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EDITORIAL

Indian Cattle. That India has been predominantly an agricultural country and that her wealth ever lay in her crops and cattle are facts which no one can deny. It is but fit that the Advisory Board of the Imperial Council of Agricultural Research should have thought over the cattle problem and recommended that steps should be taken to encourage the export of Indian cattle which would have a very encouraging effect on cattle breeding. In fact, this was the view that was held by the Royal Commission on Agriculture when they declared, "It is certain that no other circumstances would more favour private enterprise in breeding in India than the existence of an export market for high class stock." It is indeed very gratifying to note that during the last thirty or forty years several batches of Indian cattle have been exported to other countries, and that in various parts of the world, particularly South America, cross breeding with the Zebu (a type best suited for cross breeding with the European) has become the established practice. It is learnt that there are breeders who keep herds of pure Indian cattle for the production and sale of pure-bred stud bulls. It is the curious irony of fate that for Indian cattle foreign markets have to be sought. But this fact is an eyeopener, and already the Advisory Board of the Imperial Council of Agricultural Research have moved in the matter in the right direction. From information gathered, it is clear that the Ongole cattle was exported from Madras to Brazil, and that to-day the progeny of this breed is splendidly thriving in that land. Not only Ongole, but other valuable breeds like the Gir, the Kankraj and the Sahiwal are all said to be coming up very well in foreign lands. The realization of the value of Zebu blood in other tropical countries of the world has raised the importance of Indian cattle in the eyes of the world. Considered and expert opinion is in favour of export of Indian cattle. Coupled with an organization for the development of production of pedigree cattle, the future of Indian cattle is sure to be very bright. And as the Editor, *Indian Farming* has written—"With the help of breed societies and an efficient Herd Book organization with its system of registration of all pure-bred animals, it should be possible to develop and control the export trade in the interest of both the breed and the breeder.

Vegetable Drugs. A number of drugs, including some of vital importance, were being imported from the Continent, and with the outbreak of war and occupation by the enemy of various European countries, the Empire supplies are cut off. In this interruption of drug supplies we have

a serious problem to deal with. It is well known that a number of drugs are procurable in India. It is therefore urged that the collection of these from wild sources and the production of these by cultivation be encouraged. In this connection the readers of the Madras Agricultural Journal are referred to the very comprehensive and valuable memorandum prepared by M. Ashby, on "War-time Drug Supplies and Empire Production" published in the *Bulletin of the Imperial Institute,* Vol. 39, 1941, No. 1. It is mentioned that a sub-committee has been set up to act as a clearing centre for information and advice. This Committee is expected to deal with all inquiries, promote experimental work and initiate action where necessary.

While it is not possible to bring together all the valuable drugs that are available in this country, in the space of an editorial, mention will be made of the more important amongst them, with the fervent hope that this will stimulate those interested in the line to pursue the subject in detail and render all help to the Empire in its hour of need.—*Digitalis purpurea* L., the Foxglove, in the Nilgiris ; *Datura stramonium* L., thorn apple, in the Hills ; *Cinchona succirubra,* (Pavon ox Klotzech,) *C. officinalis* Hk. etc. ; *Peucedanum graveolens* Benth , the dill, throughout India, commonly used by Ayurvedic doctors also and known as *sathakuppai* in Tamil ; *Valeriana officinalis* L., the valerian in the Himalayas ; *Pimpinella anisum,* the anise (Tam : *Sombu*) common in parts of India ; *Cephaelis Ipecacuanha* Rich the ipecac, in the Nilgiris ; *Terminalia Arjuna* W & A , from which tincture arjun is prepared ; all over the Province; *Zingiber officinale* Rosc., the ginger, all over India ; *Acorus Calamus* Linn ;, the sweet flag, in swamps in Nilgiris and Malabar: *Elettaria Cardamomum* Maton, the Cardamom, in Mysore and West Coast.

Indian Census. In a very well thought out article on "The census as an agency for economic planning", (*Sankhya*, Vol. 5, Part 3), Professor P. J. Thomas has pointed out the defects in the present system of taking census especially in the matter of classifying earner or dependant. To quote his own words ; "Especially in agricultural communities, not only the principal earner but other members of the family, women and even children, assist in his work and therefore this further classification was justified. Although this change may be good for the future, it has made comparison of previous censuses difficult. As Dr. Hutton says, the 'earners' plus 'working dependants' of 1931 are perhaps equivalent to the 'workers' of 1921. But various misunderstandings and mis-entries have occurred and the figures do not enable us to study the occupational trends correctly." He has rightly deplored the dropping out of industrial census since 1931 and emphasized on the need for the Economic Departments of the Universities to render help in this work and pile up valuable information on the economic condition of our urban areas with the help of census schedules and supplementary questionnaires. It is urged that in view of the fact our country is now keen on economic planning for which accurate economic data is necessary, a permanent staff be maintained by the Government of India for working up the material collected at each census.

Rose Growing.

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The rose is no foreigner to India. Many species of roses grow wild in the Himalayas. History reveals that as far back as the Seventeenth Century the Empress Nur Jehan was acquainted with the process of preparing the Otto of the rose. *Attar, Pannir* and *Gulkhand* or rose-petal preserve are some of the other preparations known in this country from the Eighteenth Century onwards. A famous authority on roses is of opinion that the queen of flowers was introduced from India and Persia to the Greek and Roman Empires. There is no flower to excel the rose in beauty, fragrance and variety and the rose plant is one that gives flowers throughout the year.

Rose culture is a very interesting study. There are innumerable varieties of roses differing in colour, size, shape and fragrance. It is estimated that there are not less than two thousand totally different varieties. However, that need not dishearten the amateur gardener who is eager to have a few varieties of roses in his garden. It is also better to have a selected few instead of speculating with a considerably large number of varieties.

Roses may be grown in beds and in pots. Many people doubt whether good rose plants can be successfully grown in beds. They believe that roses are such tender plants which need special attention that can be given only when they are in pots. The doubts are entirely groundless because rose growing is literally an industry in many villages in South India. There are many commercial growers who send a regular supply of roses to the important markets all through the year.

For successful rose growing the most important point is the selection of the site. The ideal location is an open elevated and airy plot entirely free from shade. The rose plants need plenty of sunlight and it is essential therefore that an ideal rose plot should be free from the shade of overhanging trees. Even the shade of adjoining buildings should be avoided. There should be absolutely no interference from the roots of trees that may grow anywhere nearby. These voracious roots will impoverish the rose beds. The roots of such trees, if there are any, can be successfully kept off by digging trenches about three feet wide and cutting the roots to the level of the deepest roots of the rose beds. Another method of preventing the roots is inserting old galvanised iron sheets between the roots and the rose beds. Where there are lawns rose beds can be had with different outlines cut out in the lawns. In limited space it is better to make the beds as simple and uniform as possible.

Preparation of beds. An ideal rose soil should be preferably a rich sandy loam. In places where there is likely to be scanty rainfall the soil

can be heavy loam and in places with heavy rainfall porous soils are essential. In spacious compounds a central place in the foreground of the building can be selected for having roses.

Dimensions. The beds can be as long as possible and convenient. But the width should not be more than five feet. If the beds are wider, the soil round the plants will often be trodden upon while working amongst them and plucking flowers. Hence the beds should be only so wide as to enable one to reach the centre of the beds from the sides. The depth of the beds should not be less than three feet. But the greater the depth the better the result. As good drainage is essential it is advisable to have a layer of four to six inches of broken tiles and bricks at the bottom.

It is advantageous to have the pits dug ready at least a month before planting. The soil removed from the pit can be thrown up on the sides. This will enable the soil to have good aeration and nitrification.

When the soil is well aerated and pulverized it should be mixed with well rotten cattle manure at the rate of about a cartload for 100 sq. feet of bed. But before filling the beds with this mixture it is good to have a thin layer of broken bones in the lower portion of the beds. This will last long and will be ready for the plants when they begin to bloom.

Planting. Except in places where there are extremes of climate roses can be planted during most part of the year. But the best time is during the beginning of the rains. The plants establish root growth during the rains. But care should be taken against water logging. The proper time for planting is the later half of the afternoon. The plants should be protected from the hot sun for the next two or three days. This can effectively be done by shading with a thatch of palmyra or coconut leaves. The different varieties should be planted in separate beds. There is no hard and fast rule as regards spacing. A mass of plants look better than a solitary plant. But very close planting should also be avoided. The moderate spacing is about 18 to 24 inches all round. The plants should not be deeply planted in the case of "Budded" or "Grafted" roses, the point of union should be not more than 3" below the ground level.

Watering. Watering once in four days is all that is needed for the next few days till the plants are established well. One good watering is sufficient for about a week from the time the plants are established well. Copious watering is good for roses but waterlogging should be avoided. However, in the flowering season flooding the beds oftener will do good.

Manuring. The beds do not require any addition of manure during the first year. The initial mixture contains enough manure to induce the first year's growth. Once roses are established and growing they may be fed regularly with advantage. As is the general truth, over manuring is injurious to roses also. Organic manures are always preferable to chemical manures in the case of roses. Chemicals have to be properly mixed and applied. There is also the risk of overdosing. The chemicals are injurious

in that they make the soil sour very soon. Cattle manure is the best manure for roses. Horse manure and pig dung come next. Experiments have proved that roses respond very well to a mixture of horse manure and cattle manure in equal proportions. But it is essential in these cases that they should be well rotten.

Well rotten manure will be dark brown in colour and can be powdered easily by the hand. The manure should be powdered well and passed through a sieve before using. Leaf mould is another useful manure. Though it is not chemically very rich, the manure can improve both heavy and light soils. Bone meal and fish meal are also useful, though these are very slow in their action. Oil cakes are not absolute necessities. However a small dose of castor cake in powdery and rotten condition applied after the rains forces the plant to flower profusely.

Extra vigorous growth and quick flowering can be brought about very successfully with liquid manures. The gardener who has to meet an urgent demand for roses and the amateur who has to get ready roses for exhibitions should remember this. The clever grower is alive to the fact that the use of liquid manure in a dilute state affords a safe, efficient and rapidly acting means of nourishing the plants and promoting growth. It is made by immersing a quantity of solid manure in a tank or tub of water until its soluble contents are diffused through the whole volume of water. It is impossible to stipulate the precise proportions of liquid manure and water that should be mixed up for safety and serviceability. But the safe rule is to use a liquid manure so weak that a sufficient quantity may be given to thoroughly soak the area of root spread without the risk of injuring the most fragile root hair. "Weak and often" is the secret in the case of liquid manures.

After the addition of manures the plants should not be immediately watered unless manures have been added in excessive quantities in which case they will be injurious to the plants. The top layer of soil in the beds should be well worked with hoes or hand forks, as to make the soil mellow and friable. Watering should then be done. But flooding should be avoided now. Good irrigation can be given only when the buds appear in the shoots. Watering can be more profusely given thereafter.

Pruning. It is essential that we have a control over the growth of the rose plants as otherwise old exhausted shoots, if allowed to remain, will take away much of the food material and will be a drain on the resources of the plant. If the plants are likely to grow mis-shapen, then also pruning can be successfully resorted to. Pruning is a special necessity if flowers are required on a particular date. In this case pruning should be done at least two months before the time.

When to prune. A plant should never be pruned until it is well established, which will not be before at least a year is over. The local climatic condition should also be taken into consideration. Pruning should

not be done during the hot summer months or just before the rainy months. For in the latter case, the plants may put forth profuse leafy growth and few flowers. Hence the correct time for pruning is the period when the plants are dormant and when they begin to shed some of their leaves after the rains. As far as enquiries and practical experience go, the proper time for pruning seems to be middle of October.

