such as, the introduction of new varieties of sugarcane and improved processes of jaggery-making, the spread of paddy strains, the introduction and spread of green manures, the popularisation of cotton strains, the extension of fruit culture and the control of the black-headed caterpillar of coconuts and the *Mohali* disease of areca palms.

In 1936, Mr. Alwa was drafted on as Headquarters Deputy Director of Agriculture where he had the unique distinction of functioning as the right hand man of three successive Directors of Agriculture. He was the recipient of the Silver Jubilee and Coronation medals, but an apter recognition of his services came in 1941 when he was awarded the title of Rao Bahadur.

Mr. Alwa was one of the founder-members of the Madras Agricultural Students' Union inaugurated in 1911 and has ever remained a devoted member. Besides being the Joint-secretary in the first year of its inception he has held office in the Union as executive committee member, sub-editor of the journal and moffusil Vice-president. With his retirement from service, he has been unanimously elected as a Patron—an eloquent testimony to his long period of loyalty and devotion to an organisation in the creation of which he played an important role thirty years ago. The Union and its Journal wish the Rao Bahadur a long lease of happiness and peace in his retirement and trust that he will continue his connections with the former fields of his activities.

(K. M. T.)

Weather Review—FEBRUARY 1941.

RAINFALL DATA

Division	Station.	Actual for month	Departure from normal @	Total since January 1st	Division	Station	Actual for month	Departure from normal @	Total since 1st January	
Circars	Gopalpore	0.0	-0.7	0.0	South	Negapatam	2.1	+1.5	3.8	
	Calingapatam	0.4	-0.1	0.4		Aduthurai *	0.5	+0.1	1.7	
	Vizagapatam	1.5	+0.6	1.5		Madura	0.0	-0.4	1.4	
	Anakapalli *	2.2	+1.0	2.2		Pamban	1.1	+0.4	6.0	
	Samalkota *					Koilpatti *	0.0	-0.8	1.7	
	Maruteru *	0.2	-0.8	0.2		Palamkottah	0.0	-0.8	1.4	
	Cocanada	1.4	+1.1	1.4						
	Masulipatam	0.1	-0.3	0.1		West Coast	Trivandrum	0.0	0.0	0.9
	Guntur *	0.0	-1.0	0.1			Cochin	1.0	-0.8	1.7
Ceded Dists.	Kurnool	0.0	-0.2	0.1	Calicut		0.0	-0.2	0.6	
	Nandyal *	0.6	+0.3	0.6	Pattambi *		0.0	-0.5	0.0	
	Hagari *	0.2	0.0	0.2	Taliparamba *		0.0	0.0	0.0	
	Siruguppa *	2.1	+1.8	2.4	Kasargode *		0.0	-0.3	0.0	
	Bellary	0.7	+0.5	0.7	Nileshwar *		0.0	-0.2	0.2	
	Anantapur	0.8	+0.5	0.8	Mangalore		0.0	-0.1	0.0	
	Rentachintala	0.5		0.5						
	Cuddapah	0.5	+0.4	0.8	Mysore and Coorg	Chitaldrug	0.1	0.0	0.2	
	Anantharajupet *	1.0	0.0	1.1		Bangalore	0.0	-0.2	0.2	
Carnatic	Nellore	0.2	+0.1	0.2		Mysore	0.0	-0.2	0.1	
	Madras	0.1	-0.3	0.7		Mercara	0.0	-0.2	0.0	
	Palur *	0.2	-0.4	2.7						
	Tindivanam *	0.3	-0.6	1.3		Hills	Kodaikanal	0.3	-1.1	4.5
	Cuddalore	1.0	+0.1	4.3			Coonoor			
	Central	Vellore	0.0	-0.3			0.5	Ootacamund *	0.0	-0.1
		Gudiyattam *	0.1	0.0		0.6	Nanjanad *	0.0	-0.6	0.9
		Salem	0.0	-0.3	0.1					
		Coimbatore	0.0	-0.3	0.8					
Coimbatore										
A. C. & R. I. *		0.0	-0.5	1.4						
Trichinopoly	0.0	-0.6	0.2							

* Meteorological Stations of the Madras Agricultural Department.

