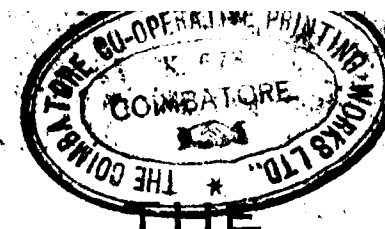


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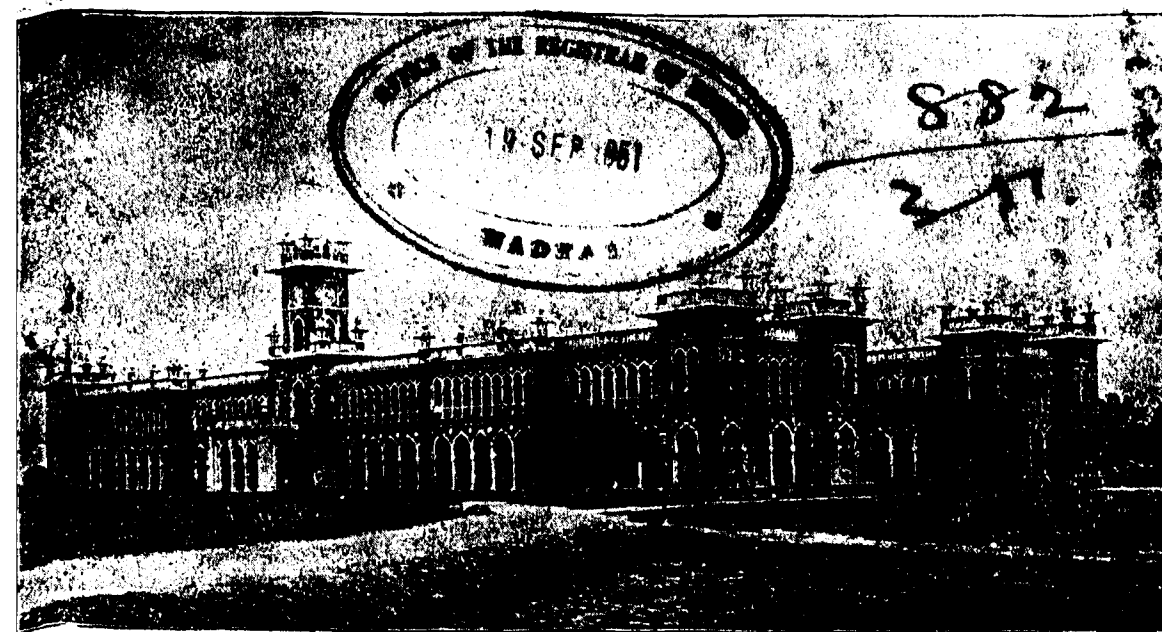
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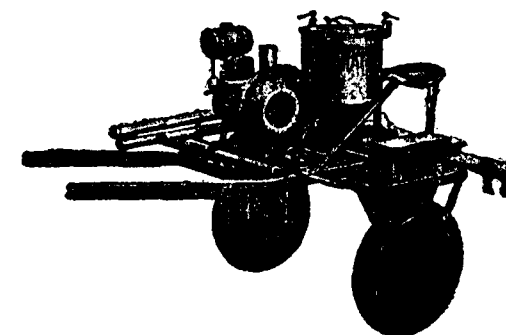
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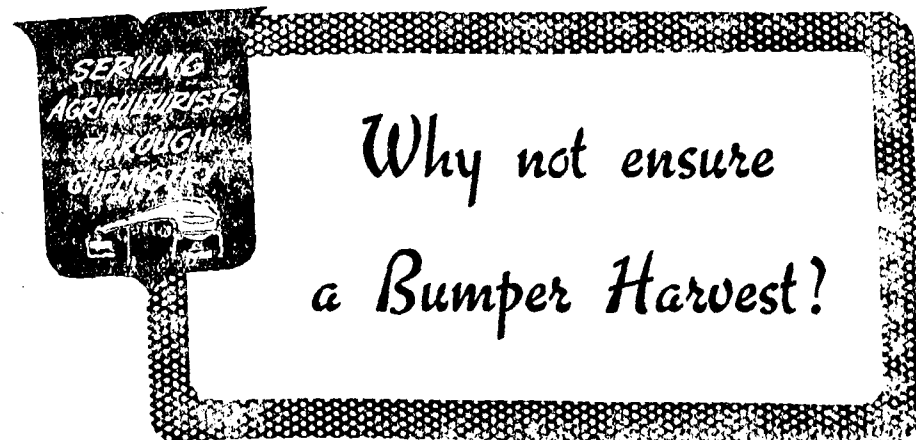
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Editorial

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Thirty-fourth College Day and Conference: This annual function of the Madras Agricultural Students' Union was celebrated this year on the 30th and 31st July. The Hon'ble Sri K. M. Munshi, Minister for Food and Agriculture, Government of India, was gracious enough to come down for the occasion and inaugurate the Conference on the 30th July. In a vigorous speech, delivered extempore, the Food Minister exhorted all agricultural graduates not to be hankering after Government jobs but to go back to the villages and help in making the Grow More Food Campaign a success, by spreading the knowledge they had gained, among the rural folk and agriculturists.

Sri Ram Lal Sethi, Agricultural Commissioner with the Government of India, who was the President of the subsequent sessions, also made a similar appeal to all agricultural graduates to help in the Grow More Food Campaign. He stressed the need for putting these activities on a war footing and incidentally stressed also the need to keep research workers at their work throughout and give them all the necessary facilities.

It is common to find that in many cases, research workers who may be expected to be capable of making some real contribution towards agricultural development, get promoted to posts that are purely administrative in their nature. The loss to the nation by such changes is much more serious than would appear at first sight. For about a century, during the British rule, the best brains of the country were being systematically attracted to the Indian Civil service and if today India is so far behind the other advanced countries of the West in science, one of the main reasons is this draining away of the best intellects into administrative channels. In countries like Britain, America and Germany, scientific workers are invariably drawn from the best material that is available in the universities and it is the exception rather

than the rule in these countries to find the pick of the universities drifting into administrative careers. In after-life, too, scientists in these countries, are esteemed and rated as quite as efficient and useful a member of the body politic as any administrative officer of the Civil Service.

Even after attaining political independence, we have still to realise that it is a short-sighted policy, which would injure our national progress in the long run, to hamper scientific development by diverting experienced research workers into administrative posts. No doubt, as things are at the moment, it may not always be possible to avoid such changes altogether, but the wiser course would be to have a re-orientation of values and to see that scientific workers are kept on in their chosen subjects without any room for mental or material dissatisfaction.

A Contribution to the Taxonomy of the Genus *Turnera*, L.

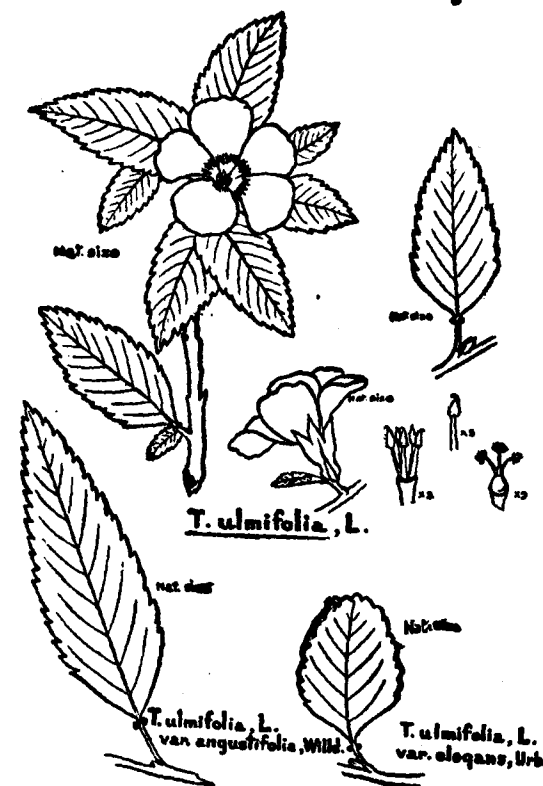
By

C. RAJASEKHARA MUDALIAR and J. SAKHARAM RAO

Botany Section, Agricultural Research Institute, Coimbatore

The genus *Turnera*, L. (*Turneraceae*) is not dealt with in detail in any of the Floras and an adequate description is wanting. Haines (1921) and Trimen (1894) recognise only one species, viz., *T. ulmifolia*, L. while Grisebach (1864) mentions three species, namely, *T. ulmifolia*, L., *T. parviflora*, Benth., and *T. pumilia*, L. Harvey (1862) has described in his flora only one species, *T. capensis*, Harv. Hooker (1894) has omitted the entire family while Gamble (1924) gives only a very meagre description of the solitary species *T. ulmifolia*, L. and the two varieties *T. ulmifolia*, L. var. *angustifolia*, Willd., and *T. ulmifolia*, L. var. *elegans*, Urb., pointing out only the difference in leaves.

In this brief note it is proposed to describe the single species and the two varieties occurring in South India. This is a West Indian and Tropical American species found growing wild in both the east and west coasts in South India. Though it is a weed it is quite ornamental, with yellowish flowers. In addition to the difference in the shape and size of the leaves, the colour of the flower and the nature of the bracts also differ. The description of these have been made from the following sheet of the Madras Herbarium.