How to prune. A sharp secateur is essential for pruning. The unwanted old and dead shoots should be first cut clean off from the seat of their growth. Crossed shoots must then be removed. Too many shoots should not be left in the plants. Strong single shoots growing from the base should be pruned back to about 18 inches from the ground and two to three buds should be left on the laterals which have grown from the main shoot. In leaving the buds it is necessary to see that buds pointing outwards are left in the shoots and not those which point inwards. This is necessary because the central region of the plant will get crowded very soon if the inward pointing buds begin to grow. The particulars given so far do not exhaust the subject of pruning. It is a separate technique by itself and there are countless varieties of roses and various types of growth—which require individual consideration. But discretion and common sense must always be used. More information can be obtained from the book on *Pruning Roses* published by the National Rose Society of England.

Pests and diseases. Pests. (i) Caterpillars. These eat away the tender shoots at night. Hand picking of the caterpillars can be done if found in small numbers. But if there are too many of them a strong solution of lead arsenate, 1 lb. of powder in 25 gallons of water, can be sprayed at intervals over the plants.

(ii) Aphids or plant lice. These feed on the growing points and flower buds. A wash with a contact insecticide, like tobacco decoction, will control the pest.

(iii) Rose beetles and cockchafers. These also damage the leaves and the young ones of these beetles damage the roots as well. Naphthalene powder can be sprayed at the bottom of the plants to kill the larvae. kerosene emulsion (Bar soap 8 oz., water 1 gal., kerosene 2 gal.) or lead arsenate has to be sprayed to kill the adults.

(iv) White ants are sometimes the worst enemies of the rose plants. especially in young cuttings. They are worst because if once they attack the roots of the plants it is rather difficult to save the plants. Plants which are apparently healthy, suddenly wither and droop down. Transplanting in a fresh pit can be tried. Irrigation water mixed with crude oil emulsion will also be effective.

Diseases. There are several fungus diseases, of which, rust, mildew and black-spot are important. Sudden changes in the temperature and atmospheric conditions are supposed to be very favourable to these diseases.

These attack the leaves, the leaf-stalks and stems. Greyish or brownish black spots appear among the affected area and the leaves begin to fall away quickly. Once the disease is detected, it is wise to remove the affected portions from the plant and burn them. On the other hand if they are not removed the fungus will soon spread to other healthier parts of the plant.

The general and effective remedy in the case of fungus attack is spraying with Bordeaux mixture. This mixture is a notable fungicide. It is prepared with a pound each of copper sulphate and quick lime mixed up in ten gallons of water. Copper sulphate and lime are separately dissolved in water in mud pots and both mixed in a third pot and diluted to the aforesaid strength. This mixture should be used as soon as it is made. The local Agricultural Demonstrator will be able to render further help needed in the matter of preparation or application of this fungicide.

Culture of Oranges at Kodur.*

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In popular parlance the word orange designates both the tight jacket or sweet oranges and the loose jacket or mandarines. The application of the name orange to both the sweet oranges and the loose jackets is very misleading and has been responsible for a lot of confusion with the fruit-nursery and growing industries. There is, however, some doubt whether our loose jacket orange is really a mandarine, as some authorities have put it to be identical with the famous *Ponkan* orange of China—*Citrus poonensis*, Tanaka, while the mandarine is botanically known as *Citrus tangerina*, Tanaka or *Citrus nobilis var. deliciosa*, Swingle. There is no such doubt, however, about the nomenclature of sweet oranges (*Citrus sinensis*, Osbeck) under which fall our Sathgudi, Batavian and Manilla oranges. For better precision and standardised nomenclature, it would be well if our sweet oranges only are designated under the orange group and the loose jackets are designated by a different name such as Santras as in Western and Central India, Coorg loose jackets or Kamalas.

It is now well known that the conditions suitable for the commercial cultivation of these two distinct groups of citrus differ markedly from each other. While the loose jackets flourish even on hill slopes of poor fertility and under the heaviest precipitation, the optimum growth in sweet oranges is found to be in tracts where soils are comparatively more fertile and relatively dry conditions prevail. Great care and intensive cultural practices are the key notes of success in the sweet orange farming, as against the almost primitive methods which seem to suffice for the production of the loose jackets. Medical science and popular fancies have put a greater premium on the quality of sweet orange, and this coupled with high cost of production of sweet orange has made this fruit more valuable and therefore

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more expensive. In this paper an attempt is made to describe the sweet orange farming in Cuddapah district, in a tract reputed to produce the finest quality fruits in South India.

Sathgudi orange has been seen to come up best on well-drained red loamy soils. The water table in such soils at Kodur is at depths ranging from 20 to 30 feet.

Propagation. Seed propagation has been the rule. No particular care is taken in the selection of fruits for seed purposes. The fruits are cut when fresh and seeds extracted. Those that float on water are discarded and only the heavier ones which sink are utilised for sowing. The seeds are generally sown in the months of July and August, in seed beds at a distance of about 10 to 12 inches. Seeds take 25 to 35 days for germination. The seedlings are not transplanted to nursery beds for hardening but are directly lifted and planted out in the orchard when they are a year old. Since the public outside Kodur appear to have a great fancy for bigger size plants, most of the seedlings sold outside are about two to three years old.

Till about five years ago trade in such seedlings was carried on to the extent of over a lakh of plants per year, at an average of Re. 1 per seedling at the nursery. But after the establishment of the Fruit Research Station, the growers have come to recognise the value of vegetatively propagated plants. With the rapid popularisation of budded plants through the Fruit Research Station, Kodur and through several private nurseries started subsequently, there has however been a fast decline in the volume of trade and the price of the seedlings, so that, at present the supply of the budded plants from Kodur far outweighs that of seedlings, and the price of the latter is less than half of the former.

Lay out and planting. Two to three ploughings are given with the advent of the first rains of the North-East monsoon. Square system of planting is followed with a spacing of 9 yards either way. In November, pits 3′ × 3′ × 3′ are dug, and they are left to weather till the middle of December. They are then filled up with the excavated earth, taking care to remove any clods or stones. Trees are lifted from seed beds by digging all round, and planted in December.

Irrigation. The seed beds are pot watered twice daily in the morning and in the evening, till the seedlings are about five months old. In the orchard, basins are formed around the tree soon after planting and pot watering is done. Another watering is given the next day, and thenceforth every alternate day for three months. With the setting in of the South-West monsoon the basins are widened and channels are formed. Water requirements are judged from a superficial examination of the soil surface. Growers prefer to give a shallow watering at short intervals to soaking irrigation at longer intervals. On an average, in a bearing plantation, about five to eight irrigations are given per month, depending on the soil texture and climatic conditions. The basins are widened to keep pace with the "drip" of the

leaves. No arrangements like sloping of the basins away from the tree is done to keep off water from the trunk of the tree. In some cases the purpose is achieved by heaping the soil under the trunk either in a mass or in the form of a ring. In older plantations flood method of irrigation is practised.

Manures and manuring. About five to six months after the seeds germinate, margosa cake at 1½ lb. per cent. of land is applied to the seed beds in powder form. Besides serving as manure, the cake acts as a deterrent to pests. Double this dose is sometimes given when the plants are about a year old. No basal dressing of manure is given to the orchard before planting nor is any manure applied to the pits at the time of planting. Six to eight months after planting 1 lb. of margosa cake and ½ a basket of well rotten farm yard manure per plant is applied. After that, till the third year after planting only farm yard manure is used, at the rate of 1 to 2 baskets per tree. From the fourth year onwards a mixture of 12 lb. of groundnut cake and 60 to 75 lb. of farm yard manure is given till the tree comes to bearing. Subsequently the following mixture is applied per tree.

12 lb. of groundnut cake,
9 lb. of fish manure,
3 lb. of bone-meal and
60 to 75 lb. of farm yard manure.

No green manure crops are grown. Manuring of bearing trees is done in the months of June-July or December-January, within the tree spread. The above practices are not followed by all the growers, but represent those adopted in some of the well-kept orchards.

Pruning. Six to eight months after planting out in the orchard, a light pruning of the low hanging and the intersecting branches is given. Subsequent pruning is limited to the removal of dead branches only. The branches are chopped off with scythes, without badly mutilating them and making the tree unsightly and pre-disposed to diseases.

Intercropping. Intercrops like turmeric, groundnut, ragi, *jonna, korra* and *arika* are grown till the sixth year after the trees are planted. The cultivation of tall intercrops like *jonna* has injurious effects on tree growth. Although leguminous crops may now and then find a place, these are being raised along with other intercrops without any adequate idea of the influence of such crops on the soil and the trees.

Blossoming. Seedling trees come into bearing from the seventh to the tenth year, while in the case of budded trees first flowering has been noticed on two to three-year-old plants. There are two flowering seasons in the year, one in February-March and the other in October-November. Some of the trees bear exclusively in one season. Most of them, however, flower in both the seasons. Some trees produce a third crop as well, in the period intervening between these two seasons. Subsequent to the tree coming into bearing, the time of manurial application is generally adjusted after studying the flowering habit of the trees.

Root pruning is one of the practices which is done in conjunction with the application of manure with a view to force flowering. Irrigatfon is gradually stopped until the trees just begin to show signs of wilting. The basins are then dug up 9" to 10" and manure is applied and covered. A copious irrigation is given soon after.

Fruiting and harvesting. Fruits mature in seven to eight months after flowering. Those of the October-November crop of flowers take a shorter time to mature, presumably because of the summer heat. Fruits are harvested when the colour changes from dark green to light green. Usually in order to reduce the expenditure on watching the orchard, the fruits are harvested in one lot irrespective of whether they have fully matured or not. Some growers defer harvest till the fruits turn yellow especially in the case of main crop, while others keep them on the tree for longer periods, sometimes even up to four to six months after maturity, with the hope of securing better prices. Such fruits are usually below standard, and in several cases, drop off prematurely causing great loss to the growers. Incidentally, it is believed that delayed harvest inhibits the setting of a better crop in the following seasons.

Improvements suggested. Although the seedlings are popularly believed to be more vigorous, hardier and more prolific bearers and more resistant to adverse environmental factors than vegetatively propagated plants, the fruit quality in them is generally so variable that it is impossible to secure anything like a standard crop. In seedling plantations very few trees are seen to bear good quality fruits, while a greater bulk of the crop is a mixture of fruits of varying shapes and sizes, and of variable quality. In budded plantations, however, the crop remains true to parent in respect of fruit quality; and therefore from the consumer's or economic point of view, the product will be of greater value. On a consideration of all these factors vegetatively propagated plants are to be preferred. Such plants may be either purchased from reliable nurseries or raised by the grower himself.

Water requirements of the soil are to be judged by examining the surface nine inches of soil and not by a superficial examination. The practice of giving shallow irrigation results in the matting of fibrous roots on the surface and these get cut during ploughing or digging. The constant destruction of fibrous roots is deleterious to the health of the trees and consequently to its growth and bearing. Soaking irrigations should be given so as to encourage root growth in the lower layers of soil and not to confine their activity to the surface layers which are subject to frequent disturbance by orchard soil culture. Irrigation basins in non-bearing plantations should be widened so as to give full scope for root development. In normal soils such basins should extend at least three to four feet away from the drip of the leaves. Investigations at the Fruit Research Station, Kodur, have shown that a budded orange plant on *gajanimma* after about 46 months of budding and with a top spread of only four and a

half feet had a horizontal root spread of about 39 feet. This fact indicates that tree spread is not a reliable index of the feeding area of roots, which though depending on the type of soils, root stocks, etc., nevertheless covers a very much larger orchard space than that actually encompassed by the top growth. The practice of provision of basins of 2 to 3 feet wide around the tree trunk for application of water and fertilisers is, therefore, hardly sufficient to give full benefits of these treatments, apart from leaving a greater part of the root zone unfed and unirrigated. Flood irrigation overcomes this defect, but this system encourages excessive weed growth and consequently leads to an increase in cultural expenses. The furrow method of irrigation usually resorted to in American orchards seems to be the ideal, and deserves a trial in our plantations as well.

