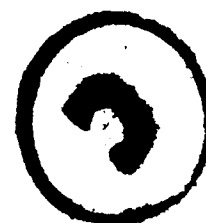


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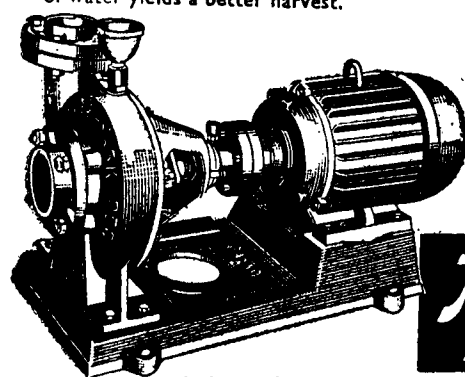
No. 11

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Editorial

The need for satisfying the man power requirements and the training of technical personnel are considered as important among the basic conditions for economic development. The most crying need of to day is increased production and productivity in all fields of development, particularly in agriculture and industry. This lays stress on the importance of technical education. While agricultural production has registered very good increases in the past ten years, it is often desired that the same could be said of productivity also. But productivity depends to a great extent on the technically proficient personnel, the technical factors and other general conditions. Technical training given in the agricultural colleges is aimed at fulfilling the needs of the above purposes, specially towards the training of technically proficient workers in several fields.

When we refer to as the technical personnel, we mean the workers at all levels who plan, organize, supervise, do research or extension work as well as those who are immediately in contact with ryots in the villages. This involves the different stages of training right from the village level worker. Therefore the agricultural education is to be recognized as a technological rather than a professional one. Experience has brought out that many new methods of improved agricultural production make much impact on the cultivator through adequate technically trained personnel who could convey the goods.

Many steps have been taken to expand the facilities for training the large number of personnel for agricultural development, in the Rural Extension Training Centres and the agricultural institutions. In-service training for the Agricultural Extension Officers, the Farm Managers of State Seed Farms and the District Agricultural Officers as given in the Agricultural College and Research Institute, Coimbatore is another step in fulfilling an important need. The proposed Training College in Agriculture at the Agricultural

College, Coimbatore, for giving training to the teachers in secondary schools and high schools will help in giving the due agricultural bias to the subjects taught in schools. The opening of agricultural schools for training the sons of farmers who cannot avail of higher agricultural education and special courses to young farmers are all steps taken in Madras State and these are sure to yield fruitful results.

With the long tradition of practical outlook in agriculture and agricultural problems, and the facilities, equipment and conditions being well met, the contributions of the Agricultural College and Research Institute at Coimbatore towards the training of technical personnel, is a matter over which it could be proud of. The institution of the Post-Graduate training and the availability of improved technical equipment and facilities in the Agricultural College and Research Institute, Coimbatore have further enhanced the value of the training given here.

When the reader receives the Journal, he will be happy to note that the Annual College Day and Conference of this great institution comes off in the third week of December, which synchronises with the celebration of the Golden Jubilee of the Journal. A perusal of the programme will convince the importance given in the deliberations to the scientific and educational aspects. We wish the function a great success.

An Invitation

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**THE MADRAS AGRICULTURAL STUDENTS' UNION,
COIMBATORE**

THE FORTY-FOURTH COLLEGE DAY & CONFERENCE

AND

The Golden Jubilee Celebrations

OF THE

MADRAS AGRICULTURAL JOURNAL

have been programmed
to be held from the 21st to 24th December 1961.

SHRI MORARJI DESAI

(MINISTER FOR FINANCE, GOVERNMENT OF INDIA)

has kindly consented to inaugurate the celebrations.

Shri M. BHAKTAVATSALAM

(MINISTER FOR HOME & AGRICULTURE, GOVERNMENT OF MADRAS)

has graciously agreed to preside over the function.

You are cordially invited to participate
in the celebrations.

M. BAGAVANDOSS

Secretary

blossoms once formed. Though being able to produce commercial crops of roots under most conditions, it flowers best under tropical and subtropical conditions. In general experience, the sweet potato has been so decidedly barren that the Standard Cyclopedia of Horticulture (1917) says of it, "flowers and fruits are rarely seen". A still more recent volume says, "occasionally a small ball or morning glory shaped bloom with a purple throat and white margin may be noticed in commercial fields and the mature seed may be produced if the growing period is prolonged by the use of artificial means".

Stout (1924) collected information on the flowering and seed setting of the sweet potato from 15 States in the U. S., A., the United State Department of Agriculture, and from the Virgin Islands, Puerto Rico, Cuba, Santa Domingo, Barbados and St. Vincent (Trinidad), Hawaii, Cuam, Phillippines, Java, Newzealand and Australia. Thompson (*loc. cit*) says that seed production is restricted rather closely to the tropical regions. Although the plant flowers frequently in South Atlantic, the Gulf States of the U. S. and occasionally as far north as Washington D. C., it is only in exceptional cases that perfect seed matures in the U. S. He is of the opinion that a relatively dry tropical climate apparently is conducive to seed production whereas the more humid areas are less favourable. The information collected by Stout (*loc. cit*) is more or less in agreement with Thompson's observations. Young of Georgia is quoted by Stout (*loc. cit*) thus: "on several occasions, seeds have been produced and seedlings grown in an experimental way though no strain of superior variety has been produced". The reports obtained by Stout from Barbados, Puerto Rico, Philippines and the New York Botanic Garden are that there was profuse bloom but no seed; Calvino in Cuba was, however, successful and obtained 1000 seedlings. But the seedlings so produced reverted largely to types not considered desirable for commercial growing.

In Hawaii, a large number of varieties and hybrids thereof seeded freely, but during the moist seasons the foliage developed most luxuriantly and even seedling varieties were less inclined to seed during the wet season. Raising of seedlings was found difficult in Queensland. A report from Java (Stout, *loc. cit.*) says that self-fertilization is possible even if a large planting is made of one sort isolated from other varieties. Menezes (1953) observed 66 varieties and concluded that all varieties flowered well under the conditions of the State of Paulo in Brazil, fertile pollen was produced but very little seed set under conditions of self-pollination.



Examination of seedlings at an early stage prior to isolation of promising ones. (Sweet Potato Research Centre, Chase, Louisiana, U. S. A.)



Seedlings of sweet potato in the green house (Sweet Potato Research Centre, Chase, Louisiana, U. S. A.)

Sampath and Bhanumurthy (*loc. cit.*) state that the sweet potato flowers freely at Benares and that the varieties differ in the extent of flowers. At Coimbatore and Bapatla, they state that conditions for flowering and seed setting are optimum during the cool months from December to February and that "even if the vines flower freely, no seed may set as there is a high degree of self incompatibility". In 1950 Richharia and Ghosh (*loc. cit.*) tried over 1600 plants of 25 varieties introduced in Sabour from the Indian Agricultural Research Institute, of which only 36 plants of five varieties flowered. In 1951 they tried 14 American varieties besides five from the Indian Agricultural Research Institute and three local varieties. Two of the American varieties died and of the remaining 12, seven flowered while all the local and Indian Agricultural Research Institute varieties flowered. They attribute the better flowering in 1951 to a more favourable temperature than during the previous year.

Inducing flowering: Tioutine (1935) made unsuccessful attempts to induce flowering in varieties that did not flower naturally by restricting the root system by grafting on another species of *Ipomoea* and by growing the varieties as perennial cultures under glass. He explained that the ability to produce flowers is a varietal characteristic and that fertility in the species is the exception rather than the rule. Thompson's (1925) work showed that plants within the same variety varied in the tendency to produce flower and seed. McClellan quoted by Miller (1939) found pronounced effects of varying periods of daylight exposure on the growth and blossoming of sweet potatoes and beans.

The experiments of Miller (1937 and 1938) in the Louisiana State University Agricultural Experiment Station were probably the most comprehensive and also the most successful. Miller tested a number of treatments such as root pruning, vine girdling, growing the vines on trellises, photoperiod adjustments and stimulation of natural flowering and fruiting conditions by temperature adjustments. In one of his experiments, the plants were set to the green house in August. They were trained to a trellis and kept growing under optimum conditions. At that time no flowering occurred. Two pounds of super phosphate were worked into the soil around each plant, watered heavily and kept on what may be considered the wet side of the optimum from November until January 1. During this period the plants developed highly vegetative growth. Beginning from January 1 and extending to February 15 the plants were watered lightly or kept on the dry side. Following this period of drying and

desiccation, the plants were again watered heavily for six weeks until they again became rather vegetative. Following this, the plants were maintained in optimum growth. In the later part of this second vegetative growth, the plants bloomed and set seed from selfed, crossed and inter-crossed flowers from four varieties. Among other contributory factors to flowering are mentioned: (i) a day length of $11\frac{1}{2}$ hours increased to $12\frac{1}{2}$ hours, (ii) a relative humidity of 75 to 85 percent and (iii) a temperature varying from 70° to 80°F. The building up of carbohydrate reserves is suggested to be responsible for the flowering.

The plants bloom better when trained to a trellis and thus given plenty of air and sunlight.

Another method is described by Miller in which the vines are trained on an upright trellis and cut from $\frac{1}{2}$ to $\frac{3}{4}$ across at the base when they have reached a length of 6 or 7 feet. Under this treatment some varieties flowered as early as July.

Studies conducted by Miller in 1929 included a treatment of overwintering the vine cuttings taken in August, transferring them to a greenhouse and planting in spring followed by girdling.

Yet another technique developed by Miller (1939) is the bouquet method or the "melting pot technique". Vines bearing flower buds about to open are cut and placed in a nutrient solution of acidified water in a lath house where they develop roots in a few days. They continue to flower and produce seeds and the set is reported to be much higher than in the field. Hawaiian varieties have been induced to flower by this technique.

Probably more significant in its value, particularly in view of the failure of the attempts of Hartman (1947), is the success achieved by Mikell, Miller and Edmond (1948) in inducing flowering in the Jersey type of sweet potato which seldom flowers in the United States. They grafted one of the Jersey varieties, Orange Little Stem on *Ipomoea ruber* and *I. Carnea* rootstocks. The latter do not produce storage organs. The resulting accumulation of carbohydrates is believed to have induced the flowering. Lam and Wadner quoted by Millet (1955) found it possible to induce flowering and seed set in the Jersey type by grafting on morning glory stock, provided they allowed two or more leaves to remain on the stock. If the leaves were removed from the stock, flowering was retarded or inhibited

entirely. They conclude that the leaves develop the hormone 'florigen' which is responsible for flower production. Whittwer quoted by Miller (1955) found that 2, 4-D effectively induced flowering in the Jersey type. Stino and Hassan (1954) working in Egypt found that scions of rarely blooming types produced flowers readily when grafted on to readily blooming types and this has been suggested as indicating a translocation of a flowering stimulus upwards from the stock to the scion. Miller (1937), however, is of the opinion that no such translocation takes place. The flowering, according to him, is due to the accumulation of carbohydrates in the scion and due to the fact that the non-tuber forming rootstock species does not utilise any of the carbohydrates reserves so accumulated.

In Japan, Sigemura *et al* (1938) report of having induced flowering in 27 varieties under artificial short day conditions with a photoperiod of 8-10 hours. Akimoto's experiments (1940) included three methods of accelerating flowering viz. grafting on botanically related tuberous plant, water culture and short day treatments. The water culture treatment is reported to have given the best results. Cross fertilization gave a higher percentage of set than selfing. Sugawara (1940) has reported a similar success with water culture treatment.

Prijampoljskii (1950) obtained some seed at Odessa by treating cuttings with manganese solutions of various concentrations for two to six hours. Edmond and Martin (1946) found length of day most effective in flower and fruit production.

Improvement through mutations: Elmer (1938) calls attention to the widespread occurrence of bud mutations in sweet potato varieties and to the consequent need for continued plant selection by the farmer to maintain quality of his stocks. Richard (1939) estimates that on an average one mutation occurs in every 7000 plants. Most of them being retrogressive, he suggests that the skin and flesh colour of all seed potatoes be checked. Miller and Kimbrough (1937) found six mutations in Porto Rico variety, differing mainly in skin and flesh colour. Further rigid selection over a six year period gave rise to a strain known as unit 1 Porto Rico, believed to be the best source of Porto Rico seed available in 1936. About 2000 bushels of this strain were certified in 1936. Carmago (1952) refers to six mutations in Brazil, most of which differ in stem colour while two of them are regarded as distinct improvements on the parents, ranking among the best varieties available for cultivation.