T. ulmifolia, L. M. H. No. 84671. Collected by R. D. Anstead, 1918, Kottayam.

T. ulmifolia, L. var. *angustifolia*, Willd. M. H. No. 81719. Collected by G. V. Narayana at Kasargod, 1931.

T. ulmifolia, L. var. *elegans*, Urb. M.H. No. 93548. Collected by J. Sakharam Rao and D. Daniel Sundararaj, near Quilon, 1950.

Key to the Genus: Annual or perennial, attaining a height of 3 to 5 feet, with alternate leaves, with two glands at the base of the leaf blade. Stipules small or no stipules. Flowers are regular, hermaphrodite, solitary and the pedicels of flowers are adnate to the petiole of the leaves. Bracteoles two, prominent, sepals 5, petals 5, stamens 5, anthers oblong with longitudinal dehiscence. Ovary one-celled with parietal placentation. Fruit a capsule, ovules arranged two-seriate.

Key to the Species and Varieties. Leaves elliptic-lanceolate, very coarsely serrate, 2 to 3 inches with two glands at the base of the leaf blade. Petiole .5 to .75". Pair of bracts .5" to .75", lanceolate and .1" broad. Flowers are bright yellow in colour.

T. ulmifolia, L.

Leaves elliptic lanceolate, longer than *T. ulmifolia*, L. 4" to 5" irregularly serrate, with two glands at the junction of the petiole and the leaf blade. Petiole upto 1" or more. Flowers are more orange than yellow and bracteoles two, .75 to 1.25" long and .2" to .3" broad, with serrate margin.

T. ulmifolia, L. var. *angustifolia*, Willd.

Leaves small 1" to 1.75" roundish, more or less crenate with two glands at the base of the leaf blade, petiole very short .25" to .4". Flowers are whitish yellow with dark violet area in the inner lower part of the petals. Bracteoles linear upto, .75" long.

T. ulmifolia, L. var. *elegans*, Urb.

REFERENCES

1. Haines. H. H. (1931.) Botany of Bihar and Orissa. p. 384.
2. Trimen. H. (1894.) Flora of Ceylon. Vol. ii. p. 239.
3. Grisebach. A. H. R. (1864.) Flora of British West Indian Islands. p. 296-297
4. Harvey. W. H. & Sonder O. W. (1863.) Flora Capensis. p. 599.
5. Gamble. J. S. (1924.) Flora of Madras Presidency. Vol. iii. p. 523.
6. Hooker. (1894.) Flora of British India.

The Estimation of Toxicity of Insecticidal Deposits by Biological Methods*

Part—II

By

DR. P. SATYANARAYANA, M. SC., PH. D. (Lond.), F. R. I. C.
Agricultural College, Bapatla

Introductory: Investigations reported in the earlier communication (Satyanarayana, 1951) showed that the amount of D. D. T. (1:1:1) Trichloro - 2:2-bis (P-Chlorophenyl-ethane), recovered from the surfaces of apple leaves and estimated chemically varied with the mode of deposition, the nature of solvent used in the preparation of the insecticide, and the concentration of the insecticide itself. As it was next intended to see how far these chemical recoveries could be correlated with their biological performances experiments were conducted in advance to test the suitability of the insect used for the test and the extent to which the results could be relied upon and reproduced.

In estimating toxicities of deposits by biological methods different insects were used by different workers. In cases where the insecticide tested is one which kills by contact action, it is preferable to choose an insect that does not fly. Symes (1946), Barlow and Hadaway (1946), using tsetse fly and mosquito as test insects experienced considerable difficulty in making them remain in contact with the treated surfaces and so no clear-cut relationship could be established between the chemical and biological tests. *Tribolium castaneum* was used by Parkin and Hewlett (1946), and McIntosh (1947), with satisfactory results. This species is not only stationary with the advantage of being easily handled, but occupies little space, is economical, and is convenient in several other ways. After a scrutiny of the available literature, *Tribolium confusum* (DUV), was selected as the test insect and experiments conducted with emulsions of D. D. T. on glass surfaces using the following technique.

Experimental: Glass slides (25 x 70 mm) used in microscopic work were taken and 3 squares each 4.0 sq. cm. in area were marked on one side of the slide with a diamond pencil. The slides were then cleaned with 1% Triton-X-100 solution to free from grease, washed with alcohol and dried. Accurately measured quantities of the insecticidal preparation (usually 0.05 cc.) were deposited in the centre of each square with a micropipette and then uniformly spread and allowed to dry. After the deposit had dried, cylindrical glass cells 2.5 to 3.0 cm. in height and 1.8 cm. in diameter whose rims were finely ground down,

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

were lightly painted with collodion solution and placed on each square so that the whole base of the cell was covered by the deposit. After an hour or two when the deposits had dried and the smell of the solvent disappeared, the insects which were previously drawn into specimen tubes and pre-conditioned by keeping in the incubator at 25°C, were transferred to each cell and the slides then transferred to an incubator kept at 25°C. Counts were taken after 6 days (144 hours), since 100% kill was usually obtained within that period with the maximum concentration of the insecticide used in the investigations, viz., 0.05 cc. of 0.08% preparation which gave a concentration of 10 micrograms of D. D. T. per sq. cm.

Discussion: In the conduct of biological pests strictly comparable conditions like the age of insect, temperature, humidity etc. are very necessary, and provided they are satisfied, reliable and reproducible results are obtained as seen from the results presented in Table 2. The variation of L. D. 50, with age of insects is illustrated by the results presented in Table 1, and confirm the observations made by Hunt (1947).

Summary: A method of estimating the biological performances of insecticidal deposits is described. Provided the essential conditions are satisfied, reliable and reproducible results are assured.

Acknowledgments: To Dr. R. G. Hatton (now Sir), Dr. H. Shaw, Dr. R. L. Wain, and Dr. J. K. Eaton my grateful thanks are due for the encouragement they gave throughout. To Mr. R. G. Davies who had undertaken the statistical examination of the results and helped in the conduct of the biological tests and to the other members of the Plant Protective Chemistry Section who helped in various ways I offer my sincere thanks. Also, to Dr. R. A. E. Galley, for permitting me to refer to certain unpublished reports, my thanks are due.

TABLE — I.

The variation in L. D. 50 with age of insects.

Surface used: Glass. % Benzene in Emulsion: 2.0%
Emulsifier used: Triton-X-100 at 0.02% (V/V).

Concentration of DDT in the emulsion.	Micrograms of DDT per sq. cm.	Age of insects 0-12 days.			Age of insects 0-19 days.			Age of insects 0-23 days.		
		Number used.	Dead.	% Dead.	Number used.	Dead.	% Dead.	Number used.	Dead.	% Dead.
0.04	5.0	60	59	98.3	59	57	96.6	59	46	78.0
0.02	2.5	60	59	98.3	61	48	82.0	60	38	63.3
0.01	1.25	59	54	91.3	59	29	49.2	59	25	42.4
0.005	0.625	62	31	50.0	60	18	30.0	60	3	5.0
0.0025	0.3125	61	10	16.4	62	5	8.1	59	0	0
Controls	—	50	1	2.0	50	1	2.0	48	0	0

For L. D. 50:—			
% D. D. T. in emulsion	0.00427	0.0088	0.0155
Micrograms per sq. cm.	0.523	0.10	1.94

TABLE — II.

Testing the reliability and reproducibility of biological tests.

Insect used: Tribolium confusum. 1% Benzene and 0.02% Triton-X-100 (V/V) were used in emulsions.

Surface used: Glass.

Concentration of D. D. T. in emulsion.	Micrograms D. D. T. per sq. cm.	Test 1.			Test 2.			Test 3.			Test 4.		
		Number used.	Dead.	% Dead.	Number used.	Dead.	% Dead.	Number used.	Dead.	% Dead.	Number used.	Dead.	% Dead.
0.08	10.0	56	56	100	60	60	100	60	60	100	60	60	100
0.04	5.0	58	58	100	60	60	100	60	59	98.3	60	60	100
0.02	2.5	60	59	98.3	60	57	95	60	59	98.3	60	60	100
0.01	1.25	58	27	46.6	60	28	43.3	60	21	35.0	60	24	40
0.005	0.625	60	6	10.0	30	4	13.3	60	9	15	60	4	6.7
Controls	—	51	1	2	—	—	—	—	—	—	—	—	—

Statistical Analysis: For 144 hours:— Analysis of variance after transferring percentages to angles of equal information ($p = \sin^2 \theta$), showed differences between concentrations to be highly significant ($P < .001$), whereas differences between trials were non-significant, ($P > .0.2$).

REFERENCES.

1. Barlow F and A. B. (1946). Preliminary note on loss of D. D. T. and Gammexane by absorption (In press).
2. McIntosh. A. I (1947). A dipping apparatus for estimating the toxicity of insecticides in liquid media. Ann. Appl. Biol. 34, 233.
3. Parkin E. A. and Hewlett. P. S. (1946). Preliminary experiments with films of pyrethrum and D. D. T. in a heavy oil. Ann. Appl. Biol. 33, 381.
4. Satyanarayana P. (1951). The deposition and retention of certain plant pest control materials in relation to their biological performance. Part I. Madras. Agri. Jour. 38, 200.
5. Symes B. (1946). Colonial Insecticide Research Progress Report I. Entebbe, Uganda, S. Africa.