The relative merits of application of manure in a single dose in the year or in a number of doses, are yet to be studied in all their bearings. But it can be safely stated that the application of bulky organic manures usually involves some root disturbance, which if done a number of times during the year or during an active growing period is bound to adversely affect the tree performance. Therefore, till we have the results of well-layed-out experiments the application of manures once a year, before the production of the main crop of flower may be safely advocated.

All manures should be applied in a manner to become readily available to the trees. The practice of spreading them too close to the trunk of the tree is wasteful and may cause serious injury to the trees. Many foreign fruit-growers prefer the furrow method of applying manure to applying them in basins, and the efficacy of this method in our orchards is to be tested.

Root pruning of citrus is definitely a weakening process. While its value in the regulation of crops cannot be denied under certain conditions, it has to be admitted that repeated annual pruning of roots may reduce the longevity of trees by progressively impairing their growth. In heavy soils, root pruning may produce some benefit by providing better soil aeration, but such a result is not likely to be of any importance in open soils. It is therefore advisable to find out how the effects of root pruning can be brought about by other and less severe orchard operations. At any rate, it appears necessary to suggest that root pruning may be resorted to only infrequently, once in two or three years in normal but shy-bearing groves. Annual root pruning cannot be advocated even in the case of very vigorous-growing and shy-bearing trees.

The importance of clean culture in the control of insect pests and diseases should not be overlooked. But experience in other parts of the world has clearly shown that clean culture can be overdone. As a matter of fact, there is now a distinct swing from clean culture to the minimum of soil disturbance, particularly in America and South Africa. At the present state of our knowledge, while the practice of leaving orchards to rank weed growth deserves to be condemned, we should guard against going to the

other extreme, and thus bring about results not only contrary to our expectations but also highly injurious to tree growth and soil conservation.

There is no doubt that with the progress of research, the orange cultural practices at Kodur or elsewhere are bound to undergo rapid changes. During the past five years alone as the result of the work done at the Fruit Research Station, Kodur, a number of changes is evident in some of the plantations. The popularity of budded plants has taken such a strong hold among the public that new seedling plantations appear to be very few and far between. This shows conclusively that fruit-growers as a class are generally very responsive to scientific advice and guidance, perhaps in a much better degree than the general class of agriculturists. In the present paper it has been possible to refer to only a few of the more important items on which improvements are necessary and possible.

The Artisan's Share in Agricultural Production.

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Introduction. The self-sufficiency of Indian villages has, in fact, disappeared, and it exists now only in the vision of the future. Although the old harmony is absent and there is no well-defined functioning of the various social groups for the welfare of the entire village, the inter-dependence of classes is readily apparent even at the present time. In no other occupation is such mutual dependence so frequently felt as in the agricultural pursuits which still dominate life in the country side. The farmers cultivate the land with cattle and human labour while they are continually helped by many others like carpenters, smiths and basket-makers who supply ploughs, spades, baskets and similar articles of deadstock which are essential in farming. These artisans function mainly as suppliers of agricultural implements and their services are constantly needed in agricultural production.

For a general appreciation of the place of implements in the agricultural economy, it is necessary to know the organisation and set-up of the farm. An analysis has to be made of the capital investment on holdings under such items as land, livestock, building and implements and see how much of each is used up in production. It will enable one to obtain a quantitative estimate of the different items which are indispensable in themselves, but are required in varying proportions. And if information is gathered as regards the individual items and the particular social groups responsible for the same, it will be helpful in apportioning the share of each in agriculture.

Tract surveyed. A survey was made in 1939—40 of 54 agricultural holdings in the Palghat taluk. Paddy is the main crop of the locality and its cultivation is the mainstay of the people. This one taluk accounts for nearly a fourth of the district acreage under rice cultivation, and had

207,445 acres under the crop in 1938—39, which represents 71·2 per cent. of the annual cultivated area.

Palghat is one of the ten taluks comprising the Malabar district, and is situated at the southernmost extremity bordering on the tamil country. Through the 'Palghat gap', the taluk constitutes the highway of communications between the rest of the district and the other parts of the Presidency. Possibly, too, geographical position partly explains the presence only in this taluk of *Gramam* and *Tara* which are so conspicuous in other South Indian villages but are totally absent in the other taluks of Malabar.

For convenience of revenue collection, Palghat taluk has been divided into six revenue *firkas*, each *firka* being composed of nearly twenty villages known as *amsoms* in the tract. The survey was systematically conducted in all the revenue *firkas* by selecting a few typical villages in each *firka*. The cultivators were chosen at random from the villages to represent the big, medium and small sizes af agricultural holdings. The total figures of all the holdings studied in each revenue *firka* have been used to calculate the average for the whole taluk.

The organisation of the holdings studied has been presented *firka*-war in Table I.

TABLE I

Revenue *Firka*.	No. of holdings studied.	Total area cropped on the holdings. (Acres)	Total capital investment on the holdings. (Rs.)	Capital investment per acre of cropped area.* (Rs.)	Percentage capital investment on			
					Land.	Live-stock.	Buildings.	Implements.
1. Elapulli.	10	272·4	12142·5	44·6	69	17	10	4
2. Palghat town.	9	292·2	5791·8	19·8	48	27	15	10
3. Coyalmanna.	9	151·2	3263·5	21·6	26	33	34	7
4. Alathur.	9	312·0	5345·5	17·1	30	43	21	6
5. Kollengode.	8	345·0	5615·8	16·3	32	40	18	10
6. Parli.	9	183·6	3853·0	21·0	37	48	8	7
Average for the taluk.	9	259·4	6002·0	23·2	40	35	18	7

Share of Implements in Capital Investment. Having obtained from Table I a general picture of the equipment on holdings and the position of agricultural implements on it, let us examine the details regarding the different articles of dead-stock, and the classes of people who are directly engaged in its manufacture with a view to apportioning their share. Agricultural implements are very simple and they are made and mended by the village artisans. The 'country' ploughs, carts, levelling-boards and spades constitute the chief items of deadstock, and the carpenters and blacksmiths are jointly responsible for their manufacture. The basket-makers are a separate class who work with bamboos, reeds and palm-leaves, and make

* Value of owned land not included.

receptacles for farm use. The ploughs and spades serve as important tools in tillage, while the bullock-carts and baskets are often found necessary for the transfer of manures or produce. The expenditure on these village crafts are expressed as percentages in the accompanying Table II.

TABLE II

Revenue *firka.*	Total capital investment on implements on the holdings studied. (Rs.)	Total cropped area on the holdings studied. (Acres).	Capital investment on implements per acre of cropped area. (Rs.)	Percentage capital investment on implements.				
				Ploughs.	Levelling-boards.	Country carts.	Spades.	Basket work.
1	474·5	272·4	1·7	24	14	40	12	10
2	571·8	292·2	0·8	20	10	48	9	13
3	212·5	151·2	1·4	27	17	17	19	20
4	340·5	312·0	1·1	35	11	23	13	18
5	545·8	345·0	1·6	19	12	47	10	12
6	273·0	183·6	1·5	28	13	13	19	27
Average for the taluk.	403·0	259·4	1·7	25	13	31	14	17

The cost of materials, such as iron and wood, comes to nearly three-fourths of the price of the implements, while the remaining one-fourth forms the making charges which are shared among the artisans. It is distributed among the carpenters, the blacksmiths and the basket-makers, nearly a sixth of the wages going to the basket-makers while the carpenters and smiths share between them the rest. This is evident in Table III.

TABLE III

Revenue *firka.*	Total cropped area in the holdings studied.	Total investment on implements on the holdings studied.	Total share as wages (25% of the capital investment on implements).	Share as wages per acre of cropped area.	Share of different classes as percentage.	
					Carpenters and black smiths.	Basket-makers.
	Acres.	Rs.	Rs.	Rs.		
1.	272·4	474·5	118·6	0·4	90	10
2.	292·2	571·8	142·9	0·2	87	13
3.	151·2	212·5	53·1	0·4	80	20
4.	312·0	340·5	85·1	0·3	82	18
5.	345·0	545·8	136·4	0·4	88	12
6.	183 6	273·0	68·3	0·4	73	27
Average for the taluk.	259·4	403·0	100·8	0·4	83	17

It will be seen from Table I that in Palghat taluk Rs. 23·15 are needed as total average capital investment per acre of paddy cultivated, and also that 7 per cent. of this initial outlay or Rs. 1·7 is expended on agricultural implements. It has also been shown in Tables II and III that out of Rs. 1·7 spent per acre as capital on implements, 25 per cent. or Rs. 0·4 gets distributed as wages among the artisan class, the proportion of the share between

the carpenters and the smiths on the one hand and the basket-makers on the other, being as 4·9:1. With these average figures, a quantitative estimate of the share of artisans, as measured by the wages received, has been made for the whole taluk.

TABLE IV

Area sown under rice in Palghat taluk. (Acres.)	Capital investment on implements per acre of cropped area. Rs.	Total capital investment on implements in the taluk. Rs.	Artisan's share as wages per acre of cropped area. Rs.	Total share of the artisans in the taluk. Rs.
207,445	1·7	344,026·8	0·4	860,06·7

Share in Depreciation Charges. The economic life of the implements on the farm is so short that almost all through the year every farmer has to provide for some repair or replacement. Few articles survive their seasonal use and hence the services of the artisans are often found necessary. Their services are largely dependent upon the probable life of different implements, which may be estimated as under:

TABLE V

Implements.	Probable life (years).	Depreciation per cent.
Country carts	7 to 8	12·5
Levelling boards	3 to 4	25·0
Spades	1½ to 2	50·0
Ploughs	1 year	75·0
Basket-work	1 year	100·0

Based on the probable life of each implement, the depreciation charges have been worked out for the holdings in every *firka* and presented below:

TABLE VI

Revenue *firka*.	Capital investment on implements (Rs.)	Depreciation charges (Rs.)	Depreciation per cent.
1.	474·5	212·2	44·6
2	571·8	225·0	39·3
3.	212·5	118·6	55·6
4.	340·5	190·3	55·6
5.	545·8	215·3	39·5
6.	273·0	169·3	62·1
Average for the taluk.	403·0	188·4	46·8

The rather high rate of depreciation denotes the constant use of village crafts and the consequent employment of the artisans. The amount distributed as wages from the depreciation charges represents 25 per cent. which is the same as in the case of the initial outlay. The average depreciation per acre of cropped area works out to Rs. 0·7, and one-fourth of the amount gets disbursed as wages to the artisans. For the whole taluk with

an extent of 207,445 acres under paddy, the total share of the artisan class in the depreciation charges amounts to Rs. 150,605.

In working out the proportion of the shares in the disbursement of the depreciation charges, a deviation has been observed in that the share of the basket-maker has nearly doubled. This upward trend in favour of the basket-maker is no doubt due to the maximum depreciation in that particular item of deadstock. The shares received between the two different classes have been contrasted below:

TABLE VII

Revenue *Firka.*	Percentage share of implements in capital investment.		Percentage share of implements in depreciation charges.	
	Carpenters and blacksmiths.	Basket-makers.	Basket-makers.	Carpenters and blacksmiths.
1.	90	10	23	77
2.	87	13	32	68
3.	80	20	35	65
4.	82	18	32	68
5.	88	12	32	68
6.	73	27	43	57
Average for the taluk.	83	17	33	67

Conclusion. Valued at the market rate, i. e., Rs. 35 per cartload of 70 big measures, locally termed *para* and each *para* weighing about 16—18 lb., 1556·4 acres of cropped area in the holdings studied bring a gross return of Rs. 61,295·5 or Rs. 39·38 per acre. For cultivating one acre of paddy the average capital expenditure on farm implements is Rs. 1·7, while the total capital investment for the same is Rs. 23·2 The depreciation charges are rather high and works out, 46·76 per cent. Out of both the capital expenditure and the depreciation charges, 25 per cent. goes as wages to the artisans. Between them, the carpenters and the smiths carry the lion's share of the wages, while basket-makers get by far less, the proportion being respectively 4·9:1 in capital expenditure and 2:1 in the depreciation charges. The marked increase in the basketmaker's share in the depreciation charges is explained by the high rapid destruction of his item of 'dead-stock.