Breeding Investigations: Sampath and Bhanumurthy (1948) conducted preliminary investigations on the hybridization of the sweet potato with six clones differing in the presence or absence of purple colour in the stem, leaves and tubers as well as in the shape of leaves. They obtained four capsules at Coimbatore out of 20 flowers pollinated, and at Bapatla ten capsules out of 180 flowers cross-pollinated. At Bapatla they report that pigmented types gave proportionately more capsules than unpigmented ones. They also noted two lengths of style, one about 14 mm. and the other about 16 mm. and that similar types can be crossed. They verified the heterozygous nature of the parent type by sowing two seeds from one capsule which gave one purple and one green seedling. Because of the high number of chromosomes in this species ($2n=90$) they doubt if cytogenetical line of improvement will be practicable. Richharia and Ghosh (1954) conducted breeding investigations in Bihar. Detailed studies of seedlings raised showed distinct segregation for incision of lamina, petiole, node and inter-node colour, pubescence on vine, root colour etc. No conclusions have, however, been drawn in view of the limited population.

Work initiated at the Louisiana State University Agricultural Experiment Station by Miller and co-workers had specific aims directed towards not only the improvement of the crop in general but also in increasing the dietetic value in terms of the carotene content and the market value by way of improving the external and internal colour, shape of roots etc.

Methods of Breeding: Edmond and Martin (1946) have given a detailed account of the floral structure of the sweet potato. The flowers open just before, at or immediately after sunrise and close on the same day. The anthers dehisce just before or immediately after the flower opens and the amount of pollen that is shed varies with the seedling or variety. A high humidity is believed to facilitate shedding of the pollen, the stigmatic surface is most receptive between 8-00 A. M. and 10-00 A. M.; the fruit requires a month to attain maturity; most fruits contain one or two seeds and very few contain 3-4 seeds.

Sampath and Bhanumurthi (1948) observe, "All the flowers opened by 8 a. m. with burst anthers and all withered the same day".

Controlled pollination: In selfing and protecting the flowers of the male parent in the crosses, Miller *et al* employed a large paper clip placed on the tip of an "about to open flower" in the late afternoon.

The next morning emasculation of the selected female parent is performed between 5-00 a. m. and crossing between 8-00 and 10-00 a. m. on the same day. In selfed flowers the corolla is closed again with the paper clip. Pill boxes and soda straw have also been used to protect flowers. According to Edmond and Martin (1946) emasculation is done on an "about to open flower" between 2-00 p. m. and 6-00 p. m. Pollination of flowers consists of removing the pill box or straw, applying the pollen, replacing the straw and tagging. Menezes (1953) states that the best time in Brazil to effect emasculation is 16-00 hours, the pollination being performed at the same time on the following day. Richharia and Gosh (1954) emasculated fully developed buds late in the afternoon, covered them with parchment bags and pollinated the following morning between 6 and 10 a. m. They state that the anthers generally burst when the corolla is fully expanded mostly at sunrise. Sampath and Bhanumurthy (1948) have dispensed with emasculation on the grounds that because of self-sterility no emasculation is needed.

Sterility and fertility: Miller (1938) found varietal differences in flowering and setting which he ascribes as due to differences in photoperiodic responses. The earlier part of the optimum time for pollination, namely 7 to 9 a. m. in the spring and 8 to 10 a. m. in the fall seemed to be more conducive to seed setting in selfed flowers. Miller *et al* (1943) evaluated the plants in the nursery as to their fertility level when used as parents. Certain lines were more fertile as female parents than others. Preliminary studies suggested that lack of fertility may be due to the style being deficient in an unknown substance which may initiate pollen germination or it may contain some substance which acts as an inhibitor to pollen germination. They also found considerable difference in plants with regard to ability to produce viable pollen. With the help of this information planned crosses were made using very fertile female and good pollen producing plants as parents, increasing thereby the seed production.

Togari and Kawahara (1942) carried out studies on compatibility relationships in the sweet potato at the Tokyo Agricultural Experiment Station. Approximately 50 varieties were tested and classified into three groups each of which is intrasterile and is fertile in crosses with the other two groups. As shown by the percentage capsule set and seed number per capsule in compatible matings, differences in grade of compatibility were noted in reciprocal crosses between members of the three groups. It is suggested that grades of pollen activity exist among the three groups. The stimulating

action of the pistil upon the pollen also varies; pollen grain germination is almost completely suppressed in selfing, neighbour pollination and intravarietal pollination within each of the varieties designated A, B and C. Germination of pollen grains occurred, however, in the matings $A \times B$, $B \times C$ and $A \times C$ and their reciprocal crosses. Compatible matings showed variations in the percentage of pollen germination and tube growth, closely corresponding to the variations in the percentage of capsule set and number of seeds per capsule previously observed. In regard to the possibility of inducing pseudo-fertility by means of bud pollination, Togari (1942) observed that since the style of the sweet potato flower does not become receptive until a few hours before anthesis, by which time the pollen fails to germinate bud pollination offers little prospect of overcoming incompatible matings.

In Delhi, Chatterjee and Nagbiswas (1952) found that although the flowers did not set fruit, pollen fertility ranged from 76.5 to 100 percent; the plants appeared to be self-sterile.

Seeds and Sowing: The seeds of selfings and crossings are saved until required for sowing. They are scarified with sulphuric acid and planted in warm moist soil maintained from 75° to 85°F. Richharia and Gosh (1954) report of the failure of germination of seeds soaked in tap water in petri-dishes. Treatment with concentrated sulphuric acid for 15 minutes gave satisfactory germination.

In Louisiana Agricultural Experiment Station about one week after the seedlings appear, they are transplanted in the green house bench or bed. As the seedling grows, cuttings consisting of 3 to 4 nodes are made and planted in the green house or the seedlings allowed to grow and vine cuttings made just before they are set in the field. A single plant thus produces five or six cuttings which will be ready for planting by the third week of May. These in turn produce sufficient seed stock for the production of the plants in the following year.



(To be concluded)

Reclamation of Saline and Alkali Soils (Field Experiments)

by
C. L. DHAWAN, SADHU SINGH KAHLOON and VED PARKASH,
Amritsar (India).

A fairly large variety of legumes and non-legumes constitute the green manuring crops. The majority of them are legumes. An ideal green manuring crop should possess three characteristics - ability to grow well on poor soils, rapid growth, and abundant and succulent tops.

Lander (1935) used *Senji* (*Trifolium alexandrinum*) as green manure in the alkaline fields. His treatments with *Senji* revealed that the exchangeable calcium of the soil had increased and an average wheat crop was produced. *Janter* (*Sesbania aculeata*) is an ideal green manure crop. Gadgil (1937) recommended it even under water logged conditions. Basu (1937) reported that *Janter* improved alkaline soils by lowering exchangeable sodium. Rege and Patwardhan (1956) were of the opinion that green manuring with *Janter* not only reduced harmful salt but also opened the soil. In semi-arid and arid zones, the problem of gradual salinization demands immediate attention. It has been estimated that such type of soils comprise about 39 per cent of the world's dry land area. Dhawan and his collaborators (1958; 1958; 1953) have carried out intensive work on the reclamation of alkali soils. From the results of different experiments conducted by them on different green manures they concluded that *Janter* was one of the best reclaiming agents for alkali soils.

Very little work has so far been done on field scale for investigating most effective methods for the reclamation of saline and alkali soils. It was, therefore, considered desirable to conduct field experiments for comparing different treatments.

Experimental: Two typical soil blocks containing predominantly white alkali (sodium chloride and sodium sulphate) and black alkali (sodium carbonate) were selected for carrying out different treatments. The following data in respect of white alkali reveals the nature of the soil and sub-soil observed on the analysis of a typical representative profiles :-

TABLE I.

Results of analysis of white alkali profile.

No. S.	Depth.	Total Soluble Salts.	pH	Dispersion Co-efficient.	Degree of alkalization. Exch. Na + K $\times$ 100 Exch. Na + K + Ca + Mg.
1.	0'-0.5'	2.5	9.90	59.3	90.5
2.	0.5'-1.0'	0.81	9.15	53.8	77.5
3.	1.0'-1.5'	0.56	9.77	66.6	61.2
4.	1.5'-2.0'	0.48	9.20	80.7	68.5
5.	2.0'-2.5'	0.47	9.85	79.1	61.8
6.	2.5'-3.0'	0.41	9.93	83.3	79.7

TABLE II.

Results of analysis of black alkali profile.

No. S.	Depth.	Total Soluble Salts.	pH	Dispersion Co-efficient.	Degree of alkalization. Exch. Na + K $\times$ 100 Exch. Na + K + Ca + Mg.
1.	0-0.5'	3.00	10.25	67.10	81.40
2.	0.5-1.0'	0.85	10.00	63.80	74.40
3.	1.0-1.5'	0.68	9.95	51.00	71.90
4.	1.5-2.0'	0.70	9.97	64.80	74.50
5.	2.0-2.5'	0.70	10.05	74.00	66.67
6.	2.5-3.0'	0.73	10.05	65.70	84.10

Dispersion co-efficient measures the percentage of total clay that can pass into suspension stage by contact with water.

The following treatments were conducted :—

A. White alkali soils :

- (i) Control :— Leaching (18" delta before rice transplantation).
- (ii) Leaching as in (i) *cum* green manuring with *Janter* (*Sesbania aculeata*) at 26,000 lb. per acre.
- (iii) Leaching as in (i). Farm yard manure at 8,500 lb. per acre plus green manure (*Janter*) at 13,000 lb. per acre.
- (iv) Leaching as in (i). Press-mud at 4,500 lb. per acre plus green manure (*Janter*) at 13,000 lb. per acre.

Press-mud is a waste from sugar factories and contains 40 to 45% Calcium oxide.

B. Black alkali soils :

- (i) Control :— Leaching (24" delta before rice transplantation).
- (ii) Leaching as in (i) cum green manuring with *Janter* (*Sesbania aculeata*) at 26,000 lb. per acre.
- (iii) Leaching as in (i). Farm yard manure at 8,500 lb. per acre plus green manure (*Janter*) at 13,000 lb. per acre.
- (iv) Leaching as in (i). Press-mud at 4,500 lb. per acre plus green manure (*Janter*) at 13,000 lb. per acre.
- (v) Leaching as in (i). Press-mud at 4,500 lb. per acre plus distillery waste at 65,000 lb. per acre.

Distillery waste is a waste product from alcohol factories. Its pH ranges between 4.5 to 4.9. Due to its acidic nature the calcium carbonate usually present in the semi-arid and arid soils become soluble at this pH value and the reverse reaction of replacing Sodium by Calcium in the exchange complex starts. With the gradual replacement of Sodium by Calcium the ameliorative properties of the soil begin to re-appear.

- (vi) Leaching as in (i). Farm yard manure at 8,500 lb. per acre plus Gypsum at 2,500 lb. per acre.
- (vii) Leaching as in (i). Farm yard manure at 8,500 lb. per acre plus Distillery waste at 65,000 lb. per acre.
- (viii) Leaching as in (i). Green manure at 13,000 lb. per acre plus Gypsum at 2,500 lb. per acre.

The size of the experimental plots was kept at 40 ft. x 20 ft. Four replications were given to each treatment.

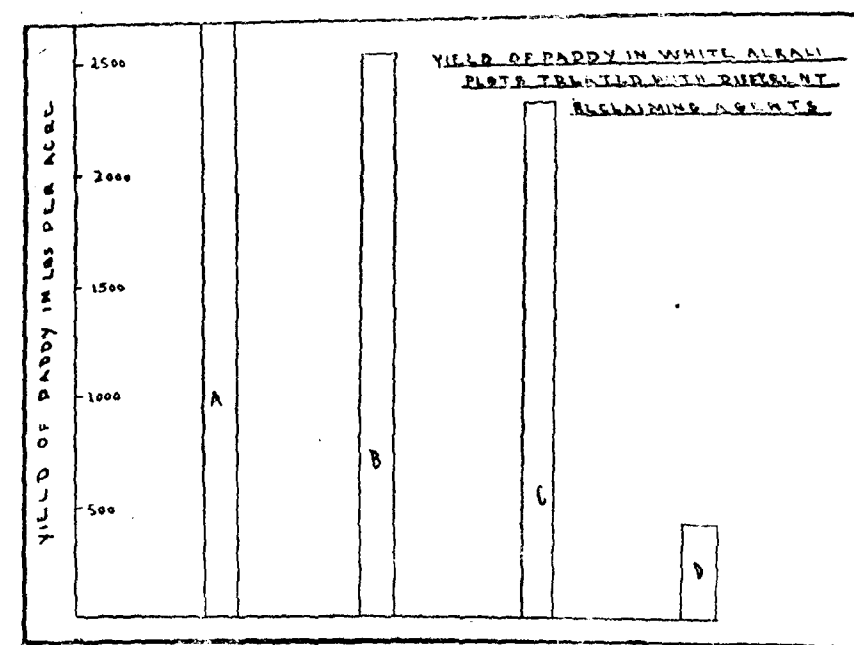
Drains from 3 to 3½ ft. deep were dug all around the fields for facilitating the sub-soil drainage.