@ From average rainfall for the month calculated up to 1937 (published in Fort St. George Gazette).

Weather Report for the Agricultural College and Research Institute Observatory.

Report No. 2/41.

Absolute maximum in shade.	93.8°F
Absolute minimum in shade.	55.5°F
Mean maximum in shade.	89.4°F
Departure from normal.	-1.1°F
Mean minimum in shade.	66.0°F
Departure from normal.	0.2°F
Total rainfall for the month.	Nil
Departure from normal.	-0.52
Heaviest fall in 24 hours.	Nil
Total number of rainy days.	Nil
Mean daily wind velocity.	1.53 m. p. h.
Departure from normal.	-1.22
Mean humidity at 8 hours.	68.8%
Departure from normal.	-3.1%

Summary. Dry weather prevailed throughout the month. The day temperatures were slightly below normal while the night temperatures were normal. The sky was moderately to heavily clouded. The movement of wind and relative humidity were below normal.

Weather review for February 1941. The weather was generally dry throughout the month excepting on the first three days and the seventh and eighth when a few showers were received. The rainfall was generally in defect in the West Coast, Mysore and the Hills and locally in other places.

The chief falls of rain reported were :

Negapatam	1.9 inches (9th),
Vizagapatam	1.5 " (2nd)
Cocanada	1.4 " (2nd).
Pamban	1.1 " (8th).

The temperatures were above normal in the northern parts of the country.
P. V. R. & R. S.

Departmental Notifications.

Gazette Services

Transfers.

Name of officers.	From	To
Sri U. Vittal Rao,	Offg. Asst., D. A., Tellicherry	Asst. D. A., Pattukottai.
„ M. U. Vellodi.	Asst. D. A. (on leave)	Asst. D. A., Tellicherry.
„ R. N. K. Sundaram,	Asst. D. A., Bellary	Asst. D. A., Cuddapah.
„ P. Krishna Rao,	Temporary G. A. to the Principal, Agri. College, Coimbatore	Temporary Superintendent, D. F. S. Hagari.
„ C. Vijayaraghava Acharya,	Temporary Superintendent, D. F. S., Hagari	Temporary G. A. to the Principal, Agri. College, Coimbatore.

Subordinate Services.

Transfers.

Name of officers.	From	To
Sri M. K. Gopalan,	A. D. (on leave)	A. D., Trivellore.
„ P. Narayana Nayar,	A. D., Coimbatore	F. M., A. R. S., Taliparamba.
„ E. K. G. Nambiar,	F. M., A. R. S., Taliparamba	F. M., Central Farm, Coimbatore
„ K. C. Thomas,	A. D., Palladam	A. D., Coimbatore.
„ S. Rajaratnam Chetti,	F. M., Nanjanad	A. D., Palladam.
„ T. Gopalan Nayar,		A. D., Gingee sub-circle.
„ L. Sankarakumara Pillai.	A. D. (on leave)	A. D., Wallajah.
„ V. V. Rajagopalan,	A. D., Dharapuram	F. M., C. E. S., Coimbatore.

Leave.

Name of officers.	Period of leave.
Sri V. G. Venkatarama Rao, A. D., Palmanier,	L. a. p. for 30 days from 25-3-41.
„ A. Shanmugasundaram, A. D., Pattukottai,	L. a. p. on m. c. for 30 days from 2-3-41.
„ K. Sitharama Iyer, F. M., Pattukottai,	L. a. p. on m. c. for 4 months from 23-1-41.
„ C. S. Krishnaswami, Assistant in Mycology, Coimbatore,	L. a. p. for 3 months from 1-4-41
„ A. Chidambaram Pillai, Secretary, South Arcot Groundnut Market Committee	L. a. p. for 3 months from 4-2-41.
„ P. Nagadhara Nayudu, under the Cotton Market Committee, Nandyal.	L. a. p. for 2 months and 14 days from 17-2-41.