An attempt has been made in the fore-going to determine how much the artisans get out of agriculture. But it is equally necessary to appreciate what agriculture owes to the artisans. Different classes serve differently and their services are not properly represented by arithmetic. Percentages and proportions convey little when they are used in comparing social values. What is more important is a proper recognition by the people that in agriculture, as in other walks of life, it is the mutual appreciation between parts that really builds up the harmony of the whole.

The Status and Study of the Insect Group 'Thysanoptera' in India.

By Dr. T. V. RAMAKRISHNA AYYAR, B. A., Ph. D.

Introduction. There are sufficient evidences to show that in India there exist numerous forms of the insect order *Thysanoptera,* known popularly as 'Thrips' but unfortunately our knowledge of these insects is extremely meagre. Neither Lefroy in his monumental work on 'Indian Insect Life,' nor Fletcher in his pioneer publication on 'South Indian Insects,' has done sufficient justice to this group of insects; the former makes mention of only two species from India, while the latter does not refer to even a single species of the order. While in other countries the group had attracted the serious attention of Entomologists long ago, as may be seen from the early works of eminent scientists like Uzel, Karny, Buffa, Haliday and Bagnall in Europe, and Hood, Hinds, Morgan and Moulton in America, we in India did not have a single worker on this group until comparatively recent years. Evidently the reasons for this neglect were perhaps due to the ignorance of the importance of this group in many ways.

General features and peculiarities. In spite of their small size the members of this insect order possess not only some remarkable structural characters which are absent among other insects, and worthy of study from the point of view of the pure entomologist, but the group possesses also some real importance to attract the interest of the economic entomologist. It may be noted that this group is one of the few insect orders of the original nine order classification, which have retained their primitive independent status unlike most others which have undergone radical changes at the hands of taxonomists. This feature of retaining the original status through decades is possibly due to the possession of some unique and striking morphological features quite characteristic and fundamentally different from members of the other insect orders. Speaking of their features, the structure of their wings and their peculiar feeding apparatus alone would afford ample room for intensive studies on the anatomy and physiology of these creatures. The members of this group are minute insects, the biggest among them not measuring more than $\frac{1}{3}''$ in length. The general form and the variations in the structural armature of their wings are quite characteristic. They are four winged like most of the insects, but these organs are small, narrow and provided with fine long fringes along the margins, a feature which is quite unique and which has gained for this order the name 'Thysanoptera' or 'fringewinged insects.' Here again in connection with the wing structure there are found numerous variations, some showing rudiments of wing veins, others quite veinless and then others which are megapterous, micropterous, brachypterous or even apterous; Trybom divides such forms into 8 groups in relation to their wing structure alone. The study of the wings alone of Thysanoptera might, therefore, be found a very

interesting study. In the same way the mouth parts are also curiously built in them; and the function performed by such a mechanism has not yet been sufficiently explained. Unlike as in other groups of insects the mouth parts show a curious asymmetry of the component structures; the right mandible is vestigial and not fully developed as the left one. The general features of the trophi appear to occupy a midway stage between the piercing sucking type and the biting chewing type and is generally called the rasping and sucking type. This asymmetry of the mouth parts and their evolution are worth special investigation, since such characters are not found among the members of any other insect order. Then again the structure of the limbs, which is also unique in one feature, has also gained for these insects the special designation 'Physopoda' or bladder-footed forms. This is characterised by the absence of claws to the tarsi and in its absence the presence of a bladder-like structure at the tarsal tips.

Life history and habits. Coming to the life histories and modes of behaviour of these little creatures we again find various features which are worth investigation. Among these insects reproduction takes place sexually and by oviposition, though some workers suggest that there are some viviparous forms. Though the order is brought under the category of 'Heterometabola' with regard to the phenomena of metamorphosis it is very interesting to find that the young ones before assuming the adult condition pass through what is called a 'Prepupa' stage, though the general formation, etc., of this stage are not at all similar to that in the Holometabolous groups like Lepidoptera or Hymenoptera. Almost the great majority of the Thysanoptera are vegetable feeders found on the softer tissues of various plants, their chief haunts being flowers; some exceptions have, however, been noted with regard to their food habits, a few species having been discovered feeding on mites, white flies and larvae of scale insects. Williams has recorded a blood sucking species in Trinidad, and another has been noted by Senevet as attacking man in Algeria. Some of the plant feeding forms have also developed a capacity for producing galls on their food plants, similar to gall flies or cynipids and we have some examples of these in India also. Very little is known of the natural enemies of these insects though the writer has noted a small anthocorid bug *Montadoniola thripoides,* B. feeding on a species of thrips in S. India and one internal Chalcid parasite (*Thripoctenus maculatus* W.) has recently been noted in the Punjab.

Economic importance. Since the food of most Thysanoptera consists of vegetable material, some species have developed tendencies to feed on cultivated plants of different kinds and occasionally assume the status of important crop pests. Studies so far made have also shown that we have some species of thrips which possess potentialities to become serious plant pests and cause appreciable loss to the cultivator. Among the more important of these in S. India are the *rice thrips,* the *chillies thrips* and the *grape thrips.* In some foreign countries some species of thrips are found

as very serious pests of important crops such as the bean thrips, the cacao thrips, olive thrips, etc. Apart from their status as plant pests, recent studies have also shown that Thysanoptera possess other potentialities also; some species have been found as effective weed controllers, some as vectors of virus diseases from plant to plant and some even as plant pollinators. In these various ways the group is developing economic importance both from the injurious and beneficial aspects of view.

Conclusion. A few words may be added (before I conclude this brief paper) on the work so far done on this group in India and the possibilities for future work. Until the year 1915 when the writer was attracted to this group only 14 species of Thysanoptera were known from the whole of India, though the earliest record of a species from India was in the year 1856. Within thirteen years (1928) through the efforts chiefly of one or two workers, the number of recorded Indian species rose from 14 to 126 and such work consisted chiefly in exploring only the plains of peninsular India. We can, therefore, have some idea of the possible wealth of Thysanopterous forms we can certainly expect, if the various regions of this large country are properly explored. The idea of presenting this brief note is, if possible, to attract the attention of young entomologists in India to this virgin field of entomology, possessing as it does not only avenues for investigation on many interesting scientific aspects and problems regarding a group of insects, but also the various economic features connected with these insects, a proper study of which, in these days, would go a great way to help the material welfare of our country.

EXTRACTS

Silage from sugarcane tops. A case in point is the almost universal practice of burning off sugarcane tops and trash each year after the harvest to facilitate ratooning operations or preparation for the next crop. This material is made up largely of the sugarcane top which is still in the green state at the time of cutting. Quite apart from the loss of potential humus this represents a loss of animal fodder which would be a valuable accessory in time of shortage of natural grazing.

From weighings carried out at the Agricultural College, Queensland, during 1940, it was found that the green weight of the cane top at the time of cutting was from one-third to one-half that of the cane cut from the same stem. A small area of cane at the College, comprising the varieties P. O. J. 2878, Co. 290, P. O. J. 213, Orambu and P. O. J. 2725 was consequently harvested and the tops ensiled in July 1939 in a shallow pit silo, 6 feet deep and 12 feet in diameter. A composite sample was chaffed and forwarded to the Agricultural Chemist for analysis. The tops were packed as uniformly as possible in the silo built 3 feet above the ground. After a few days of settling, more were added and 18 inches of soil placed on top to seal the silo. Considerable sinking took place as the silage settled down and fermentation set in and additional earth had to be placed on top. The temperature taken from the middle of the silo at no time exceeded 95°F.

The silo was opened in May, 1940. It was found that there was a wastage of 18 inches around the sides and on top of the silo, but the silage in the middle of the mass was of excellent colour and slightly acid in flavour. Owing to the small

size of the silo, the waste represented nearly 50 per cent. loss, but with a normal trench silo of 60 to 100 tons capacity the proportionate loss would be much less.

The silage was fed to the dairy cattle and they ate it readily with no harmful effects. A sample was also chaffed and forwarded to the Agricultural Chemist for analysis, who supplied the following figures :—

	Green tops per cent.	Ensilage. per cent.
Moisture	76·1	76·3
Crude Protein	1·8	1·4
Crude Ash	3·10	3·66
Crude Fat	0·30	0·26
Crude Fibre	7·60	8·55
Crude Carbohydrate	11·10	9·86
Lime	0 15	0·09
Phosphoric Acid	0·12	0·10

Unfortunately, no legume was available at the time for ensiling in conjunction with the sugarcane tops. This would undoubtedly have provided a better feeding mixture. However, it was sufficiently demonstrated that cane top ensilage can be easily made. (*The Queensland Agri. Journal*, Vol. 55, May 1941.)

Preparation of coconut shell charcoal. The shells are burnt in 40 gallon oil drums, the procedure being as follows:—

Preparation of drum. The drum should be free from any considerable leaks and if the bungs are of fusible metal they should be replaced by iron ones, or the bung holes closed by welding. The bottom should be cut out leaving a lip 2–3 inches wide around the outside. A circular cover is made of heavy galvanized or 16—20 gauge black iron and may be a flat disc or preferably slightly concial with a rise of about 3 inches in the centre. If a cone is made the seam must be welded or otherwise made air-tight. The cover should be of such size that it will just fit inside the rim of the drum and rest on the 2 inch lip. A few $\frac{1}{8}$ inch holes (4—6) should be drilled round the top rim so that nails may be inserted to hold the cover in place when sealing the kiln. These holes must not be low enough to penetrate into the interior of the drum, thus allowing air leaks after sealing.

Site for burning. The drum is set up on level ground, preferably where it will be somewhat sheltered from any strong wind; but not so sheltered as to prevent air currents from reaching it. If improperly stoked the drum will give off dense volumes of white smoke, so that the burning should be done where the smoke will not become a nuisance. If stoked properly, there is practically no smoke.

Shells. The shells should be clean, fresh half-shells; old rotten shells that have been lying about for months will give a low yield, and shells that have been wet with sea water must be excluded.

Starting up. A single layer of shells is put in the bottom of the drum and a small fire of kindling wood started in the centre.

Burning. As soon as the shells catch and begin to burn fresh shells are added, one at a time and at a rate controlled by the results produced. This rate of feeding is the important factor. If the rate of feeding is too slow the shell will be over burnt. This can be judged by the colour of the flame which changes from yellow to bluish, and by the apperance of the charcoal which will be seen glowing and breaking into small pieces and becoming covered with white ash. The drums will also become intensely hot. The final product will have a low volatile content, but the yield of charcoal will be low. Too fast a rate of feeding will extinguish the flame, and give rise to dense clouds of white smoke, the

temperature of the drum will fall considerably and the fire will either be completely extinguished or give a product of half burned shell containing a high percentage of volatile matter. The yield of charcoal will, of course, be high under these conditions.

As the drum fills it will be found that a somewhat faster rate of feed can be maintained, especially if the shells are thrown in so as to stack up on the leeward side of the drum, where they become pre-heated before rolling down into the burning zone. It is advisable to have a torch, consisting of a roll of oil soaked bag or similar material handy, so as to ignite the gas again if it becomes extinguished through too rapid feeding. With continuous feeding about 300 lb. (5 sacks) of half shells can be burned in a 40 gallon drum in five hours, and one man can probably burn more than one drum at a time if drums and shells are conveniently arranged.

Finishing off and sealing. When the drum is nearly full the feeding of shell is discontinued, and burning continued until the yellow hypocarbon flame has practically disappeared, giving place to a blue or purple monoxide flame. When this point is reached the lid is put on, fastened down by inserting nails or wires and sealed by placing a few shovelfuls of earth on top. It is essential that the air be completely excluded from the charcoal during cooling. The drum and contents are then allowed to cool undisturbed—probably four to six hours will be necessary, for, if the burning has been properly conducted, the lower part of the drum will be cool by the time it is filled. On opening up great care must be taken to avoid allowing earth to fall into the charcoal.