Discussion of Results : *White alkali plots :* Weekly floodings each with 3" irrigation were given to each plot for six weeks in May and June. After the fourth irrigation, treatments (ii), (iii), and (iv) were applied. Rice seedlings (349 Punjab Jhona) were transplanted in each plot in the 4th week of June. Each plot received 30" of irrigation for the maturity of rice. This was aided by a normal monsoon rainfall of 15 inches.

Fig. I presents the results of average yield per acre of rice in each plot, which runs in the following order :—

- (i) Plots treated with green manure plus Press-mud had the maximum yield.
- (ii) Plots green manured with *Janter* (*Sesbania aculeata*) alone stood second.
- (iii) Green manuring plus farm yard manure plots came next to *Janter* treated plots.
- (iv) Control plots had very little yield.

FIG. I.



- A — Press-Mud. @ 4500 lb/acre plus green manure @ 13000 lb/acre and leaching.
 B — Leaching cum green manuring with 26000 lb/acre.
 C — Farm yard manure @ 2300 lb/acre plus green manure @ 13000 lb/acre and leaching.
 D — Control (leaching with 18" delta).

It confirms that green manuring plays the dominant role in increasing the yield of paddy in such type of soils.

Dispersion co-efficient decreased maximum in plots treated with Press-mud and green manured with *Janter* in the second year of reclamation.

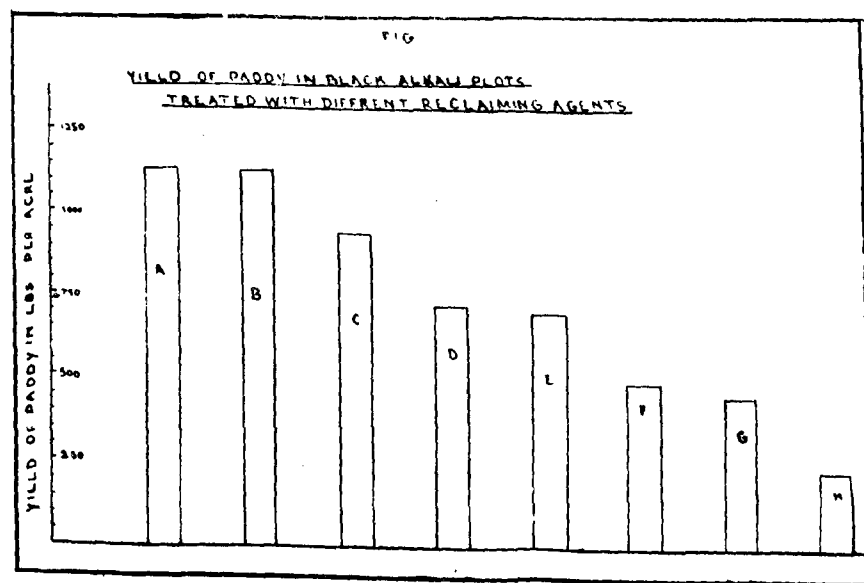
Black alkali soils: The second experiment related to the reclamation of black alkali soils as described in "experimental details".

The layout and size of plot was of the same order i. e. 40' x 20'. The treatments were eight and replications were four. The variety of rice transplanted was the same i. e. 349 Punjab Jhona.

Fig. II shows the yield of paddy in different plots given varying types of treatments. A glance at fig. II reveals the effect of various treatments in the following order:—

- (i) Plots green manured with *Janter* and containing farm yard manure or treated with Distillery waste (a waste product from alcohol industry) plus farm yard manure gave the maximum yield of 1,125 lb. per acre.

FIG. 2.



- A — Leaching farm yard manure at 8500 lb/acre green manure at 19000 lb/acre.
- B — Leaching farm yard manure at 3500 lb/acre plus distillery waste at 6500 lb/acre.
- C — Leaching green manure at 13000 lb/acre plus gypsum at 4300 lb/acre.
- D — Leaching green manure at 13000 lb/acre plus press-mud at 4500 lb/acre.
- E — Leaching green manure at 20000 lb/acre.
- F — Leaching Press-mud at 4500 lb/acre plus distillery waste at 6500 lb/acre.
- G — Leaching farm yard manure at 8500 lb/acre plus gypsum at 2500 lb/acre.
- H — Control leaching with 24" Delta.

Distillery waste being acidic in character, with pH 4.5 to 4.9 aids in neutralising the excessive alkalinity of the soil more quickly.

- (ii) Green manuring plus gypsum had 950 lbs. per acre yield.
- (iii) Green manuring plus Press-mud produced 720 lbs. per acre.
- (iv) From green manuring alone only 700 lbs. of rice per acre were obtained.
- (v) Press-mud plus Distillery waste could produce 500 lbs. per acre.
- (vi) Farm yard manure and gypsum behaved parallel to Press-mud plus Distillery Waste.

The results of dispersion co-efficient showed that Distillery waste *cum* green manuring with *Janter* (*Sesbania aculeata*) produced the maximum reduction. Dhawan (1950) reported that the structure of the soil was mainly governed by the dispersion co-efficient. Therefore the treatment producing the maximum reduction in the dispersion co-efficient was the most effective in reclaiming the alkali soils.

It was further confirmed from the results of these plots that a combination of green manuring with farm yard manure or distillery waste was very effective. But there are inherent difficulties for the transport of distillery waste, while farm yard manure may not be available in sufficient quantities. If these products are available near the site of reclamation, their combination with green manuring is the most effective treatment. In case they are not available, green manuring with *Janter* alone should be adopted as a reclamation agent.

Dhawan and his associates (*loc. cit.*) have also concluded from the laboratory and semi-field experiments that *Janter* is the most effective green manure plant.

Summary: The following methods may be safely adopted for the reclamation of saline *cum* alkali soils:—

- (1) Adequate drains depending upon the soil and water table conditions should be constructed all around the field. Field drains should pour into a bigger block-drain.

- (2) *Janter* (*Sesbania aculeata*) for green manure should be sown in early April, and when the plant attains a height of 12", leaching operations should be started to complete a total of 18" to 24" delta in May and June. If *Janter* cannot be grown in the first

year due to excessive alkalinity, it may be grown on a good field nearby and imported from there in mid June. Green manure must be incorporated before the 15th June. One or two subsequent irrigations would decompose the organic matter. If press-mud or distillery waste is not available nearby, only green manuring with *Janter* (*Sesbania aculeata*) should be carried out.

(3) Rice should be transplanted preferably in rows with two or more seedlings at each spot.

(4) If irrigation is available during winter, Berseem (*Trifolium alexandrinum*) should be taken as winter crop and sown immediately after paddy harvest; otherwise gram (*Cicer arietinum*), lentil or any cereal may be grown.

(5) Repetition of this method during the subsequent two years would reclaim the soil completely and would tend to increase the paddy yields from 2,400 lb. to 3,000 lb. and subsequent Berseem crop from 50,000 lb. to 80,000 lb. of green fodder, or in the absence of that 1,200 lb. of gram.

(6) The drains will have to be kept deep and clean.

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Biology and Control of the Brinjal Stem Borer-*Euzophera perticella* Rag. (Lepidoptera, Pyralididae)

by

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Euzophera perticella Rag. has been reported occurring commonly throughout the plains of India wherever brinjal is cultivated, sometimes as a major pest. In spite of this, however, it was found that little information was available on the life history, habits and the control of this pest. Hence, the observations taken on these aspects of *Euzophera perticella* Rag. have been given in the following account.

Food plants: The caterpillar of *Euzophera perticella* Rag. has been reported boring into the stems of brinjal, chillies, potato and tomato from various parts of India. However, its most favoured food plant is brinjal. Fletcher (1919) pointed out that the caterpillar also sometimes bores into the stems of tomato in Bombay. Jhaveri (1917) reported it boring into tomato stems at Surat. Shah (1942) found it boring into chilly stems and reported it to be a minor pest of chillies. From Coimbatore and Ranchi it was reported to be boring into the potato stems. But in Uttar Pradesh and Rajasthan, it has been found to be feeding on wild and cultivated brinjals only and has not been found on other Solanaceous plants.

Nature of Damage: The caterpillar confines its activities to the main stem mostly and it has never been found boring into the fruits of brinjal. The fullgrown caterpillars are found usually near the root portion of the stem about one to two inches above the ground. It attacks both the young and old plants alike. The borer eats up the tissues inside and fills the cavity with its excreta which in most cases oozes out from its hole of entry. The top shoots of young plants droop down and wither, older plants get stunted and sometimes even wither. In cases of severe infestation all the plants may be killed.

Characters for Identification: The caterpillar is creamy white with only a few bristly hairs on the body, tapering towards posterior end; full-grown caterpillar varies from 20 to 22 m. m. in length and 2.0 to 2.25 m. m. in width, crotchets on prolegs uniordinal, uniserial in complete ovals, spiracles vertically oval with brown rims guarded by chitinous teeth.

The adult moth has a wing expanse of 26 m. m. in the male and 32 m. m. in the female. Its head and thorax are pale rufous and grey, abdomen is pale. Fore wings are pale rufous and the costal area beyond the middle and the apical area is suffused with grey. The hind wings are whitish and their marginal area is tinged with fuscous in the female.

The immature stages of *E. perticella* Rag. are often confused with those of *Leucinodes orbonalis*. The following table gives few of the distinguishing features between the immature stages of both.

TABLE 1
Distinguishing Features of *Leucinodes orbonalis* and
Euzophera perticella in Immature Stages.

No.	Stage	<i>Leucinodes orbonalis</i>	<i>Euzophera perticella</i>
1.	Egg	Creamy white, elongate, 0.75 to 0.8 x 0.5 to 0.6 m.m. in size.	Creamy or yellowish scale like, 1.0 x 0.8 m. m. in size.
2.	Larva	Found on the upper stems or fruits, pinkish violet in colour, full grown larva measures 16-20 m. m. x 2.5-3.8 m. m.	Found in the lower stems, creamy white in colour. When full grown measures about 20-22 m. m. x 2.5 m. m.
3.	Pupa	Hard, reddish brown to dark brown in colour, 8-12 m. m. x 2.5 to 3.5 m. m. in size, cremaster with 8 spines.	Delicate, thin, light brown 14-20 m. m. x 8 to 4 m. m. in size.
4.	Cocoon	Tough, white or dark brown and measures 10-14 m.m. x 3-4 m. m.	Delicate, dirty white or brown and measures 30 m. m. x 4 m. m. in size.

Life History: The moths usually appear towards the end of March and copulation usually takes place at night. Two to four hours after mating the females start laying eggs singly or in batches usually in the angles formed by the veins with the mid-rib on the young leaves. Sometimes the eggs are also laid on the petioles and tender branches of the plants (about two months old). The egg laying is completed generally by the end of July. During the period from April to middle of October all the stages of the insect are present in the field.

Egg: The eggs are small, 1.0 x 0.8 m. m. in size, scale like and creamy or yellowish in colour. The freshly laid eggs are translucent. They become more and more dull in colour as the days advance and finally become opaque. The egg stage lasts from about 3 to 10 days but most of the eggs hatch from 4th to 6th day. Duration of the egg stage depends on the prevailing climatic conditions and temperature.