Control of Quality in Fruit Products

By

G. RAJA RAO M. sc.,
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Recent advances in our knowledge of nutrition have brought home the importance of fruits in a balanced diet. Fruits with their valuable vitamins and minerals are essential to man for maintaining good health. Unfortunately fruits, being highly seasonal, are subject to spoilage during periods of glut while they cannot be easily obtained during other parts of the year. Advances in food technology have, however, enabled us to preserve fruits in all their richness and flavour and make them available during any part of the year, and in any place by methods such as (1) Canning or bottling, (2) Preservation of fruit juices in the form of squashes, syrups, and cordials, (3) Conversion of fruit into jams, jellies, preserves and candies, (4) Dehydration and (5) Cold storage and freezing etc.

India was importing large quantities of different fruit products till the beginning of last war. The quantity and the value of imports of fruit products for the years 1939-40 and 1945-46 are given below, the share of Madras State being given separately.

IMPORTS *									
1939-40.					1945-46				
Item	Quantity (Cwts)	Value Rs.	Share of Madras		Quantity (Cwts)	Value Rs.	Share of Madras		Value Rs.
			Quantity (Cwts)	Value Rs.			Quantity (Cwts)	Value Rs.	
Canned or bottled fruits	40,131	10,39,783	6,749	1,62,149	4,224	1,90,044	86	653	
Jams and jellies	21,675	7,62,954	2,643	93,879	21,894	9,14,702	866	34,035	
Pickles, chutneys, sauces & condiments.	9,761	7,21,339	1,327	72,134	649	55,782	2	62	
Total ...	71,567	25,24,076	10,719	3,28,162	26,767	11,60,528	954	37,750	

* Figures from the annual statement of the sea-borne trade of British India with the British Empire and Foreign Countries.

Due to stoppage of imports, the fruit preservation industry in India has received a great fillip during the recent war and a number of concerns have sprung up all over the country. In Madras State itself there

Control of Quality in Fruit Products

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are as many as 60 firms manufacturing either synthetic or genuine fruit products. The quantities* and the value of fruit products manufactured by these firms during the year 1949 were as follows:

Item	Quantity in lb.	Value in Rs.
Fruits (candied or crystallised)	670	685
Fruit juices, squashes, cordials, syrups etc.	40,325	49,038
Canned or bottled fruits.	3,10,795	3,10,293
Jams, jellies and marmalades.	8,651	497
Juices, (Pine-apple or grapes)	5,132	3,645
Pickles, chutneys, vinegar etc.	1,51,682	1,48,086
Total.	5,17,955	5,22,144

* Figures compiled by the Bio-Chemist, Madras Agricultural Department, from the returns of the licensed firms in the Madras State.

The economic importance of the fruit products industry in our State is clear from the above figures. If, however, this important industry has to make any headway, sufficient confidence must be created in the public that our products compare favourably with the imported ones. It is not uncommon that unscrupulous manufacturers, with the object of making quick profits market as genuine products prepared from synthetic sweetening materials and attractive colours. These concerns should be suppressed in order to keep up the fair name of Indian products, by rigorous control of quality.

Sometimes it is difficult to differentiate the synthetic product from the genuine one by chemical analysis as the former can be made to simulate the latter in all respects. Thus a product can be prepared to the same analytical standard as a genuine fruit squash from entirely synthetic chemicals and a proportion of fruit pulp or juice sacs. The chemical analysis in such cases may not be of much use but a sure check can be maintained on such products by scrutiny of the processes in the factory itself.

Besides the type of adulteration mentioned above, there are others which can be detected only by a complete chemical analysis. The important of them are: (1) use of prohibited dyes (artificial colouring matter) to conceal the inferior quality of the product, (2) use of chemical preservatives in excessive amounts to make good the defective processing of the products, (3) use of synthetic sweetening agents like saccharin, dulcin etc. to make up the deficiency of sugar,

(4) presence of injurious metals like lead, copper, aluminium and tin either for a fraudulent purpose or by contact during the manufacturing process.

The artificial dyes are likely to be contaminated with injurious metals and other poisonous substances during the course of their manufacture. Their use in food industry must therefore be restricted to those whose harmlessness is beyond question. High standards of purity are set for such colours in all countries and these 'permitted dyes' alone should be used in the Fruit Products Industry.

Preservatives are chemical agents which serve to retard, hinder or mask the changes in food caused by spoilage or organisms. These chemical agents have a preservative action by virtue of the fact that they combine with the microbial protoplasm to produce a toxic effect on the cell. The substances that are toxic to micro-organisms may be harmful to the tissues of the human body also, when present in larger proportions. Sulphur dioxide (including sulphites) and benzoic acid (including benzoates) are the only permissible preservatives in fruit products. The maximum limits prescribed for these preservatives depend on the nature of the product. Thus in fruit juices, squashes and cordials, sulphur dioxide may be present to the extent of only 40 parts per million while sulphur dioxide can be present to the extent of only 40 parts per million in jam and benzoic acid to the extent of only 250 parts per million in a ketchup. It can be found out by chemical analysis whether the preservatives present in fruit products are the permissible ones and whether the proportions used are within the prescribed limits.

The manufacturer may have recourse to the addition of sweetening agents like saccharin either to make up the deficiency of sugar or to conceal inferiority of the product. These sweetening agents are considered as adulterants and their use in any fruit product should be prohibited.

The Government of India were alive to the necessity for controlling the manufacture and sale of fruit products in this country. With a view to upgrade the quality of this industry and to protect the health of the consumers, the Fruit Products Order, 1948, has been promulgated. The grade designations and quality specifications for different fruit products, natural as well as synthetic, were formulated and embodied in the Order. The provisions of this Order require every manufacturer to possess a licence for transacting business in fruit products.

The enforcement of this order has been vested in State Governments since March 1949. The Biochemist, Kodur, is the officer responsible for enforcement of this Order in the Madras State. He is

assisted by two inspectors, one analyst and one technical assistant. The inspectors visit all the manufacturing centres, satisfy themselves as to the hygienic requirements of the premises and take samples for despatching to the analyst. The analyst has to test and see whether the products conform to the specifications prescribed in the Order and send analytical reports to the Biochemist. On the strength of these reports the Biochemist can prohibit the sale and stocks of the fruit products, in respect of which quality specifications are contravened.

With the rise in standard of living and the growing emphasis on fruits as protective foods in the diet, the demand and the consequent production of processed foods and fruit products is bound to increase. It is essential, therefore in the interests of the health of the nation, that the existing provisions of the Fruit Products Order, 1948, be not only enforced rigorously but also make the quality specifications more comprehensive by prescribing minimum limits for vitamin and mineral content for the different products. The manufacturers may also be required to guarantee the vitamin and mineral content of their products and to display on the label of the pack the composition including the nutritive value of the product.

Cacao — Its Importance to South India and Cultural Possibilities

Cacao is both a beverage and a food crop. The world consumes about 500,000 tons of cocoa every year in one form or another. Cocoa powder, butter, paste, chocolate powder, covering chocolate and nut and milk chocolates are some of the more important products that have become popular the world over. British West Africa till recently produced half of the world's requirements, the rest being supplied by Brazil, Nigeria, Colombia, Venezuela, Trinidad, Sao Thome, Costa Rica, Santa Domingo, Nicaragua and Ceylon. In the past few years the cocoa industry of the leading country viz., British West Africa has suffered one of the most serious threats to its existence in the form of a virus disease known as 'swollen-shoot'. It is reported that several millions of trees are dying due to this cause every year. The disease has been found to be very difficult to prevent or control. As such, the world markets for cacao are already in search of other regions or countries for their supplies.

In fact British interests in Africa are now shifting to Malaya which is considered to offer a congenial home for the cacao. The other countries mentioned earlier will also no doubt step up production under the stimulus of demand.

2. Of the two chief botanical varieties of cacao, it is the *Forestero* that contributes about 95 per cent of the world's supply, leaving only five per cent to the other variety *Criollo*. The former, though hardy and more abundant in bearing, is a coarse variety, while the latter yields one of the finest products. In the cacao producing regions, due to the incontinent mixing of the two varieties, the *Criollo* has now become almost extinct, leaving therefore no choice except to fall back upon the coarser types. If therefore any country is in a position to market the *Criollo* exclusively, it could easily assume the leading position in the markets for cacao.

3. Cacao which was introduced in India more than 30 years ago, has found ideal conditions for its cultivation at the foot of the Nilgiris at Kallar and Burliar. The only variety that happened to be introduced was the *Criollo* and it has therefore remained in a pure form. Recent studies of its performance have shown that its yields are in no way inferior to those of even the *Forestero* elsewhere. Further, happily enough, no incidence of any serious pest or disease has so far been noticed. The commercial opinion on the beans, of no less an authority than the Chief Chemist of Messrs. Cadbury Bros. Ltd., Bournville, an extract of which is reproduced below, has been entirely favourable.

"The beans weighed 1.11 grams which is rather small for *Criollo* cacao. This however, is no serious defect. The shell content is 9.3 per cent. Internally the beans are a beautiful cinnamon colour and have been obviously well fermented. In this character they are the best *Criollo* cacao I have seen for many years.

"Made up into chocolate these beans made very bland, pleasantly flavoured chocolate, equal to any good *Criollo* cocoa."

"The beans are in my opinion equal to much of the best *Criollo* cocoa and should find a ready market. Perhaps it is necessary to draw attention to the fact that this is a specialised cocoa of which the present supply is only about 5 per cent of the normal cocoa production."