Yield. A normal yield is 23—25 per cent. i. e. 70—75 lb. charcoal per drum, while the volatile matter in the charcoal should be between 5 and 15 per cent. (*The New Guinea Agri. Gazette*, Vol. 7, No. 3, 1941.)

Gleanings.

World Rice Production Increased. During recent years production increased in Europe by 57%, in Africa 60%, in America 221%, in Australia 160% and in Asia only nine per cent. The general increase was 15% over the pre-war average which did not outdistance the increase in population. On an average, only eight per cent. of the total output of rice enters the world markets. Some of the chief Asiatic producing countries are also the chief importers. (A. Khan in *Rice News* May 10, Reproduced from *The Naric*, official organ of the National Rice and Corn Corporation, Manila, Philippines).

The "Topato". The cross of potatoes with tomatoes for the production of a crop above and below ground from the one plant has long been a stock joke at show dinners, but it can be done and has been done, according to a report by research workers in the United States. This is how they did it. Tomato tops were successfully grafted on to potato roots and, in due course, the top of the plant produced tomatoes and the roots potatoes. The potato produced is starchless, and the report says, "hailed as a boon to stout women who like potatoes, but shun them for fear of excess poundage". (*The Queensland Agri. Journal*, Vol. 55, May 1941).

A New Method of Plant Propagation. A new method of rooting plant cuttings without sand, peat, soil or other solid media has been under investigation since early January of this year. Based on the principle that cut stems suspended in the very moist atmosphere of a specially constructed box can develop perfectly normal roots, the method has already given promising results.

The experimental boxes are approximately 3 feet tall, 2 feet wide and 1 foot deep. Each box has a glass front and back; the former is set in grooves so that it can be opened to permit air circulation, and the latter is kept closed but enables observation of root development and of the moisture content in the back of the box. One-inch square removable shelves, made of ordinary builder's lath, are placed in a horizontal position about half-way in the box. A half-inch opening is left between shelves and vertical wooden strips are nailed on the sides of the box in front of the shelves to hold the shelves in place. A large piece of sheet rubber, with holes of the size of the cuttings to be inserted, is fitted securely immediately behind the shelves. The rubber functions to confine the moisture in the back of the box where it is most needed and to keep the cuttings in place. A water trough in the upper back part of the box from which strips of absorbent cloth are suspended supplies the moisture necessary to maintain the high humidity.

Successful rooting of a number of popular ornamentals, including Achyranthes, begonia, chrysanthemum, coleus, geranium, perennial phlox, ivy and Philodendron was achieved by this method in less than three weeks. Such plants were then successfully transplanted to soil in pots and have continued to develop normally. Dormant hardwood cuttings were placed in similar boxes in late January and early February. Vigorous roots developed in 6 to 8 weeks on *Hydrangea grandiflora*, *Deutzia crenata* and *Philadelphus coronarius*. Thes plants were also successfully transplanted to soil and have continued to grow normally.

In all the experimental boxes thus far used, root development was greatest in the vicinity of high moisture content and was either poor or entirely absent in those parts of the boxes where atmosphere was relatively dry. With improvements in methods of maintaining a saturated atmosphere in the vicinity of the cut stems in the back of the box, this new method promises to be useful not only to commercial growers but also to the amateur propagator. The special type of box in which the present investigations were conducted is tentatively called the "Rutgers Aero-propagator." (*Science*, Vol. 94, No. 2429; July 1941.)

Chemical lures for insect pests. Chemcial lures may eventually be used as protection for crops, instead of the barrages of poison spray with which plants have to be drenched now-a-days. It may become possible to mislead insect pests to lay their eggs in chemically scented traps. instead of on plants, was suggested by Dr. V. G. Dethier, of John Carroll University. Dr. Dethier has been experimenting with many kinds of insects and many kinds of chemical compounds found in plants, to get some idea of what induces certain species to lay their eggs on just one or a very few kinds of plants. The cabbage butterfly, which never lays its eggs on anything but the leaves of cabbages and related plants, was attracted by compounds found in just that group of plants. The orange puppy, a troublesome pest of citrus trees, is lured by the scent of two chemicals, citral and methyl-nonyl-ketone. The tent caterpillar has a decided preference for poison in small quantities: it hastened to a bait of hydrocyanic acid and benzaldehyde. Dr. Dethier demonstrated that insects are guided by their chemical sense by impregnating filter paper with the chemical compounds preferred by various species. Each insect went to the paper scented with its favorite luring odor and procceeded to make a meal of it, despite its lack of other resemblances to leaves and its obvious indigestibility. (*Science*, Vol. 94, No. 2429, Supplement, July 1941.)

Sun's rays for cooking food. Cooking by the sun's rays may be made easy with a new invention just granted U. S. Patent 2,247,830. It was issued to Dr. Charles G. Abbot, Secretary of the Smithsonian Institution, who has for a

number of years been experimenting with methods of using directly the energy from the sun. One object of the invention is " to provide a novel solar heater which is highly efficient, compact, cheap to manufacture, durable and easily used by the inexperienced ". Another is that it " may be made of any desired small size without decreasing the efficiency ." To collect the sun's rays there is a metal mirror, bent to the shape of a parabola. Its long direction is paralleled to the axis of the earth, and there is a clockwork to turn it during the day to follow the sun. In it, is a double-walled glass tube through which circulates a black liquid with a high boiling point. This absorbs the rays and is heated. The hot liquid then circulates through an oven at the upper end of the device, so that it may be used for cooking. (*Science*, Vol. 94, no. 2429. Supplement, July 1941.)

Research Notes.

"Teegapesara" (Telugu)—(*Phaseolus sublobatus* Roxb.) It is a leguminous creeper grown as forage and green manure crop in many parts of the Circars especially in the Godavari delta. It had been under cultivation for many years in this Province but unfortunately it has not been identified till now. A sample of seeds of this plant was obtained from Tanuku, West Godavari District, and plants were raised here. These plants have been identified as *Phaseolus sublobatus* Roxb. It is grown also in many parts of South Arcot and Trichinopoly districts as forage and green manure crop under the Tamil name Karumpayar and a detailed note on it has been published in the Madras Agricultural Journal, Vol. XXIX, No. 1, January 1941.

Herbarium, Agricultural College and Research Institute, Coimbatore. } K. Cherian Jacob.

A Note on Some Preliminary Observation on the Time Spent by Indian Honeybees for Collecting Pollen and Nectar. The success of beekeeping depends on a very large number of factors. By far the most important of such factors is the usefulness for bees of plants found in a given locality. The present investigation, which for personal reasons the author found it difficult to complete, was undertaken chiefly with a view to secure data on the time spent by bees in collecting in a single trip the optimum load of pollen and nectar from the various pasturage plants available. The work was conducted in an apiary situated about 3 miles from the Coimbatore town.

It was necessary to mark bees for observation purposes. Parker (*J. Econ. Ent. 18:* 587—590, 1925) recommends a mixture of one part of a pigment, one part shellac and one-fourth to one part ethyl alcohol. This mixture was adopted with success using eosine for colouring. Bits of coloured tin foils such as those found wrapped round some chocolates were also affixed to the bees by means of the same mixture. As the bees alighted at the entrance of the hive which had been closed temporarily, they were quickly and gently pressed with the forefinger on the dorsal side of the thorax. They were caught in the fingers and removed. The colouring matter was then carefully applied on the dorsal side of the thorax without allowing the mixture to get on the wings or any other part. Exposure just for a few seconds was enough to allow the mark to dry up and the bees were then set at liberty. Where necessary, coloured tin foils previously cut and kept ready were also affixed on the mark immediately after it was made.

The time of arrival and departure from the hive of the bees were noted during their successive trips. By actual visit to the field they were known to be working in three tamarind trees growing about 60 to 100 feet from the hive. The data available indicated that the total number of trips made by bees visiting the same species (viz., tamarind) situated at the same distance from the apiary was different on the two successive days on which observations were made, perhaps due to some environmental factor which has not been ascertained. In the forenoons it took generally less than 15 minutes for the bees to bring nectar in one trip. As the day advanced this time interval increased reaching its zenith (about 30 minutes) between 2 and 4 P. M. On return to the hive after every trip the bees spent an average of about 6 minutes inside the hive. This time interval steadily increased from about 4 minutes at 7 A. M. to about 9 minutes at 6 P. M. Each bee spent daily over 9 hours in the field and about 3 hours in the aggregate inside the hive after every trip. The total number of trips made varied from 30 to 35 on the days of observation. It was also noted that in each tamarind flower the bees spent an average of about 15 seconds to collect nectar. Disregarding the time taken to fly to and from the hive, it appeared from computation that between 6 and 7 A. M. the bees visited 30 to 40 tamarind flowers for collecting enough nectar during each trip. This may increase even threefold in the afternoons.

Studies in determining the time taken for collecting pollen in one trip were made in the field on differently marked bees. The plants were situated within 100 feet from the bee hive, and the flowers found low enough to watch marked bees working on them. The observations were made between 7-30 and 9-30 A. M. during the respective months, and the results obtained are summarised below:—

Name of plant.	Month of observation.	Mean time per trip in minutes.
Leucaena glauca	December 1938	8·0
	May 1939	6·8
Cereus pterogonus	May 1939	7·8
Psidium guajava	January 1939	6·5

The available figures indicate that some differences in the "efficiency" of one species as compared with another exist as also differences on account of seasonal conditions. About 11 flowers on an average were visited by bees in each trip for collecting pollen from *Leucaena glauca* while in the case of *Psidium guajava* this was about 5 and in *Cereus pterogonus* only 2. As the time of the day advanced the number of flowers per trip visited by bees increased in every species. For collecting pollen in a single flower of *Leucaena glauca* an average of about 40 seconds were required.

Notwithstanding the efforts made by several workers in India to draw up as exhaustive a list as possible of the various bee flora our knowledge of the possible reactions particularly of nectar secretion in such bee flora to the varying climatological factors existing in India is meagre. A comparison of the interval of time taken by marked bees to complete a given number of trips during their foraging activites on various known species and spreading such observations over several years of known climatic conditions may perhaps give us a fuller idea of the part played by climatological factors for the larger or smaller honey crop one gets in some years. The efficiency of marked bees as judged by the time taken by them in collecting pollen and nectar may also be correlated with their biometry with a view to understand how far biometric characters affect their efficiency.

Agri. Res. Institute,
Coimbatore.

R. Ratnam.

Correspondence.

To

The Editor, The Madras Agricultural Journal.

Sir,

Fairs and Shandies. A plea for more accommodation and better arrangement.

Fairs or shandies are the sole markets for nearly 90% of the produce of the country. These are the places where the bulk of the rural population buy their food and clothing, and sell their produce. Though most fairs have a shopping area of 5 to 10 acres, they are not usually large enough for the crowd of the people who gather there for buying and selling. There is of course a crude arrangement everywhere in a shandy but the space is so insufficient that most shopping spots have 1 to 2 and 3 persons for every square yard. Wholesale and retail trade is busily but clumsily going on everywhere. Business people and retailers are hurriedly striding here and there before they can get at their dusty commodity. The fairs as they are now, were perhaps suited to conditions 100 years ago but are utterly inadequate to meet modern conditions. The space is insufficient even for a quarter of the crowd. It is a pity that no attention is paid by the public or Government to improve them. These markets deserve an intelligent lead, arrangement and order.

It is for the sake of the people of the country-side, that these markets exist (and not for the tollsman or the sales tax); and the simple uncultured merchants have to pay the sales tax 2 to 3 and 4 times before a product leaves the *ryot* and reaches the consumer.