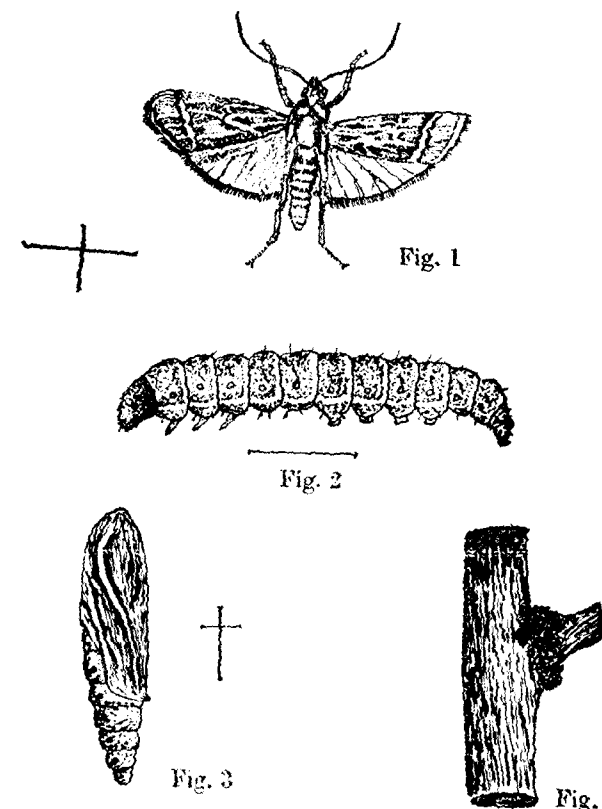


Plate — Figures showing the various life stages of *Euzophera perticella* Rag. — the brinjal stem borer.

Fig. 1 — adult moth; Fig. 2 — full grown larva; Fig. 3 — pupa; Fig. 4 — a part of the attacked stem showing the frass of excrement oozing out of the hole of the attacked stem. The hair lines indicate the natural size of the various stages of the pest.

Larva: The first instar larva is about 2 m. m. in length and 0.25 m. m. in breadth. It feeds on the exposed parts for a few minutes and then enters a petiole or stem. The larva lies curled up in the hollow which it has eaten out. The little caterpillar looks more or less cylindrical in shape, gradually tapering towards

the posterior region from about two-thirds of the body length. The head is brown, the prothoracic shield sepia brown and the rest of the body translucent, creamy white. The body is covered with hairs arising singly.

The second instar larva is about 4 m. m. long and 1 m. m. broad.

The third instar larva is 9×2 m. m. in size. The prothorax is dotted with brown spots.

The larva gets full grown in the fourth instar when it spins a long cocoon of thin dirty white silk inside the tunnel where it was feeding. When the time of moulting draws near at the end of each instar, the caterpillar becomes sluggish, curves round and stops feeding. The colour of the head and prothorax becomes blackish brown. The skin between the head and prothoracic regions gets stretched and ruptures. By gradual contraction of the body the ecdysed skin is pushed back and cast off. The head capsule which is now an outer coat of the head is dashed against the surface where the caterpillar is resting and is gradually shaken off by the help of the pair of anterior appendages. Each process of moulting takes about an hour. The larva undergoes four or five moults before it is full grown and the duration of larval stage varies from 26 to 58 days.

Cocoon: When ready to pupate the caterpillar spins a thin, delicate, dirty white or brown cocoon, about 30 m. m. in length and 4 m. m. in diameter, generally inside the tunnel in which it was feeding. The tunnel is about 40—50 m. m. in length and 4 m. m. in diameter, brown looking and located usually in the central part of the stem. The cocoon thus forms the lining of almost the entire tunnel. The caterpillar pupates in this cocoon.

Pupa: The pupa is smooth, elongated, cylindrical and delicate. Its colour is light brown and the posterior margin of the 7th abdominal segment is brown and in 8th segment below the spiracles there are two black spines. It measures 14 to 20 m. m. in length and 3 to 4 m. m. in breadth across the third abdominal segment. The pupal period lasts from 9 to 16 days.

Adult: The moths come out of the pupa and fly about. Mating generally takes place at night and two to four hours after mating the eggs are laid.

Seasonal History: The moths appear towards the middle or end of March and all the stages of the pest are present in the fields from March to middle of October. The insect spends the winter from beginning of November to the beginning of March in hibernation as a caterpillar. It starts pupating by the second week of March and the moths keep on emerging upto the third week of May. The moths which lay the eggs by the end of May are very few in number, but are the ones which are responsible for the infestation of the next brinjal crop. The caterpillars that hatch out of these eggs bore their way into the tender shoots of the food plants and after feeding for sometime they descend downwards and begin to bore the main stem just above the ground. They keep on feeding upon the old plants till the beginning of July when they either come out of the tunnel where they were feeding and pupate on the plant or they crawl down to the soil and make cocoon in the crevices of the soil or they may pupate in the tunnel itself in a long cocoon. Mostly they pupate in the tunnel itself. Moths come out of the pupae in about two weeks and after mating at night start laying eggs on newly planted seedlings or on the tender shoots of the growing plants.

Control: (A) *Cultural:* (1) Ratooning of brinjal should be avoided because the ratoon brinjals harbour the pest and are mainly responsible for its multiplication.

(2) Dry brinjal plants should be burnt soon after up-rooting. After harvest specially during the winter, the brinjal plants along with their leaves etc. should be removed and burnt in a heap to destroy the hibernating borers.

(3) During spring months the brinjal plants must be kept under constant watch and every newly attacked stem or shoot should be collected along with borers and destroyed in order to kill the borers.

(B) *Chemical:* Endrin 0.02% sprayed soon after the pest has appeared and then repeated every three weeks up to a month before harvest has given very good results. Application of 0.25% D. D. T. has also proved very satisfactory. First application should be made soon after the pest has been noticed. The application should be repeated at fortnightly intervals till a month prior to harvest.

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Quality of ground water in the Pollachi Taluk

by

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About 87,000 acres of Pollachi taluk of the Coimbatore district is to be brought under canal irrigation under the proposed Parambikulam-Upper Aliyar Project. This area is to be benefited partly by the Upper Canal, Sethumadai canal and Aliyar feeder canal and partly by the Pollachi canal. This area now is either well irrigated or dry depending upon the availability of water in the wells. The water table is fairly high in this area and the cropping pattern is changed to suit the varied nature of the well waters. The main crops for which the water is utilised at present are groundnut, chillies, brinjal, cotton and coconut. In the area, the cropping pattern is likely to be changed by the coming in of the irrigation water in the canals fed by the Parambikulam dam due to the availability of abundant water and also due to the possibility of the quality of water being changed due to the coming in of the water from the Parambikulam area. Since in most of the areas, there is only a limited choice of irrigation water now, the cultivators at present have to make the best use of the available water whatever may be the quality of the same. As the utilisation of the low quality waters for irrigation will result in the deterioration of the land, it is imperative on the part of the cultivators to understand the nature of the available water and modify the cropping pattern. In addition to this the quality of water in wells and streams changes appreciably with the season of the year and also with the distance down from the streams or canals. In addition to this the water table of the ground waters and soils will also be influenced by the fluctuations in the canal water level and also by the quality of water flowing in the canals. As such it is a necessity on the part of soil scientists now, in view of the proposed Parambikulam Aliyar project whose canals pass through this district, to prevent any hazard to the land due to the coming in of the irrigation facilities in this project area. For the above purpose it is necessary to study the quality of the ground water prior to the coming in of the water in the canals and also after the canals have been commissioned. With the above purpose in view, the present study of the quality of the ground water was taken up.

Materials and Methods: The area, north of Pollachi with Pollachi-Udumalpet road as southern border, border of Palladam taluk as the northern boundary, the eastern border of the Erpatti

village as the eastern border, the western borders of Cholanur and Kullkapalayam as the western border was selected for the first stage of the study of the quality of ground water. Water samples were collected from each village from wells, typical of the water used in the villages for irrigation purposes. In a few villages one or two more samples were collected when it was found that the water from these particular wells differed characteristically from the water normally used in the village. The water samples were collected within a couple of days of one another to avoid any seasonal fluctuations interfering with the study and comparison of the quality of water in the area.

The water samples were analysed for the various cations (Ca^{++} , Mg^{++}) and anions (Cl^- , CO_3^{--} , HCO_3^- , SO_4^{--}) by the methods of analysis proposed by the U. S. Salinity Laboratory (Anon 1954), in addition to the determination of total salts by evaporating an aliquot, drying, igniting and weighing, pH using a Beckman pH meter and electrical conductivity by the use of Solubridge. Sodium was estimated as difference between the total amount of cations and anions present.

The Sodium absorption ratio which has been proposed by the U. S. Salinity Laboratory as a reliable criterion for evaluating sodium hazards of water has been worked out for all the water samples collected in this area.

$$\text{Sodium absorption Ratio (SAR)} = \frac{\text{Na} +}{\sqrt{\frac{(\text{Ca}^{++} + \text{Mg}^{++})}{2}}}$$

The classification of irrigation waters adopted by the U. S. Salinity Laboratory based on conductance values was also adopted in this study. The modified diagram for the determination of the quality rating of an irrigation water from its Sodium absorption ratio and electrical conductivity (Thorne and Peterson 1954) has been adopted in this study.

Results: The results of analysis of the water samples from the area are presented in table I. There is a gradual variation in the quantity of water in the area and the ground waters in the Perianegamam, Avalappampatti, northern portion of Erpatti village and Chinnampalayam are of 'marginal quality' while the ground waters in the rest of the area seem to be of good quality.

The total solids content of the samples, 16 and 18 from Periyaneagamam area is more than 2,000 p. p. m. while those from Erpatti village (S. No. 2), Sinneripalayam (S. No. 19) and Chinnampalayam (S. No. 20) area are between 1,000 p. p. m. and 2,000 p. p. m. The total solids content of the rest are less than 1,000 p. p. m.

The electrical conductivity of water samples from Avalappampatti, (S. No. 16) is more than 2,250 micromhos/cm while the samples 2, 3, 7, 12, 13, 17, 18, 19 and 20 have electrical conductivity values between 750 and 2,250 micromhos/cm. The rest of the samples have electrical conductivity less than 750 micromhos/cm.

The samples 3, 11, 12, 13 and 20 have more than 2.5 meq/litre of residual carbonates while samples 5 and 7 have residual carbonate between 1.25 and 2.5 meq/litre and the rest less than 1.25 meq/litre.

The pH of the water samples range from 7.1 to 8.2.

Discussion: Irrigation waters are classified into various categories depending upon (1) total solid content, (2) electrical conductivity values and (3) the residual sodium carbonate content of the irrigation waters. On the quality ratings based on the total solid content, waters containing more than 2,000 p. p. m. were considered distinctly poor, 1,000 to 2,000 p. p. m. as of 'marginal quality' and less than 1,000 p. p. m. as satisfactory. Adopting the above system, samples from Periyaneagamam area (S. No. 16 and 18) were distinctly of inferior quality, while those from Erpatti (S. No. 2) and from Sinneripalayam (S. No. 19) were of "marginal quality" and as such they have to be used with caution for irrigation purposes.

Classifying the irrigation waters on the electrical conductivity values alone, the water samples from Periyaneagamam area (S. No. 16) and Avalappampatti are unfit for irrigation while the water samples from Annuparipalayam, Cholapalayam, Rasakapalayam, Pulimpatti, Negamam, Sinneripalayam and Chinnampalayam belong to medium to high salinity water category since their electrical conductivity values fall between 750 and 2,250 micromhos/cm. and can be used only in soils with moderate leaching. The other waters can be used safely under all conditions in 'permissible soils'.

Considering the sodium hazards of the ground waters based on the conductivity values and Sodium absorption ratio, the water samples 10, 16, 18 and 20 fall under S_2 class (Medium Sodium Class)

thus presenting appreciable sodium hazard in soils of high clay content and low organic matter content especially under low leaching conditions in the absence of gypsum in the soil. This quality of water can be used only in coarse textured soils with good permeability. The soils irrigated by these wells are of loamy type with low amount of organic matter, shallow in depth and undulating with improper drainage in the low reaches of the area and characterised by the absence of gypsum. As such the water from the above wells have to be used with caution to avoid the soils from becoming subjected to the sodium hazards. The water from other wells can be used without any risk of sodium hazard in the area.

But as the water under study contain fairly high amounts of bicarbonates, there will be a tendency for the Ca^{++} and Mg^{++} to precipitate as carbonates when the soil solution became more concentrated. Though this reaction never goes to completion under ordinary circumstances, still the concentrations of Ca^{++} and Mg^{++} will be reduced and the relative proportion of sodium increased proportionately. So, Eaton (1950, Quoted by Thorne and Thorne 1951, Govinda Iyer and Subramaniam, 1960) classified samples having more than 2.5 meq/litre of residual sodium carbonate as not suitable for irrigation, 1.25 to 2.5 meq/litre as marginal and less than 1.25 meq/litre as safe. Based on the concept of Eaton, the water samples 3, 11, 12, 13 and 20 are not suitable for irrigation while samples 5 and 7 are 'marginal' in their quality and the rest are safe for irrigation.