"The market price of *Criollo* is approximately 30 per cent higher than the normal type such as *Forestero*."

4. It is thus seen that India is in a unique position to meet the world's demand of a superior cocoa if a serious effort is made at this stage to effect a rapid extension of the area under this beverage crop in all the regions which are assessed as suitable for it. For this however, it is necessary to know where and how cocoa can be grown. The following brief notes are given to assist the prospective cacao growers in these respects.

5. Cocoa likes warmth and humidity. It does not endure drought or frost. An elevation ranging from 1000 to 2500 feet is about the ideal for its cultivation. The temperature range suited to it is from 80°F—100°F for the maximum, and 45°F—60°F for the minimum. A rainfall from 60" to 80", well distributed over the two monsoons, assists considerably in promoting vigorous growth of the trees. It revels in a retentive soil but good drainage is essential. On those considerations, Wynad, Lower Palnis, the Agency tracts, West Coast, Nilgiris (lower slopes) Kolli hills, Yercaud, Javadi hills may all be considered as of possible interest for cacao cultivation.

The land intended for cacao should be cleared of all scrub growth, leaving only such trees as are required to provide the necessary shade. The cleared surface of the ground should be thoroughly turned over. Pits of 2' × 2' × 2' size are then dug at fifteen feet both ways, keeping the rows as straight as possible. If vacant land without any tree growth has been taken over for cacao planting, it is necessary to plant shade trees, preferably of the leguminous types. In either case, when the cacao plants are set out, it is necessary to provide them with a primary shade by raising small pandals covered with dry leaves. There are two ways of planting. The seeds can be sown on the spot where the tree is to permanently remain or seedlings can be raised in seed beds and afterwards transplanted to the permanent positions. Planting is best done during moist weather in June or July.

After planting and providing 'primary' shade, steps should be taken to raise what is known as 'secondary' shade. This is done by planting banana suckers or *Glyricidia* seedlings between every two cacao trees. These plants will afford the necessary shade and protection to the young cacao plants.

The trees should be provided constantly with a mulch of vegetable matter. This can be of leaves or other trash placed six to nine inches deep around each tree leaving a space of six inches clear just around the stem. The ground should be kept clean and free from weeds. About four to six hoeings in a year are desirable but they should not be so deep as to injure the roots.

The tree should be allowed to grow freely when young. When the branches of two neighbouring trees begin to meet, they are kept in form and well balanced by pinching out the points of the shoots from time to time. All weak branches should also be removed and no part of the tree should be allowed to grow so thick as to prevent free circulation of the air. All decayed and diseased wood should be removed at once.

The trees begin to bear in their third year. While the pods can be seen on the trees almost any time of the year, the two major crops of the year are usually borne, once in the summer (April-May) and a second time in December.

The pods should be ripe when picked. They would have developed then their full colour. The Criollo bears a red pod. The pods should be harvested with a sharp knife and never pulled or torn off the tree by hand as it injures the cushions on which successive crops are borne.

The pods are broken in half with a sharp knife and the beans which number from 20 to 30 are scooped out from the two halves of the pods with a spatula, pulling off the stringy core which holds the beans together.

The way to ferment the beans is to place them straight from the pods into a box which has holes in the bottom to let the 'sweatings' run away. The box should be large enough to hold one or two hundredweights of beans. The beans are left in here for two days. During this time the temperature rises to about 50°C. At the end of the two days, the beans are turned out of this box into another or turned out and put back again. This gives the aeration necessary for the development of the right colour in the beans and prevents anaerobic fermentation from occurring. The beans should continue at about 50°C during the next two days and then are again turned as before and left for two more days, then dried slowly in the sun. The boxes should be covered with banana leaves during the period of fermentation.

At the end of the fermentation the cacao beans should be deep brown in colour, and not contain any purple. In this condition they are ready for the market.

6. Efforts are now under way to rapidly increase the production of cacao plants for supply to persons interested in a trial of this crop. Since the demand is expected to be heavy, indentors are advised to register their indents for supply of cacao plants in advance directly with the Assistant Fruit Specialist, Coonoor P. O., The Nilgiris.

[*Director of Agriculture, Madras.*]

THE THIRTY-FOURTH COLLEGE DAY AND CONFERENCE



The Thirty-fourth College Day and Conference organised by the Madras Agricultural Students' Union was held this year on the 30th and 31st July. The Hon'ble Sri K. M. Munshi, Minister for Food and Agriculture, Government of India, inaugurated the Conference on Monday the 30th. The Hon'ble Sri A. B. Shetty was also kind enough to be present on the occasion. Sri Ram Lal Sethi, I. A. S., Agricultural Commissioner with the Government of India presided over the subsequent session of the Conference on the 31st July. Sri R. M. Sundaram, I. C. S., Secretary to Government, Food and Agriculture, Sri M. Murugesu Mudaliar, Deputy Secretary to Government, Food and Agriculture, Sri M. S. Sivaraman, I. C. S., Director of Agriculture, and Sri B. M. Lakshmiopathi, Joint Director of Agriculture, the Headquarters and Regional Deputy Directors of Agriculture, the Principal, Agricultural College, Bapatla, most of the District Agricultural Officers, and a number of officers in charge of the Agricultural Research Stations were also present.

The Conference commenced at 2-30 P. M. on Monday the 30th July 1951, with a prayer by Sri M. B. V. Narasinga Rao, followed by the welcome address of the Principal, Sri P. D. Karunakar. The Secretary then read out a number of messages from the Premier of Madras and others wishing the function all success, and presented the Annual Report of the Managing Committee for the year 1950-51. Prizes were then distributed by the Hon'ble Food Minister to the prize-winning students of the year and also the Ramasastrulu Munagala Prize to Sri V. Santhanam. The Food Minister also presented on this occasion a Gold Medal and a cash award of Rs. 500/- to Sri K. Vellaiya Gounder of Krishnagiri Taluk, Salem District, who won the State Prize for producing a record yield of 12,000 pounds of paddy per acre from his land. This is also claimed to be the world's record yield for paddy.

Sri Vellaiya Gounder in a short speech described the methods he had adopted to secure this record yield of paddy.

The Hon'ble Shri K. M. Munshi then delivered his inaugural address, in which he made an appeal to all agricultural graduates to go back into the villages and help to revolutionise agriculture.

The second session commenced at 9 A. M. on the 31st July with Sri R. L. Sethi in the chair. The Director of Agriculture, Madras, initiated the discussion on the subject of the symposium on Manuring of Crops. Due to want of time the authors were requested to give only the salient features in their papers and the discussion on each paper was also limited to about five minutes.

A large number of non-officials and delegates who had come from various parts of India for the Rice and Wheat Workers' Conference from the 29th to 30th July were also present for the Conference.

On the night of the 30th the Union arranged for a variety entertainment in which farces and dramas in English, Malayalam, Kannada and Tamil were enacted.

On the 31st, the College Sports were held and Sri V. N. Lakshmanan won the Championship for the year. Mrs. Karunakar gave away the prizes to the winners in the various items.

On the 31st night the General Body meeting of the Union was held at 8-30 P. M. in the Freeman Hall when the Union accounts and budget were discussed and new office bearers elected for the year 1951 - '52.

Principal's Welcome Address

The Hon'ble Minister for Food and Agriculture of the Government of India, the Hon'ble Minister for Agriculture, Government of Madras, Sri Ram Lal Sethi, Ladies and Gentlemen:

It is my proud privilege as the Principal of this Institution and the President of the Madras Agricultural Students' Union, to accord a hearty welcome to all those assembled here to-day on the occasion of the Thirty-Fourth College Day and Conference. The Madras Agricultural Students' Union is fortunate in securing the presence in our midst to-day, of the Hon'ble Sri K. M. Munshi, Minister for Food and Agriculture, Government of India, who has graciously consented to inaugurate the proceedings of the Conference. He has, by accepting our invitation at great personal inconvenience, showed his keen interest in matters pertaining to agriculture and the food problem in the country, which is a vital issue in this State to-day. It is a gesture which we most gratefully appreciate. We extend to him a very cordial welcome and we trust that he will enjoy his visit to Coimbatore and carry with him happy memories of this occasion.

Sri Ram Lal Sethi, is to preside over our deliberations to-day and to-morrow. He has been the Commissioner for Agriculture with the Government of India for the past four years, and has been connected with the Indian Council of Agricultural Research for about fourteen years now. Earlier, he was the Professor of Agriculture and the Principal of the Government Agricultural College, Kanpur, Cane Commissioner to Government of Uttar Pradesh and Director of Agriculture, Sind. He has published some twenty-four scientific papers pertaining to agriculture. As Chairman of this conference, he will bring to it his ripe experience and wisdom and we eagerly look forward to his guidance. He

is well known to this audience, since many of the schemes submitted by us to the Indian Council of Agricultural Research come with his signature of approval or, perhaps, rejection. He has agreed very kindly to give us his precious time and be with us for five days, which shows his keen interest in the agricultural problems of our State.

We welcome in our midst our popular Minister for Agriculture, The Hon'ble Sri A. B. Shetty. He has been the guiding spirit of the activities of this Department and has always had a warm corner for the Madras Agricultural Students' Union.

I also take this opportunity of welcoming the delegates for the Rice and Wheat Research Conference who are amongst us now, due to happy coincidence of their conference preceding ours.