The seller and the buyer, and even the tollsman and the sales-tax, will each make a profit by a good arrangement of these country fairs, which are the material soul and life of the village or country as a whole, and no marketing board can ever be large enough to manage the work of these innumerable country fairs. If put on a new right track, these markets are likely to develop into self-managed good marketing boards.

Avarampalayam,
24—9—41

Yours etc.,
A. P. Krishnaswami Naidu.

Press Note.

Chinese Hand Power Groundnut Decorticator. The Chinese hand power decorticator consists of a wooden frame with an iron grating at the bottom. It has a segmental hopper and the rocker arm is swung backwards and forwards inside this hopper. Groundnut pods are dumped into it in small quantities and the swinging rocker is worked for shelling the produce. At the bottom of this rocker two pieces of channel shaped iron are fixed rigidly for effectively rubbing the pods against the round iron grids and breaking open the outer husk covering the kernels. Three different sizes of sieves are supplied with the machine and according to the size of the produce the correct sieve has to be used. For steady operation the decorticator is fixed firmly in the ground by digging small holes to take in the four legs and the earth is rammed round tight. Two men are required for working the machine, one woman or a boy to feed the hopper and two women for cleaning the shelled material and separating the kernels from the husk by hand winnowing. Working the machine steadily is not strenuous for the men and the operation can be continued for a whole day without extra exertion or the men getting over-tired.

About 200 pounds of pods can be shelled per hour and for a full working day, a machine can be made to deal with nearly 1,500 pounds. Labour charges are very low and the machine is also not very costly. There are no complicated mechanical parts which cannot be handled by an ordinary *ryot* in the villages. The cost of decorticating a bag of groundnut amounts to nearly one and a half to two annas and it compares very favourably with the charges levied by power decorticating factories. Another point in favour of this machine is the negligible amount of breakages in the case of mature produce. The *ryot* need not cart the produce in its bulky form with the shell to far away factories for decorticating. Shelling can be done in the village itself during liesure hours and labour is also available at a cheap rate in these places. The groundnut husk can be retained in the village itself and used as fuel. As the percentage of splits is very small, the buyers may offer a better price for the shelled material. Replacements of grids and all adjustments to the rocker arm are easily carried out without the use of spanners or other tools. The machine can be carried from place to place on the shoulders of two men. Its simple construction will enable it to be easily repaired by any village blacksmith and there are no parts which will get out of order or alignment. For the shelling of groundnut this is one of the best contrivances yet made available in the market.

For further particulars please apply to the Research Engineer, Lawley Road P. O., Coimbatore.

Note on the activities of the Department of Agriculture during July 1941. Lime fruit juice extracted and preserved by a simple process and at a cheap cost has been found to retain its flavour and quality after a period of one year. Those who are interested in the preservation of lime juice are requested to obtain detailed information from the Fruit Specialist, Fruit Research Station, Koduru, Cuddapah District.

There is a wide spread belief in Tinnevelly and Coimbatore Districts that a mixture of Uppam and Karunganni cottons gives a better yield than Karunganni alone. With a view to prove that this belief is unfounded a number of comparative tests were conducted in ryots' fields. The results obtained show that a mixture of Uppam and Karunganni yields less than pure Karunganni under identical conditions. The belief that a mixture gives better yield seems to have gained ground by the better appearance and better yield of Uppam plants at the cost of Karunganni plants which are suppressed. It is more profitable to grow Karunganni pure than as a mixture, both from the point of yield and from the point of the quality of lint. Uppam is an inferior variety compared to Karunganni.

There is a similar unfounded belief that Karunganni seed produced in Tinnevelly gives in Coimbatore better germination and better yield than the same seed grown locally. An experiment was therefore started at the Cotton Breeding Station, Coimbatore, to compare the yields of Karunganni cotton grown with the seed obtained from Tinnevelly and local seed. No difference was observed in yields of the two crops, showing thereby that the superiority attributed to the seed raised in Tinnevelly District has no foundation. In other words, the higher price paid for the seed obtained from Tinnevelly is an avoidable loss.

It is a common practice among *ryots* in certain places—particularly close to towns—to grow sorghum (*cholam* or *Jonna*) as a fodder crop to be fed green or convert it into hay. *Periamanjal cholam* in the south and *Pacha jonna* in the north are the varieties commonly grown for fodder. Good fodder *cholam* should give heavy yield of green matter and if it is to be relished and consumed by cattle to the last bit, its stalks should contain sweet juice and should not be pithy and

insipid. To meet these requirements two sweet juicy varieties have been evolved—one A. S. 3355 at Coimbatore and another N. 26/152 at Nandyal with high yielding characters. The variety A. S. 3355 yields nearly 30% over the local *Periamanjal cholam*, with 13% sweet content, while the variety N. 26/152 yields more than local *Pacha jonna* and has very sweet stalks. The two varieties are strongly recommended and all those who want to grow them are requested to apply to the Agricultural Demonstrator in their taluks for seed and any information regarding them.

The long felt need of a good variety of gingelly is met by a new strain S. I. 89 which has been recently evolved by the Oil Seeds Specialist. It is a high yielding bushy type which matures in 85 days. The seeds are red brown to black in colour and have 50% of oil content. It is fit for cultivation both as an irrigated crop and as an unirrigated crop. It gives an average increase of Rs. 3 per acre over the local crop.

Demonstrations: The following sales of seeds, implements, etc., and demonstrations and exhibitions were conducted during July 1941:

Sales:	1. *Implements.*	
	(i) Ploughs	89
	(ii) Intercultivators	1
	(iii) Other implements	35
	(iv) Spare parts	458
	2. *Seeds and Plants.*	
	(i) Paddy	2,09,104 lb.
	(ii) Millets	4,303 ,,
	(iii) Cotton	1,06,653 ,,
	(iv) Oil Seeds	9,186 ,, 172 No.
	(v) Sugarcane	9,400 setts
		17 candies.
	(vi) Fodder Crops	2,944 slips
		105 bags.
		5,549 lb.
	(vii) Green Manure crops	16,886 lb.
	(viii) Plants and suckers	2,678 No.
	3. *Manures:*	141 tons.
		792 bags.
		28,293 lb.
	4. *Chemicals:*	289 packets.
		2 tons.
		1,201 lb.
	5. *Publications:*	2,358
Demonstrations:	1. *Trial Plots:*	
	(i) Varietal	133
	(ii) Cultural	5
	(iii) Manurial	18
	2. *Demonstration Plots:*	
	(i) Varietal	462
	(ii) Cultural	317
	(iii) Manurial	186

3. *Conservation of Farm Yard Manure.*	
(i) Improving pits and heaps	4,852
(ii Introduction of dry earth system	720
(iii) Introduction of trench system	35
(iv) Introduction of loose box system	14
(v) Introduction of composts	235
4. *Insect Pests and Diseases*:	31,880 lb.
	303 acres
	17 trees
5. *Exhibitions and Lectures.*	138
6. Number of meetings held by the Agricultural Advisory Committees or Associations.	205

(Director of Agriculture, Madras).

Crop and Trade Reports.

Statistics—Paddy—1941-42—First report. The average of the areas under paddy in the Madras Province during the five years ending 1939-40 has represented 13·1 per cent. of the total area under paddy in India.

The area sown with paddy up to 25th September 1941 is estimated at 5,809,000 acres. When compared with the area of 6,437,000 acres estimated for the corresponding period of last year, it reveals a decrease of 9·8 per cent.

The estimated area is the same as that of last year in Bellary; an increase in area is revealed in Guntur, Coimbatore, Trichinopoly, the Southern districts and the Nilgiris and a decrease in area in the rest of the Province, especially in the Carnatic, the Circars, North Arcot and Salem.

The first crop of paddy is being harvested in parts of Chingleput, North Arcot, Salem, Coimbatore, Trichinopoly, Tanjore, Tinnevelly and the West Coast. The yield per acre is expected to be below normal in North Arcot and normal elsewhere. The condition of the standing crop is generally fair outside Vizagapatam, East Godavari, Kistna and Guntur.

The wholesale price of paddy, second sort, per imperial maund of 82⅔ lb. equivalent to 3,200 tolas as reported from important markets on 6th October 1941 was Rs. 3—13—0 in Vellore, Rs. 3—12—0 in Vizianagaram and Chittoor, Rs. 3-10-0 in Madura and Virudhunagar, Rs. 3-9-0 in Cocanada and Rajahmundry, Rs. 3-8-0 in Ellore and Guntur, Rs. 3—7—0 in Bezwada, Masulipatam and Trichinopoly, Rs. 3—6—0 in Tinnevelly, Rs. 3—3—0 in Hindupur, Rs. 3—2—0 in Kumbakonam, Rs. 2—15—0 in Conjeevaram. Rs. 2—11—0 in Cuddalore, and Rs. 2—9—0 in Negapatam. When compared with the prices published in the last report, i. e., those which prevailed on 10th February 1941 the prices reveal a rise of 49 per cent. in Madura, 42 per cent. in Conjeevaram, 39 per cent. in Vellore and Kumbakonam, 34 per cent. in Trichinopoly, 30 per cent. in Chittoor, 29 per cent. in Virudhunagar, 27 per cent. in Cocanada, 25 per cent. in Vizianagaram, 19 per cent. in Hindupur and Cuddalore, 13 per cent. in Tinnevelly, 11 per cent. in Negapatam, 6 per cent. in Ellore and Bezwada and 4 per cent. in Guntur, the prices remaining stationary in Rajahmundry and Masulipatam.

Statistics—Paddy—1941-42—Intermediate monthly report. The harvest of first crop of paddy has concluded in parts of East Godavari, Kistna, South Arcot, Salem, Coimbatore, Trichinopoly, the South and the West Coast. The yield per acre is expected to be generally normal. The condition of the main crop of paddy is generally satisfactory. In parts of Malabar second crop paddy was affected by insect pests.

The wholesale price of paddy, second sort, per imperial maund of 82⅔ lb. equivalent to 3,200 tolas as reported from important markets on 3rd November 1941 was Rs. 3—13—0 in Madura, Rs. 3—12—0 in Chittoor and Virudhunagar, Rs. 3—10—0 in Vizianagaram, Masulipatam, Vellore and Tinnevelly, Rs. 3—8—0 in Cocanada, Ellore, Bezwada, Guntur and Trichinopoly, Rs. 3--6—0 in Rajahmundry and Negapatam, Rs. 3—2—0 in Anantapur, Hindupur and Kumbakonam, Rs. 3—1—0 in Conjeevaram and Rs. 2—11—0 in Cuddalore. When compared with the prices published in the last report, i. e , those which prevailed on 6th October 1941, the prices reveal a rise of about 20 per cent. in Negapatam, 7 per cent. in Tinnevelly, 5 per cent. in Masulipatam and Madura, 4 per cent. in Conjeeveram, 3 per cent. in Virudhunagar, 2 per cent. in Bezwada and Trichinopoly and a fall of about 5 per cent. in Rajahmundry and Vellore, 3 per cent. in Vizianagaram, 2 per cent. in Cocanada and Hindupur, the prices remaining stationary in Ellore, Guntur, Cuddalore, Chittoor and Kumbakonam.

Statistics—Crop—Sugarcane—1941—Second report. The average of the areas under sugarcane in the Madras Province during the five years ending 1939-40 has represented 2·9 per cent. of the total area under sugarcane in India.

The area planted with sugarcane up to 25th September 1941 is estimated at 104,990 acres. When compared with the area of 149,420 acres estimated for the corresponding period of the previous year, it reveals a decrease of 29·7 per cent.

The estimated area is the same as that of last year in South Kanara; a slight increase in area is revealed in Guntur, Kurnool and Tinnevelly and a decrease in area in the other districts of the Province, especially in Vizagapatam (-5,000 acres), Bellary (-4,000 acres), South Arcot (-9,000 acres), North Arcot (-4,800 acres), Salem (-4,000 acres) and Trichinopoly (-5,800 acres). The decrease in area is due mainly to the low price of jaggery at the time of planting.