Combining the results got from the discussion about the quality of the irrigation waters of the area under study based on each of the above concepts, it is clear that the water in the Periyaneagamam area (samples 16 and 18) are of the marginal quality and have to be used with care because of the soil conditions existing in the area, since waters in this area contain high amounts of total salts, high electrical conductivity and fall under the class $C_3 - S_2$ on the basis of the quality rating adopted by Thorne and Peterson (*loc. cit.*). In this area good management practices have to be adopted for successful and profitable use of waters. The soils should be provided with adequate drainage facilities and irrigation waters must be applied in excess to provide considerable leaching and preferably salt tolerant crops should be selected as is done in some parts of Coimbatore district where well waters with such high concentration of total solids are met with.

The water samples 2, 10, 19 and 20 are better in quality than the previous ones but they have to be used with caution due to the high concentration of total solids, high conductance values and also due to possibility of appreciable sodium hazard to the soil due to the absence of gypsum in the soil and also other soil conditions present there.

The waters from the wells in other areas can be used under all conditions without much risk of sodium or salinity hazard.

Summary: A quality appraisal of the well waters of North Pollachi Taluk was made using the various concepts in the categorisation of irrigation waters. The well waters in the Periyaneagamam area can be used successfully if proper management practices are adopted as is done in other parts of Coimbatore District, where well waters with such high concentrations of total solids are met with while water found in Senguthupalayam and Sinneripalayam have to be used with a bit of caution. The rest of water found in the area can be used for irrigation without any risk of sodium or salinity hazard.

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TABLE I.
(Analysis and quality Rating of the Water Samples).

No.	LOCALITY	pH	Ca	Mg	Na	HCO ₃	CO ₃	CL	SO ₄	SAR.	Sodium %		Residual Na ₂ CO ₃	Class
											Found	Possible		
(Milliequivalents / litre)														
1.	Erpatti	7.3	836	4.0	0.90	2.73	5.6	1.0	1.03	1.73	35.79	...	0.70	C2-S1
2.	Erpatti	7.5	1742	8.5	4.60	10.13	6.3	9.4	7.53	3.93	43.59	60.03	...	C3-S1
3.	Anuparalayam	7.6	502	3.2	0.90	4.10	7.1	1.0	0.10	2.86	50.00	...	3.0	C3-S1
4.	Periagoundanur	7.8	600	3.4	1.80	1.83	5.2	0.8	1.03	1.14	26.03	100.00	...	C2-S1
5.	Unjavelampatti	7.5	850	2.3	0.92	3.26	5.4	0.8	0.28	2.57	50.19	...	2.18	C2-S1
6.	Subbiahgoundenpalayam	7.2	450	196	3.0	0.88	0.99	3.8	1.0	0.07	7.11	20.32	92.51	C2-S1
7.	Cholapalayam	7.6	800	1002	2.9	1.39	5.32	6.6	1.6	1.41	3.63	55.37	2.30	C3-S1
8.	Muthampalayam	7.7	700	626	3.8	0.72	3.42	5.0	1.4	1.54	2.33	43.07	0.48	C2-S1
9.	Chengottupalayam	7.8	550	936	3.6	0.90	1.59	4.8	1.2	0.09	1.66	26.11	0.30	C2-S1
10.	Cholanur	7.7	550	834	2.8	1.42	1.22	4.5	0.8	0.14	8.40	22.43	0.28	C2-S2
11.	Sadayagoundanur	7.7	700	1014	2.4	0.81	3.81	6.0	1.0	0.02	3.05	54.28	2.79	C2-S1
12.	Rasakapalayam	7.5	1000	820	3.4	1.33	7.72	7.7	2.2	2.55	5.03	62.01	2.97	C3-S1
13.	Puliambatti	7.1	900	900	3.4	0.18	6.11	7.6	2.0	0.09	4.57	63.05	4.02	C3-S1**
14.	Puliambatti	7.9	600	330	2.9	1.07	2.97	5.2	0.8	0.94	2.11	42.80	1.23	C2-S1
15.	Kadayanpalayam	7.2	400	979	2.8	0.09	0.38	2.8	0.4	0.07	3.16	11.62	25.85	C2-S1
16.	Avalappampatti	7.7	2800	2156	8.2	0.43	10.84	5.2	13.0	1.27	5.22	55.66	75.95	C4-S2
17.	Negamam	7.4	800	1000	3.6	1.12	5.02	4.3	1.6	3.90	3.27	51.23	91.20	C3-S1**
18.	Negamam	7.7	2200	2126	10.0	1.26	16.51	4.5	4.2	19.07	6.96	59.26	56.36	C3-S2
19.	Sinneripalayam	7.2	1600	1936	7.0	0.27	4.88	4.7	5.6	1.85	2.56	40.17	64.75	C3-S1
20.	Chinnampalayam	8.2	1100	1274	2.0	0.52	8.12	7.5	2.3	0.84	7.24	76.32	5.0	C3-S2

** Differs from the general character of the waters in the village.

Research Notes

Occurrence of a white grain mutant in the Fodder Cholan Strain Co. 11.

In a bulk crop of Sorghum Co. 11 (*Sorghum durra* var. *mediocre*, an improved strain of *Patcha jonna*), an yellow grain fodder Sorghum released from the Millets Breeding Station, a mutant with white grains, was spotted. In all morphological aspects, it was similar to the type from which it arose, except for the colour of grain. The seeds collected from the white grain panicle were sown and the progeny was studied in detail for the plant characters and the yield potentialities. All the plants were found to breed true for the white grain character. The comparative measurements of the white grain mutant and strain Co. 11 are given below :

	Co. 11.	Co. 11 (Mutant)
1. Average height of the plant in cms.	213	230
2. Number of leaves.	7	9
3. 4th Leaf length in cm.	62	51
breadth in cm.	7	7.3
4. Peduncle thickness in cm.	0.6	0.8
5. Panicle length in cm.	10.5	12.0
breadth in cm.	5.5	6.2
6. Grain yield in lb. per acre.	1906	1375
7. Colour of grain.	Yellow brown wash.	White grain.

From the details given above, it is seen that in respect of grain yield the mutant does not compare favourably with the parent strain Co. 11. However the white grain colour is a distinct advantage and this has been made use of for hybridising the mutant with M. 47-3 a strain of Maldandi Jower of Bombay, with the object of building up an improved strain with the pearly bold grain quality of the Maldandi type and possessing the coriaceous glume of the mutant.

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A Grassy Mutant in *Sorghum roxburghii* var. *hians* Stapf.

In a population of a Sorghum type (A. S. 7657, known locally as *Talaivirichan Cholan*) classified under *Sorghum roxburghii* var. *hians* Stapf. by Snowden (1936), a spontaneous mutant was observed, the habit of which was strikingly different from the normal type in that it developed as a short-statured midget clump of grass as against the tall, thick and practically tillerless build of the parent material (Plate). The mutant vegetated profusely in the field, with over 25 well-defined tillers, terminating in small gappy panicles, sparsely set with spikelets from which viable seeds were later obtained. The culms of the mutant were thin and the leaves, very narrow. Comparative measurements of the mutant and the normal type are rendered in the following table :

Particulars.	Normal type plant (average of ten measurements).	Mutant.
Number of tillers.	0.3	25
Average height.	270 cm.	135 cm.
No. of leaves.	9	9
4th leaf length.	79.0 cm.	24.3 cm.
" breadth.	6.7 "	0.9 "
Peduncle thickness.	0.7 "	0.2 "
Panicle length.	33.2 "	8.4 "
" breadth.	18.2 "	4.4 "

Apart from these differences in external morphology, the mutant, however, manifested the season-bound reproductive phase of the variety and flowered only in October-November. There was also no difference in the grain colour, which was chalky-white. The chromosome number of the mutant was determined to be $2n=20$, as was the case with the normal type. Propagation of the mutant was possible both by seed and by asexual means out of slips quartered from the clump.

The occurrence of this grassy Sorghum was made more interesting when it threw a somatic 'reverse' mutation in one of its tillers. The reverse mutation was identical with the normal type, having broad leaves, thick culm and an open panicle, typical of the variety. Seeds from this panicle raised only normal plants.

Singleton (1950) has reported of a grassy mutant in corn, similar in most respects to the one recorded here. This mutant, which was termed corngrass, was profusely tillering and with narrow leaves. The tassels were absent but small ears were evident, producing up to 20 seeds. Asexual propagation was possible in this mutant also, by dividing the clump. But there was no natural reverse mutation and even attempts to induce it, with P. 32 and Co. 60 irradiation, were not successful.

The occurrence of grassy mutants in both corn and sorghum is a clear case of parallelism in variation, adducing to the close similarity of behaviour which is well recognised between these two crops. The law of homologous series in inherited variation expounded by Vavilov (1943-50), that a detailed study of variability within species showed an underlying

principle manifested in striking parallelism in heritable variability of closely related genera and species, appears to be proven by yet another instance, in the identity of grassy sorghum reported herein and the grassy corn observed earlier in another part of the world.



A. S. 7657 — Normal and Grassy.

Acknowledgment: The authors are thankful to Sri V. Srinivasan, Millets and Pulses Specialist, Coimbatore, for his guidance in the preparation of this research note.

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Observations on Varietal Resistance of Gingelly (*Sesamum orientale* L.) to Phyllody Disease.

The etiology of phyllody in gingelly was considered to be either a physiological disorder (Kashi Ram 1930) or a failure of reproductive phase induced by environmental factors (Rhind *et al.* 1937). Pal and Pushkarnath (1935) indicated the possibility of a virus being the cause of the disease. They showed that the disease could be transmitted to healthy plants by grafting. They classified the different symptoms of the disease into nine categories and found that 30 Pusa *Sesamum* types were susceptible to the disease. Vasudeva and Sahambi (1955) also succeeded in transmitting the disease by grafting and described the symptoms of the disease in great detail. The disease was demonstrated to be transmitted by the leafhopper vector *Deltocephalus* sp. There is little information available about the reaction of different varieties of gingelly to the virus apart from the observations of Pal and Pushkarnath (*loc. cit.*). Advantage was, therefore, taken of the availability of 203 varieties of gingelly grown by the Oilseeds Specialist, Coimbatore to make some observations on this aspect.

The relative incidence of the disease on 203 varieties of gingelly was assessed. The number of infected plants out of 25 plants selected at random were determined. The percentages of infection were calculated and are presented below.

The percentages of infection range from 0% to 40%. There are several varieties which show no infection. The Pusa varieties SI 47 and 48, SI 61 Dholka and SI TMV local are the most susceptible ones.

Percentages of infection observed on different varieties of gingelly:

I. *Disease free (0% infection)*: SI 71 Samalpur, T. M. V. 3, T. M. V. 1, SI 858 Entebbe Uganda local, SI 789 Palur (local selection), SI 771 Mukurdi Nigeria-2, 770 Mukurdi Nigeria-1, SI 261 Comilla Gray, SI 251 Tessore Dacca, SI 245 Barisal Dacca, SI 244 Gayaw, SI 245 Rangamathi Black, SI 73 Kanpur-2, SI 929 Salem Pansa, SI 926 Jami Pyru, SI 925 Jami Pansa, SI 921 Anakapalli Pansa, SI 917 Nagapattanam Pyru, SI 902 Malun Burma, SI 877 Sathur, SI 867 Indore Dharmapuri, SI 866 Adikarapatti, SI 981 Late-til Baroda, SI 978 Judan Hills × Haani-2, SI 968 Shenthmyang Burma, SI 950 Puthur, SI 948 Kulithalai, SI 946 Pusa-7, SI 941 Balagagamnantali Salem, SI 936 Puliventhala, SI 1041 Thondararg; Pansa, SI 1035 Chinthapadi Pansa, SI 983 Tadapadi, SI 1235/11, SI 1235/9, SI 1235/6, SI 1235/5, SI 1235/2, SI 1060 Pendurthi Pansa, SI 1052 S. M. V. Chockalingapuram, Anakapalli, Santhanagpur, Muduganapalli, Tirupathur, Manaparai, Anamalai, Katpadi, Udamalpet, Vellore, Kaveripakkam, Ambur, Thathamancheri, Namakkal local, Kadambur, Tuticorin, Kurunjapadi, Kardista, Brazil V. 32, China, Ceylon, Dalco Sesame E. r. 13516.