I am glad to report that the College continues to function efficiently. Out of eight-six students who appeared for the final examination in April 1951, eighty came out successful. I take this opportunity of congratulating the student who came first, whose name by the way has not yet been communicated to us by the University; as well as all the other students who have passed the examination. I am glad to state that almost all of them have been absorbed in the Department to help in the Grow-More-Food Campaign.

Unfortunately this year, the first year students are not with us for the College Day and Conference. The admissions which are to be made in accordance with the new directive of the Madras Government are yet to be finalised.

I extend a very cordial welcome to the ladies and gentlemen and members of the general public who have assembled here on this occasion. I trust, as a result of our deliberations, it will be possible to devise practical ways and means of helping to solve the food problem in Madras.

Report of the Secretary, M. A. S. Union

The Managing Committee of the Madras Agricultural Students' Union, have great pleasure in presenting the report for the year 1950 - '51. The Union is indeed very fortunate in having been able to secure the presence in our midst today, of no less a person than the Hon'ble Minister for Food and Agriculture, Government of India, and the Committee take this opportunity to express their sense of deep gratitude to the Hon'ble Sri K. M. Munshi, for having graciously consented to inaugurate the proceedings of this year's Conference. They feel that his going over to Coimbatore at great personal inconvenience, is an indication of the increasing recognition on the part of the Government of the usefulness of associations like the Madras Agricultural Students' Union in

promoting the cause of agricultural development of the country. The Committee of the Union are profoundly grateful for this encouragement. In the choice of the President of the Conference, the Union is equally fortunate. Sri R. L. Sethi has for over a period of three decades played a very significant part in the encouragement of scientific agriculture, both as a scientist and as an administrator, and the Committee are deeply thankful to him for consenting to preside over the deliberations of this Conference.

The Madras Agricultural Students' Union: The Union was founded in the year 1911. It was started as an organisation to bring together the past and present students of the Coimbatore Agricultural College as well as its predecessor, the Saidapet College of Agriculture. After the starting of the Agricultural College at Bapatla, the past and present students of this institution have also been included in our Union. The Union has been an entirely independent, voluntary organisation, and till very recently, an entirely self-supporting one. The high cost of printing and the dwindling effective income of its members have forced it in recent years to seek Government aid and we are grateful to the present Government for the financial aid. It is gratifying to record that the Union, originally started as an Old Boys' Association with modest objectives, has with years been able to progressively enlarge the scope of its activities. It can now pardonably claim to be one of the premier agricultural organisations of the Madras State, having among its members not only the students of the Agricultural Colleges and the officers of the Madras Agricultural Department, but also a number of the leading agriculturists of the State. In addition to its function as a link between the past and present students, the Union can also claim, through the medium of the Madras Agricultural Journal, as a clearing-house of information on all matters relating to agriculture, with special reference to Madras.

The Madras Agricultural Journal: The Journal was first started as a Year-book in 1911. It became a quarterly publication later on and continued as such till 1915, when it was converted into a monthly Journal. We are glad to record that the Journal continued to maintain its regularity and the standard we have set before us in its publication, throughout the year under report. It is also gratifying to record that our Journal is recognised as a suitable medium for publication, not only of items of popular interest, but also of research items of scientific importance. Our Journal has also secured a place among the scientific periodicals of the world and has on its exchange list a large number of scientific publications, both Indian and foreign. It must be admitted, however, that the present get up of the Journal still leaves room for a great deal of improvement.

Finance: The high cost of paper and printing charges continue to be a matter of serious concern in the annual budget of the Madras Agricultural Students' Union. In this connection the Union desires to place on record its sense of gratitude to the Madras Government for the special grant of Rs. 1,800/- made during the year to meet the increased cost of paper and printing. Further, at the instance of the Government, the Symposium papers of the last College Day and Conference were all printed and published in one volume and the Government graciously made a subsidiary grant of Rs. 900/- to meet the extra cost that the Union had to incur on this account. Our thanks are due to the Minister for Agriculture, Sri A. B. Shetty and the Director of Agriculture, Madras, for this help and for a sum of Rs. 1,000/- towards the renovation of stage fittings of the Union. Owing to the difficulty in securing suitable materials, the Committee regrets however, in not being able to complete the renovation in time for this College Day. The Managing Committee desires to make an appeal to one and all of our College students, past and present, both at Coimbatore and Bapatla, to enrol themselves as members of the Madras Agricultural Students' Union. The Committee makes a similar appeal to such of those officers of the Department who are not yet members of the Union, to enrol themselves and thereby help the Union to become self-supporting.

College Day and Conference, 1950: The celebration of the Annual College Day and Conference is one of the important activities of the Union. The College Day and Conference was celebrated last year between the 29th and 30th July 1950. It was inaugurated by the Hon'ble Sri M. P. Patil, Minister for Agriculture, Bombay, and the subsequent sessions were presided over by Sri S. V. Ramamurthy, I. C. S., Regional Food Commissioner. A Symposium on "Maximisation of Crop Production" was organised and provided a subject for keen discussion, in which a number of persons, official and non-official, participated. The Hon'ble Sri A. B. Shetty, Minister for Agriculture, Madras, also honoured us by his presence and was kind enough to declare open the Agricultural Exhibition. A detailed account of the proceedings of the College Day celebrations has already appeared in the August 1950 issue of the Journal.

Prizes: The Ramasastrulu Munagala Prize, run under the auspices of the Madras Agricultural Students' Union, has been awarded this year to Sri V. Santhanam, Assistant in Cotton, for his paper on "The role of heterosis in crop breeding with special reference to hybrid cottons". Our thanks are due to Dewan Bahadur D. Ananda Rao, retired Director of Agriculture, Madras, Dr. B. S. Kadam, Sri T. Nataraj and M. A. Sankara Iyer, for acting as judges in this competition.

Patrons: We are happy to welcome as a patron of the Union Sri V. C. Palaniswamy Gounder, M. L. A., Vellaikinar, Coimbatore.

Retirements: Since our last report some of our members have retired from service, namely, Sri S. N. Chandrasekhara Iyer as Government Lecturing and Systematic Botanist, Sri T. K. Balaji Rao, as Pulses Specialist, Sri T. G. Muthuswami Iyer as Dy. Director of Agriculture, Madurai, Sri D. Marudarajan as Government Mycologist and Sri C. Ramaswami Naidu, as Dy. Director of Agriculture, Headquarters, Madras. The Union records the services rendered by these gentlemen while they were in service in various capacities as members of the different committees of the Union.

Obituary: We record with deep sorrow the death of one of our active members, Ch. Saravayya Chetty while in service as Superintendent, A. R. S. Samalkota, and take this opportunity to convey our condolences to his bereaved family.

Acknowledgements: It is now our pleasant duty to record our thanks to all those who have helped the Union during the year. To the Hon'ble Sri M. P. Patil, the Union owes a deep debt of gratitude for inaugurating the College Day and Conference last year, and to Sri S. V. Ramamurthy for presiding over the sessions of the Symposium. To the Hon'ble Sri A. B. Shetty, Minister for Agriculture, Madras, the Union is very grateful for his sympathetic interest in the affairs of the Union and encouragement of its activities. To Sri P. D. Karunakar, Principal, Agricultural College, Coimbatore, the committee offers its heart-felt thanks for his help in guiding the affairs of the Union and to Sri P. V. Ramaiah, Principal, Agricultural College, Bapatla, for his sustained interest in the Union. To Sri R. M. Sundaram, I. C. S., O. B. E., Secretary to Government, Madras, Food and Agriculture, the Committee tenders its grateful thanks for his never-failing help and guidance as Director of Agriculture, Madras last year. The Committee take this opportunity of welcoming our new Director Sri M. S. Sivaraman, I. C. S., and feels confident that his keen interest in everything pertaining to Agriculture, would be of great help and encouragement in the affairs of the Union.

**Summary of the Inaugural Address delivered by the
Hon'ble Sri K. M. Munshi, Minister for Food and
Agriculture, Government of India**

Inaugurating the Conference, Sri Munshi appealed to the students of the College, not to run after Government jobs but to go back to the villages and help the tillers of the soil with the knowledge gained through their studies. In the course of the last two hundred years agriculture in India had suffered very badly due to neglect and indifference at the hands of the foreign invaders. They did not consider agriculture as of vital importance and it was only after the British left India that the Government began to give agriculture the importance due to it. The position

had now changed and particularly after the partition of India and the unavailability of rice imports from Burma, the Government at the Centre and the States were now devoting very great attention to the development of agriculture as a means of overcoming the acute food shortage in the country. Ever since the Grow More Food campaign had come into existence, the promotion of agriculture has become the most important part of the Government's activities, next only to defence in priority. At the moment large quantities of food were being imported from foreign lands but obviously the Government could not be importing food for all time. Unfortunately various natural calamities overtook the country and were responsible for their not being able to attain the self-sufficiency target they had set before them. To a large extent the food shortage facing the country now was due to the fact we had disturbed the natural cycle of life, which meant that we must return to the earth whatever we had taken out of it, in some form or other. Agriculture must become a primary activity not only of the farming classes but also of the Government, the Universities and all the other various organisations in the country. In Japan, the Minister added, even people who had only about four square feet of land did not allow it to lie waste. Instead, they grew their requirements of vegetables on it. During his visits to the residences of foreign diplomats in Delhi he found their wives devoting most of their time in growing flowers, fruits and vegetables in their plots of land. It was a matter for regret that our people seldom showed such a keen interest in agricultural activities.