The condition of the crop is fairly satisfactory. The seasonal factor for the Province as a whole works out to 96 per cent. as against 97 per cent. for the corresponding period of last year. The total yield for the Province is accordingly estimated at 305,450 tons of jaggery as against 444,400 tons (revised) for the corresponding period of last year, representing a decrease of 31·3 per cent.

The wholesale price of jaggery per imperial maund of 82⅔ lb. (equivalent to 3,200 tolas) as reported from important markets on 6th October 1941 was Rs. 5—14—0 in Mangalore, Rs. 4--15—0 in Adoni, Rs. 4-6-0 in Cuddalore, Vellore and Trichinopoly, Rs. 4—5--0 in Vizagapatam, Rs. 4—2—0 in Cocanada, Rajahmundry and Chittoor, Rs. 3--11—0 in Vizianagaram, Rs. 3—7—0 in Coimbatore, Rs. 3—5—0 in Salem and Rs. 3-4—0 in Bellary. When compared with the prices published in the last report, i. e. those which prevailed on 8th September 1941, these prices reveal a rise of approximately 6 per cent. in Trichinopoly and 5 per cent. in Vizagapatam and a fall of approximately 3 per cent. in Mangalore and 1 per cent. in Vellore, the prices remaining stationary in Vizianagaram, Cocanada, Rajahmundry, Adoni, Bellary, Cuddalore, Chittoor, Salem and Coimbatore.

Statistics—Crop—Sugarcane—Intermediate condition report. The condition of the sugarcane crop is generally satisfactory and the yield per acre is expected to be generally normal in all districts outside East Godavari.

The wholesale price of jaggery per imperial maund of 82 2/7 lb. (equivalent to 3,200 tolas) as reported from important markets on 3rd November 1941 was Rs. 5—8—0 in Mangalore, Rs. 5—0—0 in Vizagapatam, Rs. 4—15—0 in Adoni, Rs. 4—6—0 in Cuddalore and Trichinopoly, Rs. 4--2—0 in Vizianagaram, Cocanada, Rajahmundry and Chittoor, Rs. 4—0—0 in Vellore, Rs. 3—7—0 in Coimbatore, Rs. 3—5—0 in Salem and Rs. 3—3—0 in Bellary. When compared with the prices published in the last report, i. e., those which prevailed on 6th

October 1941, these prices reveal a rise of approximately 16 per cent. in Vizagapatam, and 12 per cent. in Vizianagaram and a fall of approximately nine per cent. in Vellore, six per cent. in Mangalore and two per cent. in Bellary, the prices remaining stationary in Cocanada, Rajamundry, Adoni, Cuddalore, Chittoor, Salem, Coimbatore and Trichinopoly.

Statistics—Crop—Gingelly—1941—42—Second report. The average of the areas under gingelly in the Madras Province during the five years ending 1939-40 has represented 15·8 per cent of the total area under gingelly in India.

The area sown with gingelly up to 25th September 1941 is estimated at 435,400 acres. When compared with the area of 437,100 acres estimated for the corresponding period of last year, it reveals a decrease of 0·4 per cent.

The estimated area is the same as that of last year in Guntur, Kurnool and Cuddapah; an increase in area is revealed in the Circars (Guntur excepted), Bellary, Trichinoply, Madura and the West Coast and a decrease in area in the rest of the Province, especially in South Arcot, North Arcot, Salem and Coimbatore.

The early crop of gingelly has been harvested in parts. The yield was generally below normal except in Coimbatore and Ramnad.

The main crop of gingelly has been affected, to some extent by drought in Kistna, Guntur, the Deccan and Salem. The condition of the crop is fairly satisfactory in the other districts of the Province.

The wholesale price of gingelly per imperial maund of 82 2/7 lb. equivalent to 3,200 tolas) as reported from important markets on 6th October 1941 was Rs. 7—4—0 in Cocanada, Rs. 7—3—0 in Cuddalore, Rs. 7—1—0 in Trichinopoly, Rs. 6—12—0 in Tinnevelly, Rs. 6—7—0 in Ellore and Tuticorin, Rs. 6—3—0 in Rajahmundry, Rs. 6—1—0 in Salem, Rs. 6—0—0 in Vizagapatam and Rs. 5—14—0 in Vizianagaram. When compared with the prices published in the last report i. e. those which prevailed on 4th August 1941, these prices reveal a rise of approximately 12 per cent. in Cuddalore, nine per cent. in Rajahmundry, four per cent. in Cocanada and Ellore, two per cent. in Vizagapatam and one per cent. in Tuticorn and a fall of approximately two per cent. in Vizianagaram, the prices remaining stationary in Salem, Trichinopoly and Tinnevelly.

Statistics—Crop—Gingelly—1941—42—Intermediate condition report. The gingelly crop has been affected to some extent by drought in Anantapur, Cuddapah and Nellore. The yield per acre is expected to be normal outside these districts.

The wholesale price of gingelly per imperial maund of 82⅔ lb. (equivalent to 3,200 tolas) as reported from important markets on 3rd November, 1941 was Rs. 7-8-0 in Tinnevelly, Rs. 7-4-0 in Cocanada, Rs. 7-3-0 in Cuddalore, Rs. 7-1-0 in Salem, Rs. 6-15-0 in Trichinopoly, Rs. 6-6-0 in Tuticorin, Rs. 6-5-0 in Rajahmundry, Rs. 6-3-0 in Ellore, Rs. 6-0-0 in Vizagapatam and Rs. 5-14-0 in Vizianagaram. When compared with the prices published in the last report, i. e. those which prevailed on 6th October 1941, these prices reveal a rise of approximately 16 per cent. in Salem, 11 per cent. in Tinnevelly and two per cent. in Rajahmundry and a fall of approximately four per cent. in Ellore, two per cent. in Trichinopoly and one per cent. in Tuticorin, the prices remaining stationary in Vizagapatam, Vizianagaram, Cocanada and Cuddalore.

Statistics—Crop—Groundnut—1941—Intermediate condition report. The winter crop of groundnut has been affected to some extent by drought in the Circars, the Deccan, Salem and Tanjore, by heavy rains in Kistna and by the attack of red hairy catterpillar in parts of the Bhavani taluk of Coimbatore and of the Dindigul and Nilakottai taluks of Madura. The condition of the crop is generally satisfactory in the rest of the Province.

The wholesale price of groundnut (machine shelled) per imperial maund of 82⅔ lb. (equivalent to 3,200 tolas) as reported from important markets on 3rd November 1941 was Rs. 4-13-0 in Vizagapatam, Rs. 4-10-0 in Guntur, Rs. 4-9-0 in Cuddalore, Rs. 4-8-0 in Vizianagaram, Rs. 4-5-0 in Vellore, Rs. 4-3-0 in Nandyal, Rs. 4-2-0 in Tadpatri, Rs. 4-1-0 in Cuddapah, Rs. 4-0-0 in Salem and Coimbatore, Rs. 3-14-0 in adoni and Bellary, Rs. 3-12-0 in Hindupur and Rs. 3-1-0 in Guntakal. When compared with the prices published in the last report, i. e., those which prevailed on 6th October 1941, these prices reveal a rise of approximately nine per cent. in Adoni, seven per cent. in Bellary and Salem, five per cent. in Nandyal and Vellore and one per cent. in Vizagapatam and Cuddalore and a fall of approximately 14 per cent. in Guntakal, ten per cent. in Tadpatri, three per cent. in Guntur and Hindupur and 2 per cent. in Coimbatore, the prices remaining stationary in Vizianagaram and Cuddapah.

Statistics—Cotton—1941-42—Intermediate monthly report. In the Central districts and the South, the sowings of cotton are still in progress in parts. The area under the crop is expected to be normal or slightly above normal.

In the Deccan, the sowing of hingari or late cotton have concluded and the area is expected to be normal in Kurnool and above normal in the other districts. The crop is progressing well. The mungari or early sown cotton is in flowers and bolls. The yield per acre is expected to be below normal on account of drought.

The local cotton trade is not generally active at this time of the year. The average wholesale price of cotton lint per imperial maund of 82⅔ lb. or 3,200 tolas as reported from important markets on 3rd November 1941 was Rs. 17—5—0 for Cocanadas, Rs 20—9—0 for white Northerns, Rs. 18—2—0 for red Northerns, Rs. 15—3—0 for Westerns (Mungari), Rs 20-1-0 for Westerns (Jowari), Rs. 39-5-0 for Coimbatore Cambodia, Rs. 35—8—0 for Coimbatore Karunganni and Rs. 28-1-0 for Nadam Cotton. When compared with the prices published in the last report, i. e. those which prevailed on 6th October 1941, the prices reveal a fall of about 9 per cent. in the case of Westerns (jowari), 8 per cent. in the case of Westerns (Mungari), 4 per cent. in the case of Coimbatore Cambodia, and Nadam Cotton and 3 per cent. in the case of Coimbatore Karunganni, the prices remaining stationary in the case of Cocanadas and Northerns (red and white varieties).

(Director of Industries and Commerce, Madras.)

Cotton Raw, in the Madras Presidency. The receipts of loose cotton at presses and spinning mills in the Madras Presidency from 1st February to 14th November 1941 amounted to 598,365 bales of 400 lb. lint as against an estimate of 503,500 bales of the total crop of 1940-41. The receipts in the corresponding period of the previous year were 481,296 bales. 542,238 bales mainly of pressed cotton were received at spinning mills and 59 601 bales were exported by sea while 103,718 bales were imported by sea mainly from Karachi and Bombay.

(Director of Agriculture, Madras).

Mofussil News and Notes.

Periodical Conference at the Agricultural Research Station, Samalkot. The Conference of the Gazetted Officers of the several Departments, in the district of East Godavari, was held at the Agricultural Research Station, Samalkot, on the 15th instant, under the presidentship of the District Collector, W. R. S. Sathianathan, Esq, I. C. S., Rao Saheb G. Jogiraju Pantulu and Sri. M. Pallamaraju, M. L. A., President, District Board, also attended. A paper on soil erosion and reports on the progress of work in model villages were read. Bee-keeping and other cottage industries also came in for consideration, at the meeting. The members were taken to the Farm museum and shown round and the work of the Station explained to them.

M. S. N.

Exhibition—Victoria College, Palghat. A small agricultural exhibition was held in the Victoria College, Palghat from 24th to 26th October 1941 on the occasion of the Science Exhibition held in aid of the Madras War Fund.

Samples of improved paddy seeds, green manure seeds, posters on improved crops and control of insect pests and diseases, were exhibited with explanatory notes. Cooper 25 plough, Sprayer and live bee colonies were also put up. The extraction of honey and maintenance of bees in the colonies were actually demonstrated. Departmental publications were distributed to the visitors.

A. G.

College and Estate News.

Students' Club. There was a lecture by Sri. Srinivasachariar, Lecturer in Logic, Government Arts College, Coimbatore on the 23rd October. Sri. A. Adivi Reddi, B. Sc. III year class presided. The subject was "What am I?" The lecture delivered in very simple language was most elevating. There was another very interesting lecture on the 11th November by Rao Bahadur M. R. Ramaswami Sivan, retired Principal of the College on "The Institute of Agriculture, Anand" when R. C. Broadfoot, Principal of the College occupied the chair. A parliamentary debate was held on the 13th November on "That in the opinion of the house vivisection of India on communal basis is the only panacea for communal troubles". Sri. T. Chellappa of class III acted as the speaker and Sri. K. Subramaniam, Chairman, Coimbatore Municipal Council, kindly acted as the observer. There was a heated discussion and the motion was lost with the large majority voting against it.