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II. 4% infection: SI 72 Kanpur, SI 65 Nagpur Black, SI 64 Lyallpur, SI 52 Shew Dinka-3016, SI 58 GYP Le-Ryank, SI 56 Huan-Thi, SI 52 Theik Pan Huanne, SI 43 Anakapalli, T. M. V. 2, SI 865 Mallasamudram, SI 864 Edapadi, SI 853 Middle Asia, 768 Nyin III Kenya, SI 259 Raishai Dacca, SI 258 Dacca, SI 255 Sajjan Konda, SI 253 Tangi Dacca, SI 250 Dhinajapore Dacca, SI 923 Vijayanagaram Pansa, SI 919 Linekathur Pyru, SI 911 Kamakavandanpatti, SI 909 Padikottai, SI 898 Muthuswami Puram, SI 882 Palni, SI 973 Sitwepuaga Burma, SI 964 Ogalur, SI 935 Hyderabad, SI 931 Palaganda Pyru, SI 1045 Bodipalli Pansa, SI 1032 Chodavaram Pyru, SI 1029 Yellamanchilu Pyru, SI 1025 Pathapatnam pansa, SI 1013 Narasapatnam Pyru, SI 1012 Jami Pansa, SI 1006 Vijayanagaram Pyru, SI 998 Badavel, SI 1235/10, SI 1235/7, SI 1234, SI 1177, SI 1073, SI 1065 Juikipathra Pyru, SI 1059 Senkali Pansa, SI 1058 Yellamanchilli Pyru, SI 1056 Kottapettu Pyru, Melapatti, Kadambathur, Titakudi, Maduranthakam, Vasudevanallur, Dharapuram, Wallaja, Kurellu, Marwar M. P., Gudiatham, Thanjavur, Island of Miles (Cyclades).

III. 8% infection: SI 68 Pranti, SI 46 Sattur, SI 44 CBE Black, SI 42 Nayudupet Pansa, SI 3 Malabar, SI 778 Entebbe Uganda, SI 924 Vijayanagaram Pyru, SI 897 Oomathampatti, SI 889 Sathurkar, SI 977 Judan Hills x Haani 1, SI 963, SI 957 Karur, SI 933 Yellamanchilli Pyru, SI 930 Palaganda Pyru, SI 1036 Anakapalli Pyru, SI 1033 Chodavaram Pansa, SI 1027 Polavaram, SI 1018 Peddapuram, SI 1004 Rajamundri Pansa, SI 1235/3, SI 1231, SI 1088, Pakistan, SI 1063, Pendurthi Pyru, SI 1061 Yellamanchilli Pansa, Ambasamudram Kikkis Macedonia, Niphad Sesame T. 85, Daleo Sesame E. r. 131517, Venizula 51, Oummar No. 80.

IV. 12% infection: SI 772 Mukurdi Nigeria-3, SI 260 Dacca, SI 885 Palukar, SI 871 Kanthikuppam Krishnagiri, SI 998 Proddator, SI 1072, SI 1050 Tiruchendur irrigated, Thursiyur, Kuppam, Thiruvannamalai, Srivilliputtur, Aegiror (Konotiri), Arta Epirus.

V. 16% infection: SI 57 Tetkyaw, SI 895 Pethunnickenpatti, SI 868 Athamakottai Dharmapuri, SI 967 Oomathampatti, SI 951 Irumboothi patti Kulithalai, SI 1003 Rajamundri Pyru, SI 1002 Kakinada Pansa, SI 1001 Kakinada Pyru, SI 994 Venkatapuram, SI 1233, SI 1232, SI 1066 Samalkot Pansa, Chinnanayanam, Cheyyar, Kunnamangalam.

VI. 20% infection: SI 953 Sivayam, SI 1018 Parvathipuram Pansa, SI 1074, SI 1062 Varagapuram Pansa, SI 1057 Bekupetia Pyru, Tiruchendur, Sankarankoil, Arakonam, Lemnas, Irakleion (Crete).

VII. 24% infection: SI 256 Badampore Dacca, SI 872 Kaveripattinam, Krishnagiri, SI 976 Thadann, SI 972 Haanet Burma, SI 969 Haani, SI 1024 Badrachalam Pansa, Rajapalayam.

VIII. 28% infection: SI 61 A Dholka, Eliambedu, Vaniambadi.

IX. 36% infection: SI 61 Dholka, SI 48 Pusa.

X. 40% infection: SI 47 Pusa-8, SI T. M. V. local.

The authors thank the Oilseeds Specialist for permitting to make these observations.

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Proliferation and neck leaves in Rice.

Proliferation, 'culm branching', 'neck leaves' and scaly leaves are some of the malformations that have been reported to occur in rice. Sen and Banerjee (1960) observed that early summer sowings besides other seasonal factors caused 'culm branching', viz., production of tillers at considerably greater heights than the culm base in rice. Vivipary in rice has been reported by Sitanath Das (1958), where the matured seeds formed in the middle and top of the inflorescence germinated and produced chaffy earheads due to favourable atmospheric conditions. Nair *et. al.* (1960) and Nair (1960) reported the occurrence of 'scaly leaves' and 'neck leaves' in rice varieties which, however, did not give rise to similar progenies in the succeeding generation.

In a study of the F₂ progenies of *indica* x *japonica* cross (AS1. 1 x Asahi) during 1960 winter season (July to December) culm branching in one of the tillers was observed (Fig. 1). There were two flag leaves, each supporting one panicle with three spikes and one spike respectively. Spikelet sterility was noted to be 75% since the parents involved in the cross were of different geographical races. Mature grains were collected and progenies raised during 1961 summer season (January-May) but all the plants were observed to be normal. This however, is not in conformity with the observation recorded by Sen and Banerjee (*loc. cit.*) who found large number of plants with culm branches in the following generation though not in any particular line of segregation.

Vivipary was observed in short term rice strains Co. 13 and Co. 29 during the same period in 1960. Within a week after the emergence of the panicle, the spikelets at the tip of the panicle were transformed into small seedlings (Fig. 2). The other panicles in the same plant were found to be normal. The young seedlings, however, did not produce any inflorescence but possessed one or two white filamentous roots. The spikelets at the base of the panicle had matured and the seeds have been collected for studying the behaviour of the progenies in the coming season.



Fig. 1

There was heavy rainfall and high temperature during the period when the above observations were made.

Acknowledgments: We are thankful to the Paddy Specialist and Assistant Paddy Specialists for the help in the studies.

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AGRICULTURAL JOTTINGS

Fifty years ago, the scientific workers at the Agricultural College and Research Institute felt that there should be a medium of communication between the research workers and the extension workers and farmers in the districts on problems of mutual interest specifically to put forward in a practical way, research findings for further dissemination by the extension workers. The Madras Agricultural Journal was the result. True to its original declarations and established traditions, the Madras Agricultural Journal has kept to this objective and served well.

The agricultural jottings recently initiated and appearing month after month is yet another evidence of the journal's anxiety to serve the cause of scientific agricultural and agricultural development and assist farmers in their task for better achievements.

We are proud to be associated with the Golden Jubilee of this journal, one among the few that has completed fifty years of useful service, fifty years full of history with two great world wars and an economic depression, three holocausts the world has ever witnessed in any half a century of its existence.

We wish the journal to continue on for ever and for ever with this useful service.

As we march into December, we enter the cold winter month. The days become shorter, the day and night temperatures go down further, the good bye drizzles of the north east monsoon bid farewell in christmas week to usher in the bright weather for the Pongal harvests.

Hybrid Cholam: One of the outstanding developments in recent times in breeding is the exploitation of hybrid vigour. In an earlier jotting some reference was made to hybrid vigour and the hybrid cumbu evolved by the department. Now what is this hybrid vigour? When two inbred lines are crossed or two distinct varieties are crossed, the seed so produced by the crossing produces an unusually vigorous and good crop. This characteristic behaviour of the hybrid progeny with unusual vigour is called hybrid vigour and is now exploited by breeders. The famous hybrid corn was evolved in this manner in America several decades ago. In Madras, hybrid cumbu has become popular among farmers.

The latest development in Madras is to produce hybrid cholam. Work at Coimbatore has been directed to this end and it is found that there are practical possibilities for increasing the production of both grain and straw in cholam through these hybrids. Many hybrids have been produced by using the American parent M. S. Kafir 60. Last year the

performance of hybrid cholam was compared with our best strain Co. 18. Hybrid cholam Texas 610 gave 2,775 lb. per acre compared to 2,290 lb. per acre from Co. 18. This is certainly a remarkable increase.

Hybrid corn or Maize: Maize is not cultivated to any extent in Madras, even so, we may look forward to its extended cultivation in certain favoured localities. One thing that stood against maize till recently was limitations in the use of grain. With a large number of upto-date flour mills, probably this problem is largely solved. One advantage with maize is that some good imported types thrive well in India and give very good yields, even upto 3,000 lb. per acre. Per acre yields compared to other millets is simply astounding.

The following four hybrids have been released by the Indian Council of Agricultural Research, namely Ganga Hybrid Makka number 1 and number 101, Ranjit hybrid Makka and Deccan hybrid Makka. Small quantities of seeds may be available. You may enquire with your nearest Extension Officer.

Mechanical Threshers: With the harvest season to begin soon, it is time to think of threshing the grain. The threshing of cholam and ragi has always been a problem for the farmers. In these days of farm mechanisation, a mechanical thresher is always welcome. There are several types of mechanical threshers available, both portable and stationery. They are all operated by either a small oil engine or an electric motor. Various sizes are also available, driven by 3 or 5 h.p. power units. They are very economical and labour saving.

The threshing machine is very efficient for threshing cholam, ragi, small millets, wheat, pulses like horsegram, bengalgram etc. It is not however useful for paddy as the straw is very much damaged. The Japanese thresher for paddy is not quick enough compared to our conventional methods of beating the whole sheaves on a platform or a stone. Paddy threshing therefore has to be done by conventional methods.

The Winnowing Machine: A winnowing machine is a useful equipment to winnow grain. The winnowing machine has generally two or more sieves to suit different sizes of grain handled. A mellow draught of wind, provided by a large diameter slow running fan is directed to these sieves. The wind is just strong enough to lift out the chaff and other light matter. The sieves themselves get a kind of rotary motion just like that given by a person handling a hand sieve. The fan and the rotating sieves may be hand driven with driving wheels in small models or by power in larger models. In most cases, the power required is so small that the machine can be operated by mere hand power.

The winnowing machine has become very popular in many districts of the State. It is useful for winnowing all crops. Farmers who have to handle large quantities of grain are now using the winnower. The winnower is available in different sizes and priced between Rs. 300 to Rs. 500. You may think of a winnower this season.

The clean way of cotton picking: The clean picking of the cotton kapas is very important to get good prices. Some farmers pick the cotton with the dry leaves, bracts, the outershell etc., and these give a distinctly bad appearance to the kapas with all the admixtures. In some places though care is bestowed in picking, kapas from bolls not fully opened, kapas from bolls picked early in the season and very late in the season are mixed together, so much so there are many stained kapas of yellow and grey colour in the lot. Immature kapas contain fibre of poor strength and therefore depreciates the value of the kapas. Stained and coloured kapas also produce poor yarn and merchants therefore pay a poor price for the kapas containing an admixture of stained kapas.

In picking cotton, it is good to pick in the mornings and dry the kapas well before bagging. Early pickings of the season should be kept separate, as also pickings during the end of the season. Both may contain immature kapas. Stained kapas or kapas from insect attacked bolls also should be picked and kept separately. Before final sale, it is good to clean the kapas well by picking out any stained kapas. Studies made by the agricultural marketing section have proved that it is more profitable to sell clean cotton than to sell a mixed dirty lot.

Powdery Mildew Disease in Oranges: This is a destructive disease of Mandarin or Kamala oranges grown on the Nilgiri, Shevaroy and Kodaikanal hills of our State caused by the fungus *Oidium tingitanium*. Most of the so called decline of the orange crop, in these areas is traceable to the neglect to control this disease coupled with lack of proper manuring.

Powdery mildew is readily noticeable and the young actively growing leaves and twigs are most commonly affected. White patches, irregular in shape covered with coarse threads of the fungus are generally seen on the upper surface of the leaves. The tissue beneath the fungus growth is at first darker but later becomes yellow. Badly affected young leaves shrivel, dry and adhere to the twigs. Older leaves show a buckling. Young, succulent twigs when infected, turn brownish in colour and later dry up. These twigs show a die back and stand out as dry twigs covering the tree. Very young fruits are also affected resulting in their drop.

The disease is favoured by humid atmospheric conditions and are found in most mandarin orange gardens almost throughout the year. But it is especially prevalent during the end of the monsoon and most severe on new flush of twigs and leaves. The general neglect to manure the

trees in our State is an important contributing condition. From trials conducted in Kodaikanal, spraying the trees twice a year with the following solutions has given good results.