Our aim should therefore be to produce more food, more cotton, jute, sugar and all our requirements, because a free country like India could not go on importing food from abroad endlessly.

A graduate in agriculture, Sri Munshi continued, had two functions to perform. He must teach the farmer improved methods of farming and also explain to those unacquainted with agriculture the importance of agriculture. Agricultural graduates have so far been mainly looking to the Government for jobs and except for a few enthusiastic exceptions, these graduates had never spread themselves out into the countryside. This should hereafter be encouraged to a greater extent. The agricultural graduate should go to the villages and apply improved methods of agricultural practices on an area of four or five acres of land. These areas could then serve as convincing demonstrations of the advantages of improved farming practices.

The Food Minister also explained the vital importance of trees in the Nation's economy and said that from time immemorial people had worshipped trees in this country; they should continue to have this reverence for trees and safeguard trees in all possible ways.

Concluding, Sri Munshi exhorted the agricultural graduates to revolutionise the whole face of agriculture in the Madras State. This was particularly urgent, as Madras was mainly a rice-consuming area and India was very short of that particular commodity.

Sri Ram Lal Sethi, Agricultural Commissioner with the Government of India, spoke highly of the Agricultural College and Research Institute at Coimbatore, which had contributed not a little to the development of Agriculture. He could say confidently that in the field of research their work was in no way inferior to the work carried on in other parts of the world. He suggested that persons engaged in research work should not be transferred to mere administrative jobs. Sri Munshi, he said, had outlined for them a comprehensive scheme to make available to the ryots the results of research work that had been done so far. He concluded by exhorting the new graduates to make the Grow More Food schemes successful.

Sri A.B. Shetty, Minister for Agriculture, Madras proposed the vote of thanks to Sri K. M. Munshi and Sri R. L. Sethi.

LIST OF PAPERS FOR THE SYMPOSIUM ON MANURING

SUBJECT	NAME
1. Review of Manurial Experiments in India	Sri K. Bushanam, Special District Agrl. Officer, Araku Valley.
2. Manuring of Rice in Different Environmental factors	Sri M.B.V. Narasinga Rao, Paddy Specialist, Coimbatore.
3. Manuring of Millets in Madras	Sri P. Krishna Rao and A. Kunhikoran Nambiar, Millet Section, Coimbatore.
4. Manuring of Coconut Crops	Sri G. V. Narayana, Oilseeds Specialist, Coimbatore.
5. Manures in Relation to Cotton Production in Madras State	Sri C. Jagannatha Rao, Cotton Specialist, Coimbatore.
6. On planning Manurial Experiments in Sugarcane in Madras State	Sri S. V. Parthasarathy, Sugarcane Specialist, Anakapalle.
7. Manuring of crops in relation to Insect Pests	Sri S. Ramachandran, Government Entomologist, Coimbatore.
8. Manures and their effects on Incidence of Diseases in Crops	Sri T. S. Ramakrishnan, Govt. Mycologist, Coimbatore.
9. The Role of Organic Manures and Inorganic Fertilisers in Soil Fertility.	Sri M. Sanyasi Raju, Govt. Agrl. Chemist, Coimbatore.

OTHER PAPERS

SUBJECT	NAME
1. Emergency Food Production Camps	Sri N. Ranganathachari, Teaching Asst., Coimbatore.
2. Intensification of Agricultural Extension Service	Sri Sanjiva Shetty, Dist. Agrl. Officer, Tellicherry.
3. The food problem in Madras	Sri M. L. Narayana Reddy, Agrl. Demonstrator, Seethampeta.
4. Soil Conservation with special Reference to the Nilgiris	Sri P. N. Nayar, Dt. Agrl. Officer, Ootacamund.
5. Cardamom Thrips	Sri V. Gomathinayagam Pillai and C. Rajagopalan, Cardamom Scheme, Singampatti.
6. Green Manuring; some Suggestions for increasing the green manure area in the Godavari Delta	Sri A. Subba Raju. F.M., A.R.S., Samalkot.
7. Climate in relation to Manuring of crops	Sri M.B.V. Narasinga Rao, „ C. Balasubramaniam & „ M. Jayaraman, Paddy Section, Coimbatore.
8. Essential Oil-Yielding Grasses and their Possibilities	Sri C. Rajasekhara Mudaliar and J. Saktharam Rao, Botany Section, Coimbatore.
9. A Note on the Economic Aspects of Manuring of Crops	Sri S. V. Doraiswami and „ K. Meenakshisundram, Agrl. Economics Section, Coimbatore.
10. Methods of Increasing Production in Coconut.	Sri S. G. Aiyadurai, Asst. Oilseeds Specialist, Coimbatore.
11. Manurial Experiments on Rice (District-Trials).	Sri C. Hanumantha Rao, Superintendent, College Farm, Bapatla.
12. The Importance of Liming to the Paddy soils of South Kanara.	Sri P. N. Ananthakrishna Rao & K. Hanumantha Rao, Mangalore.
13. Green Manuring Semi-Dry Paddy	Sri M. K. Venkatasubramaniam & Sri K. Dorairaj, Rice Research Station, Tirurkuppam.

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| 14. Manuring of Rice in Malabar | Janab A. Abdul Samad & Sri P. C. Sahadevan, A. R. S. Pattambi. |
| 15. Economic Dose of Groundnut Cake (as Manure) For enhancing yields of irrigated Ragi. | Sri B. L. Narasimhamurthi, Seed Development Officer, Coimbatore. |
| 16. Manuring of Ratoons of Sugarcane | Sri P. Seetharamiah, K. Krishnamurthi and J. V. V. Suryanarayana, A.R.S., Anakapalle. |
| 17. Some Practical Aspects of Applications of Bulky Organic Manures to Sugarcane in Madras. | Sri M. Lakshmikantham, Sugarcane Liaison Farm, Samalkota. |
| 18. The Nitrogen Nutrition of Sugarcane | Sri N. V. Mohan Rao and R. L. Narasimham, Sugarcane Res. Station, Anakapalle. |
| 19. Quality of Green-Manured Rice | Sri E. J. Verghese, Chemistry Section, Coimbatore. |
| 20. Western Cotton, Its Status and work in progress for its spread | Sri Subba Rao D.A.O. Bellary & Sri G. Narasimhamurthi, A. D. Guntakal. |
| 21. Influence of Nitrogen, Potash and Phosphorus on the Incidence of Blast Disease of Rice | Sri C. S. Krishnaswami, Assistant, Mycologist, Coimbatore. |
| 22. Distribution of Silica in Relation to "Blast" Disease in Rice | Sri N. R. Adyanthaya and G. Rangaswami, Assts. in Mycology, Coimbatore. |

Report of the Managing Committee for the year 1950—'51

The Managing Committee presents the following report of the Union for the year 1950—'51.

Membership: The strength of the Union as it stood on 30—6—'51 was 936, consisting of 341 officer members, 240 student members and 295 other subscribers for the journal and the remaining 90 being made up of patrons and free exchange. The strength last year was 907 and we are glad that there was a favourable response to our requests in this respect. The student membership of Bapatla College has not increased over last year and the Managing Committee appeals to all the students of Bapatla College through the Principal to enrol themselves as

members of the Union. The Committee appeals also to all officers who are not members of the Union to enrol themselves as members and help the Union.

Office Bearers: Due to the resignation of Sri M. M. Krishna Marar from the managership, Sri M. Vaidyanathan was requested to act as manager and Sri G. Rangaswami was co-opted in his place to the Committee.

Meetings: During the year the Managing Committee met 13 times in connection with routine and emergent items of businesses. No General Body Meeting was held during the year.

Madras Agricultural Journal: The Journal was published regularly every month during the year. One thousand and fifty copies were printed every month at an average cost of Re. 0—8—0 each except the February 1951 issue in which all the symposium papers of the College Day and Conference 1950, were printed. The special issue was priced Rs. 3/- each, considering its bulk and the valuable information incorporated in it. The Journal has in its exchange list 31 journals, both Indian and foreign. The Committee places on record its grateful thanks to the Secretary of the Co-operative Printing Works, Coimbatore for their neat execution and prompt delivery. The Committee records its thanks to the Postmaster General, Madras, for kindly extending the time for posting at reduced rates on one or two occasions during the year.

The Editorial Board met 12 times during the year to select articles for publishing. A large number of articles, scientific and popular were received. The Editorial Board regrets that it could not publish all the articles received owing to pressure of space. The Committee takes this opportunity of placing on record its gratitude to the Editorial Board Members and the Editor, Sri T. R. Narayanan.

Finance: The Managing Committee requests one and all the members to help the executive by enrolling as many members, patrons and subscribers as possible. The Committee records its gratitude to the Government of Madras for the subsidy of Rs. 1800/- granted during the year towards journal and a special grant of Rs. 900/- towards the special issue. The Government granted in June 1951 a sum of Rs. 1000/- towards renovating stage fittings but it was not possible to complete the work before this College Day and Conference. The Committee was able to secure Rs. 1092/- as advertisement charges.

Ramasastrulu Munagala Prize: This year four essays competed for the prize and were evaluated by a committee of four judges. Sri V. Santhanam, Assistant in Cotton was declared the winner this year for his essay on "The role of heterosis in crop breeding with special

reference to hybrid cottons". The Committee thanks one and all of the Judges and specially to Dewan Bahadur D. Ananda Rao, who acted as chairman.