Cricket. In the match played between the Agricultural College and the St. Joseph's College, Bangalore at Bangalore in September, in the Inter-Collegiate Tournaments, the latter won having scored 268 runs the Agricultural College team scored 70 runs in first innings and 102 in the second. The third match for the Rhondy shield was played on the 22nd October, between our college team and the Scouts Recreation Club, Coimbatore which we won by a narrow margin of 4 runs. A noteworthy feature of the game was the brilliant batting by Kothandaraman who scored 40; C. N. Babu scored 24 runs. In the match played on the 26th October between class I and II in connection with the Victory cup, class II won having scored 122 for 9, (Kamath 71, Tiruvengadam 26 both retired bat in hand).

Hockey. In a friendly match played on the 19th October between the Agricultural College and the Officers' Club, the former won by 2 goals to one. In another match played against the Officers' Club on the 24th October the College won by 3 goals to nil. In the match played in connection with the Coimbatore Hockey Tournament, between the Agricultural College and the Sporting Union, on the C. R. S. grounds, the College lost by the only goal scored towards the end.

Ladies' Club. The Agriculural College Ladies' Club organised a 'Fancy Sale' on Saturday the 15th instant. The 'Sale' was opened by Mrs. N. L. Dutt. It consisted of several sections, such as fancy articles stall, tea stall, vegetable stall, and side shows as 'lucky dip', 'treasure hunt', 'fortune telling', 'coconut shy' etc. The residents of the estate took keen interest and patronised the stalls and side show. The club premises were tastefully decorated and illuminated by multi-coloured lights.

St. John Ambulance Brigade. The A. C. R. I. Ambulance Division participated in the inspection of the Coimbatore Ambulance and Nursing Divisions conducted by the Surgeon-General to the Government of Madras in his capacity as the Commissioner for the Province, on the 14th October at Government College, Coimbatore.

Another batch of candidates completed their course of instruction in First Aid, and had their examination on the 31st October 1941.

Visitors. Mr. P. H. Rama Reddi, the Director of Agriculture camped at the Agricultural College from the 17th to the 21st. Dr. S. Ramanujam, Second Economic Botanist, New Delhi, visited the Institute and the Imperial Cane Breeding Station during the third week of the month.

THE ENTOMOLOGICAL SOCIETY OF INDIA

(South Indian Branch)

A meeting of the South Indian Branch of the Entomological Society of India was held on the 18th November 1941, at the Agricultural College and Research Institute, Coimbatore, with Mr. M. C. Cherian in the chair. After presenting the minutes and the financial statement, which were adopted, the secretary announced that Sri. M. C. Cherian had been nominated for the Presidentship of the Entomological Society of India and also for a membership on the Editorial Board, by Messrs T. V. Subramania Ayyar and P. N. Krishna Ayyar. The election of office bearers of the branch for the year 1942 was postponed to a future meeting.

Sri M. C. Cherian read a paper on Life history notes on *Grammodes stolida* Fabr., a pest on Daincha—*Sesbania bispinosa*, by M. C. Cherian and C. V. Sundaram; and Sri. P. N. Krishna Ayyar read a paper on *Habrobracon hebator*, Say., a parasite on *Dichomeris ianthe* on lucerne.

A number of interesting exhibits were shown by Messrs. M. C. Cherian, P. N. Krishna Ayyar and Janab Muhammad Basheer, the chief among which were:—

i. (a) *Tarache notabilis*, Wlk.—*Noctuidae*—appeared as a very severe pest on cotton in October 1937 in the Cotton Breeding Station at Coimbatore; long cycle pupae exist and moths sometimes emerge from the soil after 18 months. (b) *Tricholyga sarbillaans*, Wied—*Tachnidae*. Occurred as a parasite on the caterpillars of *Tarache notabilis* during the same season. (c) *Actia monticolla*, Mall. *Tachnidae*—another parasite on *Tarache notabilis*, though not so numerous as *Tricholyga*. (d) *Macroplectra nararia*, Moon—a Limacodid caterpillar that appeared as a pest defoliating *Pithecolobium dulce* in Coimbatore in December 1937. (e) *Fornicia ceylonica*, Wlk.—*Braconidae*—a sigalphine larval parasite of *Macroplectra nararia*—a single parasite issues from each host. (f) *Chelonus formosaria*—*Braconidae*—the parasite was recovered from *Prodenia litura* caterpillars on castor. It is truly an egg parasite and lays eggs in one-day old eggs of the host. The parasitised eggs hatch in the normal way into caterpillars and the parasitic eggs hatch subsequently in the body of the host and develop inside along with the host; a single grub comes out of each host and pupates in the soil. From each egg mass of the host about 100—200 parasites can be reared out. (g) *Apate submedia*, Wlk. This Bostrychid was found boring into living mango stems and branches at Udumalpet in 1935. As many as 5—6 tunnels were found in badly infested branches. The trees are said to die off in the course of a few years. (By Sri M. G. Cherian).

ii. (a) A carabid predator on *Sylepta derogata*. (b) Three species of *Eublemma*—*Eublemma scitula*, *Eublemma silicula* and *Eublemma trifasciata*—predaceous on Coccids on cotton, the last two being new records of their predaceous habits on Coccids. (By Sri P. N. Krishna Ayyar).

iii. (a) *Dermestes cadavernus*, Fb. Dermestidae—found doing considerable damage to stored groundnut kernels in the godowns at Pondicherry in March 1941. (b) *Gonocephalum* Sp., *Tenebrionidae*—found in large numbers in bags containing stored groundnut kernels at Pondicherry in March 1941; but no actual

damage is reported. (c) *Rhogas percurrens* Lyle. *Braconidae*—a specific parasite of *Achoea janata* caterpillars. (d) *Microplitis maculipennis*, Szep. another specific parasite of *Achoea janata* caterpillars in the early stages. (By Janab Muhammad Basheer).

It was resolved that the Editor, Entomological Journal of India, be requested to open a special feature in the Journal entitled—"Research items", wherein matters concerning research work of an incomplete but at the same time important nature as distinct from complete elaborate papers might be published on a line with what appears as "Scientific notes" in the "Journal of Economic Entomology".

Secretary, South Indian Branch.

OBITUARY

It is with profound sorrow that we record the death of Rao Bahadur K. Gopalakrishna Raju, L. Ag., Provincial Marketing Officer, Madras, on the night of 12th November 1941. He was born at Palamcottah, Tinnevelly District, on 3rd November 1890, and is a scion of a stock that has produced the late Rao Bahadur J. Chelvarangaraju, Deputy Director of Agriculture and the famous novelist, Sri J. Rangaraju Sri Raju had his scholastic education in the Tinnevelly District and took his diploma in Agriculture from the Coimbatore Agricultural College in 1914. From his boyhood, he had made a mark by his intelligence. He entered the Agricultural Department soon after he left the College, was for some years a teaching assistant, and was promoted fairly very early in his service to the gazetted service as Acting Assistant Director of Agriculture, VI Circle in January 1920. From this period onwards, he had a meteoric rise, and was promoted as a Deputy Director of Agriculture in 1923. He held this post in various circles, such as, Bellary, Guntur, Madras, etc, and was appointed as the Headquarters Deputy Director of Agriculture at Madras in January 1934. In August of the same year, he became the Provincial Marketing Officer to the Government of Madras which post he continued to hold till his death. In recognition of his services to the agriculture of the Province he was awarded the title of Rao Bahadur in June 1939.

Raju was simple, intelligent, industrious and sociable with always a smile for everybody and was loved by one and all of his friends and colleagues. He was taking keen interest in the activities of the Union, and served in various capacities as a member of the Editorial Board, a member of the Managing Committee, Moffusil Vice-President etc. He was a lively member of the Agricultural College Officers' Club, occupying always a prominent place at the cards table.

We offer our deep and heartfelt sympathies to the bereaved family.

Departmental Notifications.

Subordinate Services.

Confirmation.

Sri. D. Viswanath Reddi, Agricultural Demonstrator, Proddatur, is confirmed as Upper Subordinate, Agricultural Section, New I grade on Rs. 145-190, with effect from 1st August 1939.

Transfers.

Name of officers.	From	To
Sri. M. Subrahmanya Chetti,	Asst. in Cotton, A. R. S. Guntur.	Asst. in the Cocanada Cotton Scheme, Guntur.
,, N. V. Kalyanasundaram,	F. M. Kalahasti,	A. D. Puttur.
,, S. Krishnamurthi,	A. D. under training, F. R. S. Koduru,	F. M. Agri. College Orchard, Coimbatore.
,, K. Krishna Hegde,	F. M. A. R. S. Nanjanad,	F. M. Sim's Park, Coonoor.
,, James Calaco,	F. M. Sim's Park, Coonoor,	F. M. Pomological Station Coonoor and to be in-charge of Kallar & Burliar Fruit Stations.
,, K. Govindankutty Kurup,	F. M. Pomological Station, Coonoor,	F. M. F. R. S. Koduru.
,, J. Gopala Rao,	F. M. F. R. S. Koduru,	A. D. Rayachoti.
,, M. Subba Reddi,	A. D. Rayachoti,	A. D. Venkatagiri.
,, R. Soundararajan,	F. M. Central Farm, Coimbatore,	Dairy Manager, Agri. College, Coimbatore.
,, V. Karunakaran Nayar,	Dairy Manager, Agri. College, Coimbatore,	A. D. Aruppukottai.
,, D. Shanmugasundaram,	A. D. Aruppukottai,	F. M., C. F., Coimbatore.

Leave.

Sri. C. Krishnan Nayar, Assistant in Mycology Section, Coimbatore, is granted leave on average pay for 4 months from 17th November 1941 and leave on half average pay for 2 years in continuation thereof *preparatory to retirement.*

Sri. A. G. Ramaswami Ayya, Sub-Assistant in Entomology Section, Coimbatore, is granted leave on average pay for 2 months from 10th November 1941 *preparatory to retirement.*

Name of officer.	Period of leave.
Sri. S. Ramachandra Ayyar, Entomology Asst., Coimbatore.	Extension of l. a. p. on m. c. for 4 months from 10-10-41.
,, K. S. Krishnamoorthi, A. D. Tanjore.	Extension of l. a. p. for 1 month from 5-11-41.
,, M. L. Narayana Reddi, A. A. D. Anakapalli.	L. a. p. on m. c. for 1 month from 1-11-41.

Sri. V. Achyutaramayya, A. D. Jami.	L. a. p. on m. c. for 3 months from 28-10-41.
„ S. R. Srinivasa Ayyangar, Librarian, Agri. College, Coimbatore.	L. a. p. for 1 month and 23 days from 1-11-41.
„ P. Satyanarayana, A. A. D. Markapur.	L. a. p. for 27 days from 3-11-41.
„ A. Venkobachari, A. A. D. Harpanahalli.	Extension of l. a. p. for 1 month from 5-10-41.
„ P. Krishnamurthi, A. A. D. Bobbili.	L. a. p. for 45 days from 1-10-41.
„ S. Varadarajulu Nayudu, A. D. Dhone.	L. a. p. for 2 months and 8 days from 16-10-41.
„ K. Kannan Nambiar, F. M. A. R. S. Nileshwar.	L. a. p. for one month from 28-10-41.
„ Ch. Venkatasaravayya Chetti, Asst. in Paddy (on leave).	Extension of l. a. p. for 1 month and 23 days from 1-11-41.
„ B. N. Padmanabha Ayyar, A. D. Puthur (Chittoor district).	L. a. p. for 2 months from the date of relief.
„ N. Ramadoss, A. D. (on leave).	Extension of l. a. p. for 1 month and 14 days from 10-11-41.
„ K. M. Narayanan, F. M. (on leave).	Extension of l. a. p. for 38 days from 16-11-41.
„ P. V. Somayajulu, Asst, in Mycology Section, Coimbatore.	L. a. p. for 4 months on m. c. from 3-11-41.
„ D. Bapayya, Foreign Service, under Tobacco Market Committee, Guntur.	Extension of l. a. p. for 3 months from 13-12-41.