Wettable sulphur	2 lb.
Zinc sulphate	5 lb.
Manganese sulphate	2 lb.
Copper sulphate	3 lb.
Ferrous sulphate	2 lb.
Boric acid or Borax	1 lb.
Lime	1 lb.
Urea	10 lb.
Water	100 gallons.

Citrus Canker in Acid Lime: Citrus canker is another severe disease in our State affecting acid lime. The disease is caused by a bacterium *Xanthomonas citri*. The disease is easily identified by the eaky circular eruptions on leaves, twigs and fruits. The lesions on leaves are surrounded by circular yellow areas. Chronic attack by the disease causes considerable leaf drop and die back leading to unthrifty condition of the tree. Lesions on the fruits reduce their market value. The disease is a serious problem in lime nurseries making the seedlings sickly and unsaleable. Young rapidly growing tissues are most susceptible to infection. Warm wet weather is favourable for infection and spread of the disease. It is believed that leaf miner injuries serve as points of hiding of the pathogen.

The disease is difficult to control satisfactorily. Pruning out infected twigs during dry season so that new growth does not coincide with favourable weather for the disease has some effect in lessening the incidence of the disease. Chewing insects and leaf miners should be controlled by insecticidal sprays.

Spraying with one per cent Bordeaux mixture lessens canker infection. Spraying should be repeated frequently and should be timed so as to protect new foilage and young fruit. In Andhra State, it has been reported that spraying a suspension of neem cake at one pound per two gallons of water materially reduced canker in lime nurseries besides inducing good growth of foliage.

A new Groundnut Type for Snacks: In South India, particularly in Madras State, our people consume large quantities of groundnut as a dessert nut for eating after roasting and also for making various kinds of confectionery. For these purposes, it would be good to have a groundnut type which is large sized, has a low oil content and higher sugar content than the usual types. A low oil content is necessary because there will be no problem of indigestion or diarrhoea which may result from the higher oil content. The kernels will be sweet with a higher sugar content.

Agricultural Jottings

Selection work with these objectives have been going on for a long time and the Oilseeds Specialist has now succeeded in bringing out a type with all these qualities.

This new type is now called TMV 6 and has been released. It has a low oil content of 48% compared to 53% in the local. It is also bold in size, the seed is nearly one and a quarter times bigger than those of the normal. The bold size of the pods and kernels has an attractive feature for the trade. It has a very high protein content of 29% compared to 19% of the usual types and therefore is highly nutritious. Because of the high sucrose content it is very tasty. Seeds of this strain are now available from the Oilseeds Specialist and enquiries for seed may be sent through your nearest Extension Officer.

Anthrachnose or Birds' eye disease in grape: This is a disease commonly prevalent in Madurai and Salem district in Madras State, particularly on the 'Patchai drakshi' variety. This disease is caused by the fungus *Elsinoe ampelina*. The disease is seen in the form of depressed cankers in the stems and twigs. The growth of the young infected twigs is arrested and they remain short and eventually dry up. Alongside brown spots with dark coloured margins develop on the leaves. Subsequently severe damage is caused to the berries on which circular brown sunken spots with dark brown margins develop. Based on the appearance of the spots on the berries, the disease is commonly known as bird's eye disease. One or more spots may form in each berry. The berries later shrivel and dry up. Entire vineyards may be damaged in this manner. The fungus causing the disease survives in the cankers on the stem and cause fresh infection of the new shoots and berries. The disease thus continues from year to year. The damage caused by the disease is very severe in Krishnagiri area where the grapevine growers do not usually adopt any control measure. Grapevine cultivation in this tract has very much dwindled due to this.

It is very difficult to keep this disease in check unless the methods of control are adopted in a systematic manner. It has been stated earlier that the fungus survives in the canker on the stem. All diseased twigs are to be removed. Some old cankers on the main stems may escape detection and serve as sources of infection. These should be inactivated. For this purpose when the vines are pruned the stem should be painted with a solution of ferrous sulphate in commercial sulphuric acid (5 lb. of ferrous sulphate in half pint of sulphuric acid diluted in one gallon water). This should be carefully handled. The pruned twigs and leaves should be burnt. The new shoots and the young branches should be protected by repeated sprayings of one percent Bordeaux mixture at intervals of 2 to 3 weeks depending on the weather conditions.

(From the Extension Specialist, Agricultural College and Research Institute, Coimbatore-3.)

Weather Review — for October, 1961.

RAINFALL DATA (IN INCHES)

Region	Station	Total rainfall for the month	Departure from normal	Total since 1st January
North	Madras (Meenambakkam) ...	10.6	— 1.5	31.2
	Tirurkuppam* ...	7.7	— 1.0	39.1
	Vellore ...	3.9	— 2.9	32.9
	Gudiyatham* ...	4.4	— 1.9	29.2
East Coast	Palur* ...	6.3	— 2.6	40.4
	Tindivanam* ...	7.9	+ £ ₁	34.0
	Cuddalore ...	4.3	— 7.2	41.5
	Nagapattinam ...	4.4	— 6.1	21.0
	Aduthurai* ...	5.2	— 1.9	33.0
	Pattukkottai* ...	10.6	+ 3.5	30.2
Central	Salem ...	8.9	+ 2.4	38.2
	Coimbatore (A. M. O.)* ...	5.8	— 0.2	25.2
	Coimbatore ...	3.7	— 2.6	23.7
	Tiruchirapalli ...	8.3	+ 2.1	31.7
South	Madurai ...	2.9	— 4.6	18.2
	Pamban ...	4.2	— 4.4	13.5
	Koilpatti* ...	6.5	+ 0.2	22.4
	Palayamcottai ...	6.8	— 0.3	18.9
	Ambasamudram* ...	3.6	— 1.8	29.9
	Nagercoil* ...	5.4	+ £ ₂	50.9
	Capecomorin* ...	2.2	— 1.5	37.8
Hills	Kodaikanal ...	7.4	— 2.8	40.2
	Coonoor* ...	14.3	+ 3.4	62.4
	Ootacamund* ...	7.2	2.6	50.3
	Nanjanad* ...	7.5	— 1.0	75.3

* Meteorological Stations of the Madras Agricultural Department.

2. £₁ Actual Value = 0.01.

3. £₂ „ „ = 0.02.

The Madras State received either scattered or localised showers throughout the month of October, 1961. The rains were fairly widespread on 24 and 25—10—'61, indicating thereby that the North-east Monsoon had set in. The day temperatures were practically normal throughout the period. The noteworthy rainfalls and zonal rainfalls are furnished hereunder:—

Noteworthy Rainfall (in inches)

S. No.	Date	Name of Place	Rainfall in inches
1.	19—10—1961	Palayamkottai	3.11
2.	22—10—1961	Coimbatore (A. M. O.)	2.19
3.	25—10—1961	Pattukkottai	2.53
4.	26—10—1961	Coonoor	2.90
5.	29—10—1961	Meenambakkam	2.80

Zonal Rainfalls (in inches)

Name of the Zone	Rainfall for October, 1961 (inches)	Departure from normal	Remarks
North	6.7	— 1.8	Below normal
East Coast	6.5	— 2.4	„
Central	6.7	+ 0.4	Just above normal
South	4.5	— 1.8	Below normal
Hills	9.1	— 0.8	Just below normal

From the Agricultural Meteorologist, A. C. & R. I., Coimbatore - 3.

MADRAS AGRICULTURAL STUDENTS' UNION

1961 — '62.

Consequent on the withdrawal of Dr. D. Daniel Sundararaj and Messrs. C. V. Govindaswamy, K. Khaleel Ahmed and M. Balasubramaniam, from the contest for the election of Office-bearers 1961—'62 the following is the final list of valid nominations :

Vice-President — Sri S. Rajaratnam

Editor — Dr. D. John Durairaj

Secretary — Sri M. Stephen Durairaj

College and Estate News

M/s. Paul Devakumar & Ramaswamy of 3rd year B. Sc. (Ag.) Class, represented the District in the City Vs. District Colleges Cricket Match. They acquitted themselves creditably by their all round display. Our hearty congratulations to them.

After many years of creditable association with the Students' Club as Vice-President, Dr. D. Daniel Sundararaj handed over charge to Sri J. Saktharam Rao, the Staff Adviser in a pleasing function arranged under the auspices of the Students' Club.

M. H. Khan was selected to represent Coimbatore Zone in the semi-final round of the University English debate at Madras. He entered the final round but was not given a place. In the Rotary Club elocution competition M. H. Khan was awarded the best speaker award. The Agricultural College team consisting of M. H. Khan & D. Lalitha Kumari was adjudged the 3rd best.

Departmental Notifications

Gazetted Officers - Madras Agricultural Department Postings and Transfers during the month of November, 1961

Name and Designation	Posted or Transferred to
Sri S. V. Ramachandran, Asst. Marketing Officer, Trichy.	Retired.
„ V. M. Kalyanaraman, Assistant Entomologist (Pulses Scheme), Coimbatore.	Field Officer, Thanjavur.
Kumari I. P. Janaki, Asst. in Entomology	Asst. Entomologist, Virology Scheme.
Sri V. Mahadevan, Asst. in Entomology	Crop and Plant Protection Officer, Thanjavur.
„ E. V. Abraham, Crop and Plant Protection Officer, Thanjavur.	Assistant Entomologist (Hill Fruits), Kodaikanal.

Upper Subordinates - Agricultural Department Postings and Transfers during the month of November, 1961

Name and Designation	Posted or Transferred to
Sri T. K. Kandaswamy, Asst. in Bacteriology, Coimbatore.	Mycology Assistant, A. C. & R. I., Coimbatore.
„ K. M. Padmanabha Namboesan, Horticultural Assistant, Kodaikanal.	Fruit Assistant, Periyakulam.
„ K. R. Dasian, Fruit Asst., Periyakulam.	Horticultural Assistant, Kodaikanal.
„ R. Sundararajan, A. E. O., Kangayam.	Technical Asst., Oil Seeds Development Office, Coimbatore.
„ K. A. Kolandaippan, A. E. O., Erode.	Instructor, R. E. T. C., Bhavanisagar.
„ A. Thirunama Sambandan.	A. E. O., Erode.
„ V. Muthu, A. E. O., Nallampalli.	A. E. O., Avadayarkoil.
„ S. V. Ponnuswamy, A. E. O., Avadayarkoil.	A. E. O., Nallampalli.
„ P. V. Subbiah, A.E.O., Maduranthakam.	P. P. A., Sivaganga.
„ P. Ramalingam Chetty, A. E. O. (On leave).	Agricultural Information Assistant, Madras.
„ K. Ramanathan, Special A. D., Udumalpet.	Special A. D., Nellikuppam.

New Postings:

Sri Abraham Thomas, Kallupurathu.	Bacteriology Asst., Coimbatore.
„ Jacob Kuruvilla, Nediuzhathu.	A. E. O., Cumbum, Madurai District.
„ G. Madhavan Nair, Madavoor.	A. E. O., Avanashi, Coimbatore Dt.
„ A. S. Parashivamurthy, Bangaloro.	Coconut Nursery Assistant, Attur.
„ C. V. Mathai, Kothamangalam.	Assistant in Entomology, Coimbatore.
„ M. T. Balagopalan Nair, Cherukunnu.	A. D., Paramarathupatti.
„ S. Pichiah, Shencottah.	Certification Inspector, Rajapalayam.
„ P. S. Kesavan, Madras.	Research Assistant, Plant Breeding and Genetics Faculty, Coimbatore.
„ M. K. Thankappan Nair, Edappavoor.	Horticultural Development Assistant, Salem.
„ V. K. Gopalakrishna Panicker, Vayalathala.	Asst. in Entomology, Coimbatore.
„ P. K. Mathew, Pulinkunnu.	do. do.
„ A. Jacob Thomas, Devipatnam.	A. E. O., Kadavur, Trichy District.
„ M. Gopakumaran Nair, Trivandrum.	A. E. O., Marungapuri, Trichy Dt.

DISTRICTS

SOUTH ARCOT; NORTH ARCOT
COIMBATORE
RAMANATHAPURAM
TIRUNELVELI



CROPS
GROUNDNUT, GINGELLY
COTTON
&
TOBACCO

Review of market conditions of commercial crops in the Madras State for the month of October 1961.

Cotton:

COIMBATORE DISTRICT: The north east monsoon commenced rather late during the third week. There was a rainfall of 96 mm. in Tirupur. The rains were moderate to heavy in other areas of the district and were favourable for completing the sowings of cotton.