Acknowledgements: The Committee thanks the various members of the Union for the unstinting help they have given in successfully conducting the activities of the Union. Our thanks are due to Sri C. M. John, who has been appointed as Director of Coconut Research and to Sri P. D. Karunakar, Principal, Agricultural College and Research Institute who had given active unfailing help and advice in all Union affairs. To the convenors and members of the various sub-committees such as Reception, Entertainment, Sports, Tea and Conference Committees we extend our grateful thanks for their whole-hearted co-operation and help in the College Day and Conference this year.

Weather Review — For July 1951.

RAINFALL DATA

Division	Station	Total rain-fall for the month	Departure from normal in inches	Total since 1st January in inches	Division	Station	Total rain-fall for the month	Departure from normal in inches	Total since 1st January in inches
Orissa & Circars	Gopalpur	5.8	-1.4	20.2	Central Contd.	Coimbatore	1.9	+0.2	10.1
	Calinga-patnam	12.4	+6.9	21.5		Tiruchirappalli	4.0	+2.9	15.6
	Visakha-patnam	15.1	+10.7	22.1	South	Naga-pattinam	2.4	+0.7	14.9
	Araku Valley*	16.7	+8.5	36.7		Aduturai*	3.3	+1.8	7.5
	Anakapalle*	10.9	+5.9	21.7		Pattukottai*	4.8	+1.5	10.8
	Samalkot*	10.2	+2.8	20.4		Madhurai	5.9	+3.9	13.4
	Kakinada	10.8	+4.2	19.2		Pamban	0.2	-0.3	14.3
	Maruteru*	18.4	+11.4	28.9		Koilpatti*	1.1	+0.5	12.2
	Masulipatnam	10.4	+4.0	22.6		Palayam-cottai	0.1	-0.2	10.8
	Guntur*	7.4	+0.6	18.6		Amba-samudram*	0.9	+0.2	16.7
	Agri. College, Bapatla*	4.8	-1.0	14.3		Trivandrum	5.6	-2.2	38.4
	Agri. College, Farm, Bapatla*	5.9	X	15.9	West Coast	Fort Cochin	15.3	-8.0	65.1
	Rentachintala	4.9	+0.1	12.2		Kozhikode	27.3	-7.0	74.3
Ceded Districts	Kurnool	5.8	+1.4	16.2		Pattambi*	17.2	-8.4	53.4
	Nandyal*	6.4	+0.7	16.0		Taliparamba*	32.4	-12.3	82.2
	Hagari*	3.4	+2.2	10.3		Nileshwar*	33.8	-10.1	81.0
	Siruguppa*	3.1	+0.3	8.1		Pillicode*	31.4	-13.5@	79.3
	Bellary	5.4	+3.8	11.8		Mangalore	36.1	-3.3	85.5
	Cuddapah	3.4	-0.7	11.4		Kankanadi*	34.1	-6.7	82.7
	Kodur*	4.0	+0.3	9.1	Mysore & Coorg. Hills	Chitaldrug	1.7	-1.2	12.5
Carnatic	Nellore	4.7	+1.9	8.0		Bangalore	6.8	+2.9	16.2
	Buchireddipalem*	2.3	-0.5	5.6		Mysore	2.2	-0.5	12.7
	Madras (Meenam-bakkam)	3.4	-0.2	9.0		Mercara	42.9	-0.2	74.4
	Tirurkuppam*	2.6	-2.6@	8.7		Kodaikanal	6.6	+1.9	43.7
	Palur*	1.1	-2.5	9.7		Coonoor*	4.7	+1.6	34.0
	Tindivanam*	0.9	-2.3	5.2		Ootacamund*	10.1	+3.8	27.5
	Cuddalore	1.5	-1.1	7.8		Nanjanad*	20.4	+8.8	40.2
Central	Vellore	5.6	+1.0	20.0					
	Gudiyatham*	4.2	+1.2	8.9					
	Salem	3.4	-0.4	13.5					
	Coimbatore* (A. M. O.)	2.0	+0.3	7.1					

- Note:—
- * Meteorological Stations of the Madras Agricultural Department.
 - @ Average of eight years' data for Tirurkuppam, nine years' data for Pillicode and seven years' data for Araku Valley is given as normal.
 - Average of ten years' data is taken as normal.
 - X The farm was started only this year.

Weather Review for July, 1951

The month began with a weak monsoon in the Peninsula and West Madhya Pradesh. On 2-7-1951 the Arabian Sea branch of the monsoon showed signs of strengthening along the West Coast. But in reality it remained weak throughout the first week. On 7-7-1951 the monsoon was again found to be slightly active in the South Konkan. Barring the slight improvements in isolated pockets the monsoon was generally weak over the country in the subsequent week also.

A heat low was observed over Sind on 13-7-1951 and this caused incursion of moisture in South Rajasthan.

On 18-7-1951 the monsoon became active along the West Coast and remained so for three days.

A shallow depression was noted on 21-7-1951 off the North Circars Coast, about 100 miles of Calingapatnam. Under its influence widespread rains were received in the northern districts of Coastal Andhradesa. It became unimportant on the third day. But for two days from 23-7-1951 the monsoon was fairly active along the West Coast.

The depression in the Bay of Bengal intensified into a cyclonic storm on 25-7-1951 and became feeble the next day. But the monsoon was strong on 26-7-1951 over Orissa and Madhya Pradesh.

The vigour of the monsoon along the West Coast subsided on 28-7-1951, and remained so till the end of the month.

Regarding temperature there is nothing worth recording except the persistence of summer in the Circars, though in less severity, till the end of the first half of July, 1951.

Particulars regarding the noteworthy falls and zonal rainfall during the month are furnished below :—

S. No.	Date.	Place.	Rainfall in inches for the past 24 hours.	
1.	8-7-1951	Tiruchirappalli	...	3.1
2.	12-7-1951	Bellary	...	3.6
3.	23-7-1951	Fort Cochin	...	3.4
4.	23-7-1951	Tellicherry	...	7.4
5.	24-7-1951	Visakhapatnam.	...	6.4
6.	25-7-1951	Kozhikode	...	4.2
7.	25-7-1951	Palghat	...	3.3
8.	26-7-1951	Mercara	...	4.9

ZONAL RAINFALL

S. No.	Name of the Zone.	Total Precipitation.
1.	Orissa and Circars	Far above normal
2.	Ceded Districts	Above Normal
3.	Carnatic	Below Normal
4.	Central	Above Normal
5.	South	Above Normal
6.	West Coast	Far below Normal
7.	Mysore and Coorg.	Slightly above Normal
8.	Hills	Above Normal

Agricultural Meteorology Section
Lawley Road Post, Coimbatore
Dated, 9-8-1951.

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

I. Rainfall forecast for August and September, 1951.

The total rainfall during these two months will be fairly near about normal not only in the Peninsula but also in the North-West India.

II. Errata for the June, 1951 Rainfall Data.

Against Trivandrum read 32.7" instead of 42.7".

Departmental Notifications

GAZETTED SERVICE
Postings and Transfers

Name of Officers	From	To
Sri Ananthanarayanan K. P.,	P. P. O., (Entomology), Coimbatore,	Lecturer in Entomology, Coimbatore.
„ Gopala Menon E. R.,	On leave	P. P. O., (Entomology), Coimbatore.
„ Krishnaswami Rao P. N.,	Asst. Cotton Specialist, Srivilliputhur,	Earlification Officer, Rajapalayam.
„ Krishnamurthi, N. H. V.,	Asst. in Paddy, Maruteru,	Superintendent, A. R. S., Maruteru.
„ Muthuswami Iyer, S.	Sugarcane Inspector, Madurai,	Addl. D. A. O., Intensive Manuring Scheme, Kakinada.
„ Raju, C. P.	Agricultural Engineer, Coimbatore,	Agricultural Engineer, Indian Sugarcane Committee
„ Ramachandran, C. K.	Asst. Cotton Extension Officer, Kovilpatti,	Asst. Cotton Specialist, Srivilliputhur.
„ Saptharishi, K.	Asst. in Paddy, Aduthurai,	Superintendent, A. R. S., Nanjanad.
„ Leo Swamikan,	Officiating Civil Engineering Supervisor, Coimbatore,	Asst. Agri. Engineer, Madras.
„ Subbaiah Mudaliar, V. T.	On leave,	Head-quarters Dy. D. A., Madras.
„ Srinivasacharya, K.	On leave,	D. A. O., (Crop Sampling), Tanjore
„ Verghese, E. J.	Asst. Agri. Chemist, Coimbatore,	Analytical Chemist, Central Coconut Research Committee, Kasargode.
„ Venkata Subramaniam, P. S.	D. A. O., (crop sampling), Tanjore,	Addl. D. A. O., Intensive Manuring Scheme, Tanjore.

SUBORDINATE SERVICE
Postings and Transfers

Name of Officers	From	To
Sri Anjaneyulu Naidu, N.	D. I. H. course, Coimbatore,	Fruit Asst. Kodur.
„ Arunachalam, T.	On leave,	F. M. C. F., Coimbatore.
„ Bhaskara Rao, V.	A. D., Bobbili,	Special A. D., Gurulakshmiapuram.
„ Balasubramaniam, B.	D. I. H. Course, Coimbatore,	A. D., Srivilliputhur.