The kapas market at Tirupur opened with 20,068 quintals of Cambodia and 381 quintals of Karunganni kapas and the arrivals were 19,027 quintals of Cambodia and 73 quintals of Karunganni kapas. The despatches were 26,703 quintals of Cambodia and 150 quintals of Karunganni kapas leaving a stock of 12,392 quintals of Cambodia and 304 quintals of Karunganni kapas.

The lint market at Tirupur opened with 44,451 quintals of Cambodia lint and 221 quintals of Karunganni lint. The arrivals were 16,117 quintals of Cambodia lint which included 4,887 quintals of Cambodia lint locally ginned. Despatches from Tirupur were 17,975 quintals of Cambodia and 161 quintals of Karunganni lint. The closing stock was 42,593 quintals of Cambodia lint and 60 quintals of Karunganni lint.

The prices of Cambodia cotton ranged from Rs. 93 to Rs. 137.80 for kapas and the lint from Rs. 276 to Rs. 375. Karunganni kapas was quoted at Rs. 108—12 all per quintal.

RAMANATHAPURAM DISTRICT: Fairly good and widespread rains were received during the middle of the month. The rainfall recorded at Virudhunagar amounted to 201 mm. during the month. The rains received during the month facilitated timely sowings of Karunganni cotton in the district.

During the month 24,000 quintals of kapas and 8,965 quintals of lint were received, out of which 23,000 quintals of kapas and 5,045 quintals of lint were disposed of leaving a stock of 1,000 quintals of kapas and 3,920 quintals of lint.

The price of the Karunganni kapas best quality ranged from Rs. 92 to Rs. 97 and second from Rs. 60 to Rs. 88. Tinny from Rs. 70 to Rs. 90 and Uganda, first quality Rs. 113 to Rs. 130, second quality Rs. 93 to Rs. 118 and third Rs. 60 to Rs. 86. Karunganni lint was quoted at Rs. 252, average quality Rs. 234 to Rs. 241 and Tinny Rs. 201 to 226. Uganda seed farm lint Rs. 366 to Rs. 377 and Uganda Certified Rs. 300 to Rs. 331. Karunganni seeds ranged from Rs. 36 to Rs. 39. Tinny Rs. 40 to Rs. 42 and Uganda Rs. 24 to Rs. 33.

TIRUNELVELLI DISTRICT: The rainfall recorded was about 500 mm. during the month. The rainfall was considered very useful since the sowing of cotton crop was proceeding very briskly.

During the month, in Karunganni 16,295 quintals of kapas and 1,849 quintals of lint were disposed off out of a stock of 16,545 quintals of kapas and 2,299 quintals of lint leaving a balance of 250 quintals of kapas and 450 quintals of lint. In Uganda 26,193 quintals of kapas and 3,835 quintals of lint were received and 24,993 quintals of kapas and 3,745 quintals of lint were sold leaving a stock of 1,200 quintals of kapas and 90 quintals of lint.

The price of Karunganni kapas first sort was Rs. 102, second sort Rs. 95, Uganda kapas Rs. 108 and cotton seed Rs. 44 per quintal.

Groundnut :

SOUTH ARCOT DISTRICT: Widespread and heavy rains, nearly 120 mm. were received during the month. This not only facilitated the harvest of the irrigated crops but also helped further growth of the standing winter crop and checked the attack by the red hairy caterpillars wherever the crop had been affected by it. The early sown winter crop is being harvested.

The total arrivals amounted to 7,384 tons and despatches came to 2,440. Consumption by oil mills and *chekkus* was 4,065 tonnes and 483 tonnes respectively. Wastages were calculated at 361 tonnes. The stock with the trade at the end of the month stood at 3,306 tonnes.

The average prices in the several markets ranged from Rs. 73 to Rs. 80 per bag of 80 kgs.

RAMANATHAPURAM DISTRICT: During the month 9,545 quintals of groundnut kernels were received and 8,000 quintals were disposed of with a closing balance of 1,545 quintals. In groundnut pods, 700 quintals were received and the entire quantity was disposed.

The price per bag of 80 kgs. of groundnut kernels pucca ranged from Rs. 65 to Rs. 81 and Katcha from Rs. 55-66 to 78-33. Groundnut oil per 226-80 kgs. ranged from Rs. 350 to Rs. 388.

NORTH ARCOT DISTRICT: The weather conditions continued to be favourable with rains throughout the district except in Tirupathur and Gudiyatham taluks. The harvest of winter crop was taken on hand by the middle of the month and by the close of the month was in full swing all over the district except Wandiwash and Cheyyar taluks. The crop harvested was of the peanut variety in many parts of the district.

During the month 54,093 bags (40 kgs. pods) were received and 40,993 bags were disposed with a closing stock of 13,100 bags. In groundnut kernels 46,758 bags (each of 80 kgs.) were received and 42,405 bags were sold with a balance of 4,353 bags.

The price of groundnut pod (per bag of 40 kgs.) ranged from Rs. 15 to Rs. 25, groundnut kernels (per candy of 240 kgs.) from Rs. 112 to Rs. 240. Groundnut oil (per candy of 226 kgs.) from Rs. 372 to Rs. 478.

TIRUCHIRAPALLI DISTRICT: Heavy to very heavy rainfall has been received in almost all parts of the district during the period under review and as a result, the winter groundnut crop and other standing crops have been greatly benefitted. Harvesting of gingelly in Udayar-palayam taluk has been reported. The harvesting of canal irrigated groundnut crop of Karur has been reported to be nearing completion.

The Regulated Market at Jayakondan received 225 bags of groundnut kernels and 119 bags of gingelly seeds. Karur and Ariyalur Regulated Markets received 53 bags of groundnut pods and 4 bags of kernels respectively during the month.

The prices of groundnut kernels ranged between Rs. 200 to 230 per candy of 240-95 kgs.

Gingelly :

SOUTH ARCOT DISTRICT: A quantity of 4,904 bags from the district produce arrived for sale in the different markets. Despatches to other districts are estimated at 2,682 bags. Consumption by *chekkus* was 2,046 bags. The trade was left with a stock of 841 bags at the end of the month.

The average prices in the several makets varied from Rs. 73 to Rs. 81 (per bags of 80 kgs.)

Tobacco :

COIMBATORE DISTRICT: At the end of the month there was a stock of 42,153 quintals of chewing and 2,930 quintals of cheroot tobacco. About 6,575 quintals of chewing and 390 quintals of cheroot tobacco were exported to places in Kerala State, Salem, Tanjore and Tirunelveli districts of Madras State, Bombay, Mysore and Andhra States.

The price of chewing tobacco sun-cured (Meenampalayam) ranged from Rs. 88 to Rs. 200 and other varieties from Rs. 66 to Rs. 225 in different grades. Cheroot varieties, sun cured, grown in Erode and Bhavani taluks ranged from Rs. 66 to Rs. 230 according to three different grades. The price of chewing tobacco, pit cured, grown in Palladam and Sular areas ranged from Rs. 100 to Rs. 297.

Cardamom :

MADURAI DISTRICT: During the month under report there was good to heavy rainfall in most of the cardamom plantation areas in Madurai District as well as Kerala Hills adjoining Madurai District. The condition of the standing crop of cardamom was good. Agricultural operations like picking and curing of the fruits were in good progress.

Prices (Prices per lb.)

Pattiveeranpatti :

	Sundried	Store green
Superior and fold	...	Rs. 8.60 to 9.12
Medium and bulk	Rs. 6.60 to 8.32	Rs. 6.54 to 8.35
Inferior and small	Rs. 4.00 to 6.53	Rs. 4.00 to 6.50
Splits	Rs. 5.80	...
Lights	Rs. 2.00 to 4.00	...
Seeds	Rs. 7.25 to 8.52	...

Review of administrative activities of market committees in the Madras State during the month of October 1961.

Enforcement :

Name of the Market Committees	Section 5 (1)		Section 5 (3)		Weighmen	
	A	B	A	B	A	B
South Arcot	255	2504	203	1690	185	1501
North Arcot	975	2278	970	2228	131	693
Coimbatore	164	1990	81	1467	—	598
Tirunelveli	23	268	2	101	8	236
Tiruchirapalli	175	1913	159	1754	145	1550
Ramanathapuram	7	464	2	400	2	318

N. B.: A = Licences issued during the month.

B = Licences issued upto the month.

GUIDE TO THE ECONOMIC PLANTS OF SOUTH INDIA By Dr. D. Daniel Sundararaj and Girija Balasubramaniam. (Amudha Nilayam (Private) Limited, Madras-18. Foreword by Sri M. S. Sivaraman, Director of Agriculture, pp. 344, Rs. 12—00).

This handy neatly got up book running to 344 pages, written by Dr. Daniel Sundararaj, Systematic Botanist and Professor of Botany and Srimathy Girija Balasubramaniam, Lecturer in Botany, Agricultural College and Research Institute, Coimbatore is indeed a valuable guide not only to the students of botany, agriculture, medicine and forestry but to every one who is interested in the plant wealth of our land, import and export trade of plants and plant products, their exploitation and profitable use.

The authors have taken considerable pains to choose the relatively more important economic plants of South India numbering 1,145 as it is well nigh impossible to deal with all plants in a small book. In the first section covering 237 pages, the plants are arranged alphabetically as in a dictionary, each plant is given its last botanical nomenclature, a serial number and opposite to it in a tabulated form the English or popular name, equivalents in various Dravidian languages namely Tamil, Malayalam, Telugu and Kanarese, also in Hindi or Hindustani and at the end short notes bringing out its importance. The next section which extends from page 241 to 266 deals with economic plants classified under different heads such as food crops, sugars, medicinal plants, tubers etc., etc. In fact there are twelve major heads and each of these are further subdivided in an intelligent manner so as to make it easy for the person who uses the book to get at what he wants easily.

The book has an exhaustive glossary helping the readers to understand the meaning of the technical terms and a list of reference books for the use of those who seek more knowledge on any of the plants dealt with.

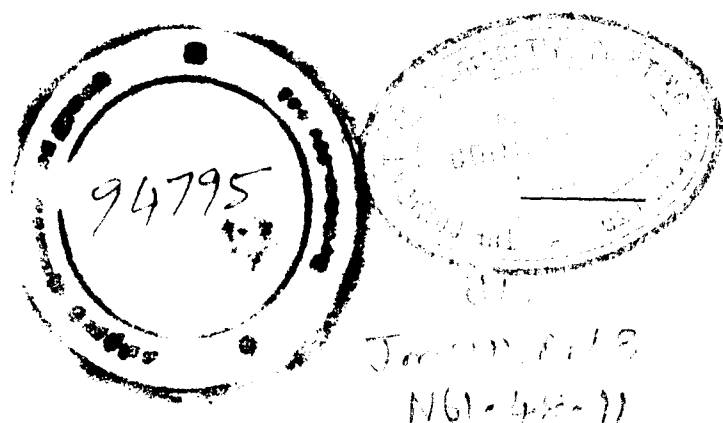
Last but not least, the indices at the end for the popular names in Tamil, Telugu, Malayalam, Kanarese and Hindi are invaluable.

At a time when India is making rapid strides in all scientific fields, eager to catch up with the more advanced countries and when we are straining our nerves to restrict imports and increase exports so as to conserve our national wealth, it is very essential to know our potentialities. It is rather unfortunate that there are a good many who have no idea of the abundant plant wealth of our country. This book will help them to profit by that wealth for their individual as well as

the country's gain. It is therefore very desirable that all the public and private libraries are provided with this book. Now that we have Panchayatraj, every village library must have this book.

I wish to congratulate the authors for the marvellous way in which they have brought out this very useful book which would help all people from the level of the village worker to the researcher and the lay public.

S. N. C.



OBITUARY

Sri K. Venkataswamy was born on 5th January 1910 in Coimbatore District and had early College education at the Government Arts College, Coimbatore. He joined the Madras Agricultural College during 1930 and passed his B. Sc. (Ag.) course in 1933. He joined the department in 1934 and worked as Farm Manager in Millet Section from 1936 to 1944. Later he was drafted on to the Civil Supplies Department where he worked as a technical assistant helping the Grain Purchasing Officer. In this capacity he served in Nagpur and Madras. By his sincere and efficient work he was promoted as Assistant Director (Storage) and later as Deputy Director (Food). He has served in a number of places all over India. He was of a quiet and retiring nature and very meticulous in his work and outlook. While serving in the last capacity as Deputy Director (Food) in Vijayawada, he had a heart-attack and passed away on 15-10-1961. He was a member of the MASU and took active part in its activities during his days at the A. C. & R. I. He leaves behind his wife and three children. We convey our heartfelt condolences to the members of the bereaved family.

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