Name of officers	From	To
Sri Bindu Madhava Rao,	Addl. A. D., Puthur,	Asst. in Paddy A. R. S., Aduthurai.
„ Chockalingam, C. D.	D. I. H. course, Coimbatore,	A. D., Gingee.
„ Doraiswami, N.	„	Seed Dev. Asst. Madurai.
„ Dharmalingaswami, P.	F. M., A. R. S., Bellary,	Fruit Asst., Kodur.
„ Dhananjaya Rao, V.	Special A. D., Sugarcane, Hospet,	Asst. in Cotton, A. R. S., Nandiyal.
„ Edwin Mangala Dass, D. I.	D. I. H. course, Coimbatore,	F. M., Botanic Gardens, Ootacamund.
„ Ebrahim Ali,	„	P. P. A., (Ento.) Tanjore.
„ Gopala Rao, M.	Seed Dev. Asst. (Paddy) Srikakulam,	Seed Dev. Asst. (Paddy) Anakapalle.
„ Gopalam, B.	Asst. in Cotton, A. R. S., Hagari,	Asst. in Cotton, A. R. S., Nandiyal.
„ John Chandra Mohan,	Addl. A. D., Villupuram,	Asst. in Paddy, A. R. S., Ambasamudram.
„ Jagannatha Rao, G.	Special A. D., Gurulakshmipuram,	A. D. Bobbili.
„ Kuppaswami, K. P.	D. I. H. Course, Coimbatore,	Special A. D., Cotton Scheme, Suler.
„ Krishna Rao, D. V.	On leave,	A. D., Atmakur.
„ Kanaka Rao, G.	D. I. H. course, Coimbatore,	F. M., Araku Valley.
„ Krishnan, K.	Special D. A. O., Tanjore,	Dairy Manager, Coimbatore.
„ Lakshminarayana Rao,	Asst. in Cotton, A. R. S., Nandiyal,	Asst. in Cotton, Bellary.
„ Muthukrishnan, C. R.,	D. I. H. course, Coimbatore,	Fruit Asst. Banana Re- search Station, Aduturai.
„ Muthuswami S.	„	Fruit Asst. Kallar.
„ Madhava Rao, S.	„	Special A. D., Sugarcane, Udamalpet.
„ Muthuperumal, V.	A. D., Nilakottai,	Special A. D., Cotton Koilpatti.
„ Mahadheva Iyer, S.	on leave,	Addl. F. M., Kulitalai.
„ Narasimha Dutt, K. V.	D. I. H. course, Coimbatore,	Asst. in Paddy, A. R. S., Maruteru.
„ Narasimha Iyer, B. S.	On leave,	A. D., Ambasamudram.
„ Nanjappa Manigar, V.	Fruit Asst. Kallar,	A. D., Palladam.
„ Nargunam, W. R.	On leave,	F. M., A. R. S., Pattambi.
„ Narasimhamurthi, D.	Fruit Asst. F. R. S., Anakapalle,	F. M., Aarku Valley.
„ Prabhakara Rao, C.	Agrl. Engineer Super- visor, Hospet,	Special A. D., Sugarcane, Hospet.
„ Padmanabha Rao, K.	D. I. H. course, Coimbatore,	Fruit Asst. F. R. S., Kodur.
„ Padmanabha Nambiar, K. P.	Fruit Asst. A. R. S., Taliparamba,	Botany Asst. Pepper Scheme, A. R. S., Taliparamba.
„ Parthasarathy, A. V.	Millet Asst. A. R. S., Hagari,	Millet Asst. A. R. S., Nandiyal.

Name of officers	From	To
Sri Prasada Rao, K.	Millet Asst. Nandiyal,	Millet Asst. Hagari.
„ Raghunatha Reddy, K.	On leave,	F. M., S. R. S., Gudiyattam.
„ Rangaswami Iyengar, K.	F. M., A. R. S., Gudiyattam,	A. D., Chingleput
„ Raghavan, P. N.	D. I. H., Course, Coimbatore,	A. D., Lalgudi.
„ Raman, N. V.	„	A. D., Nilakottai.
„ Rajappan, P. V.	„	Fruit Asst., Taliparamba.
„ Ramachandran, T. K.	Asst. Banana Research Station, Aduthurai,	A. D., Orthanad.
„ Raghava Rao, N.	Lecturer in Entomology, Coimbatore,	Asst., in Entomology, Coimbatore.
„ Radhakrishnamurthi, K.	Agrl. Engineering Super- visor, Guntakal,	Asst. Soil Conservation Scheme, Bellary.
„ Sounder-Raj.	Fruit Asst. F. R. S., Kodur,	Nursery Asst., Kodur.
„ Sivasubramaniam, T.	On leave,	F. M., Sugarcane Division Farm, Nellikuppam.
„ Srinivasa Rao, U. L.	On leave,	F. M., C. F., Coimbatore.
„ Venkateswarlu, P.	Fruit Asst. F. R. S., Kodur,	Striga. Asst. A. R. S., Hagari.
„ Venkatasubramaniam, V.	A. D., Ambasamudram,	K.2 Cotton Scheme, Koilpatti.
„ Venkata Rao, M.	D. I. H., Course, Coimbatore,	F. M., C. F., Coimbatore.
„ Venkata Raman, N.	On leave,	Special A. D., Manures, Melur.
„ Venkataswamy, M.	P. P. A., (Mycology) Coimbatore,	Senior Ento-Myc. Asst. A. R. S., Tindivanam.
„ Venkatesam, C.	D. I. H., Course, Coimbatore,	Fruit Asst., A. R. S., Anakapalle.

APPOINTMENTS

The following B. Sc. (Ag.) Graduates are appointed as upper Subordinated and are posted to the vacancies shown against each :

Name of Officers	To
Sri George, A.	Addl. A. D., Trichinopoly.
„ Kannan Tatachary, R.	Addl. A. D., Villupuram.
„ Krishna Kutty, K. S.	F. M., A. R. S., Nileshtar.
„ Krishna Alwa, H.	Addl. A. D., Puthur.
„ Kaleswara Rao,	P. P. A., (Myc.), Srikakulam.
„ Mohammad Fathauddin,	P. P. A., Cuddalore.
„ Narasimha Rao, P.	Addl. A. D., Sugarcane, Hospet.
„ Ranganathan, S.	Junior Ento - Myco. Asst. Tindivanam.
„ Sankaran,	Asst. in Oilseeds, A. R. S., Nileshtar.

Agricultural College and Research Institute, Coimbatore.

LIST OF ADDITIONS TO THE LIBRARY FOR JULY 1951.

1. ANANTAN PILLAI (R) ... Guide on soil sanitation, 2nd Edition 1951: C. Coomaraswami Naidu & Sons.
2. AVERY (George S), etc. ... Hormones and horticulture, 1st Edition 1947: McGraw Hill Book Company.
3. CLIFTON (C. E.) ... Introduction to the bacteria; 1st Edition 1950: McGraw Hill Book Company.
4. ELLIKER (Paul R.) ... Practical Dairy Bacteriology, 1st Edition 1949: McGraw Hill Book Company.
5. FARM MECHANISATION ... Directory 1951—Temple Press, London.
6. HAMMONDS (Carsie) ... Teaching in agriculture, 1950—McGraw Hill Book Co.
7. HARRISON (George), etc. ... Practical Spectroscopy, 1st Edition 1948: Blackie & Sons Ltd.
8. HOYLE (Fred) ... Nature of the Universe, 1950: Basil Blackwill, Oxford.
9. HUNTER (H) ... Crop Varieties, 1st Edition, 1951, Farmer and Stock Breeder Publication.
10. JOHANSEN (Donald Alexander) ... Plant Embryology, 1st Edition 1950, Chron. Botanica Co.
11. KRISHNASWAMI (P. A.) ... Manual of Highway Engineering, 1st Edition 1950.
12. KROEBER (Elsbeth) and WOLFF (Walter H) ... Adventures with animals and plants, 1st Edn. 1948: D. C. Heath & Co., Boston.
13. Madras Agricultural Department ... Report on the work of the Agricultural Stations in the Madras Presidency, 1947—48
14. MARTIN (John H) and LEONARD (Warren H.) ... Principles of field crop production, First Edition 1949: McMillan & Co.
15. SEN (H. K.) and VENUGOPALAN (M) ... Practical applications of recent lac research, New Edition 1951: Orient Longman's Ltd.
16. THOMAS (W. L.) and EYRE (P. W.) ... Early potatoes, 1st Edition 1951. Faber and Faber Co.
17. WALKER (John Charles) ... Plant pathology, 1st Edition 1950: McGraw Hill Book Co.
18. WARNER (James N.) ... Dairying in India, 1st Edition 1951, McMillan & Co.,
19. WESTCOTT (Cynthia) ... Plant disease Hand book, 1st Edition 1950. Von Nostrand & Co., New York.

THE MADRAS AGRICULTURAL STUDENTS' UNION.

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

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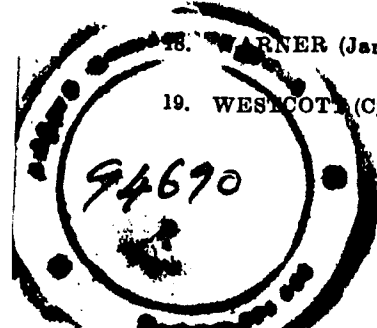
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All communications should be addressed to:

The Secretary, M. A. S. Union,
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