The Madras Agricultural Journal.

(ORGAN OF THE M. A. S. UNION)

Vol. XXX MAY 1942 No. 5.

EDITORIAL

Successful Marketing. Every educated Indian, interested in matters agricultural, is aware of the fact that in the year 1926. His Majesty's Government in the United Kingdom sent out to India, a Royal Commission on Agriculture, presided over by no less a personage than His Excellency Lord Linlithgow, the present Viceroy. It was with the express purpose of finding out ways and means for improving the lot of the Indian Farmer. The terms of reference specifically included a research into the conditions under which agricultural produce was marketed in India. In response to one of the recommendations of the Royal Commission the office of the Agricultural Marketing Adviser to the Government of India was established at Delhi in the year 1935, with the object of devising ways and means for the successful marketing of the agricultural produce of the country so that the farmer may get a better return for his produce. "In the course of investigations undertaken by the Agricultural Marketing Adviser, it was found that one sure way of achieving this object was to put on the market standard goods of well defined quality."

That "honesty is the best policy" is admitted on all hands, but unfortunately it is becoming less and less observed in life in matters small or great. It is sad to note that the practice of adulteration of food stuffs and agricultural products is widely prevalent in this country. Among those worst adulterated may be cited, ghee and rice. It is a matter of common knowledge that one meets with in the bazaar different grades of impure ghee but very rarely with pure ghee. Instances of this kind could be multiplied. The Government felt, therefore, that "*there was genuine need for the introduction of a system which, on the one hand, would guarantee to the consumer the quality of the goods he was paying for and, on the other, bring in additional returns to the producer of pure and high quality produce.*" So, in the year 1937 the Agricultural Produce (grading and marking) Act was passed by the Indian Legislatures, the word AGMARK ("AG" for Agriculture and "MARK" for Marketing) being adopted by the Government of India as a symbol of purity and a guarantee that the product which bears it possesses the declared attributes of quality.

What the Marketing Section does is, it grades. Grading is the process of sorting goods according to their merit or quality. Grading gains two birds at a stroke. It ensures the highest return to the producer for his goods and the best value for his money to the consumer. "The

Agricultural Produce Act. 1937, empowers the Central Government to fix grade designation marks to indicate the quality of any scheduled article and to authorize a person or body of persons, subject to any prescribed conditions, to mark with a grade designation mark any article in respect of which such mark has been prescribed. Penalties are provided for unauthorized marking with a grade designation mark or for counterfeiting the same. The ultimate authority for permitting the use of a grade designation mark with reference to a particular commodity rests with the Agricultural Marketing Adviser to the Government of India. He issues the necessary Certificate of Authorization after having fully satisfied himself about the *bona fides* of the applicant and that it would be expedient in the interest of better marketing to grant the authorization. Grading rules and grade specifications have been formulated and promulgated under the Act for a number of commodities. Standard methods of grading and marking have been laid down for such commodities as, Ghee, Eggs, Grapes, Apples, Alphonso (export as well as home consumption), Dusehri, Swarnarekha, Banganapalle, Collector, Neelum, Malda, Peter, Fazli, Surma Fazli, Khajri, Bathua, Sindhi, Rumani, Malgoa and Sufeda varieties of mangoes, Plums, Peaches, Pears, Pomegranates, Oranges, Maltas, Grape fruits, Mozambis, Sathgudis, Batavian oranges, Limes, Sweet limes, Guavas, Pine apples and Kumaon apples, Citrus Fruit Products (juice, squash, cordial, etc.), Potatoes, Hides, Skins, *Ata*, Rice, Wheat, Tobacco, Cotton, Lac, *Sann* Hemp, Edible Oils, Vanaspathi, Handpicked Selected Groundnuts and *Gur* (jaggery)."

The Agmark seal can be given only to commodities which are not uniform and also to such products which could stand transport easily without perishing. For example, strawberries and raspberries cannot be graded and the Agmark seal given to them.

To give an idea as to how the Agmark scheme is worked, rice, one of the commonest but a very much adulterated food grain, can be taken as an example. The special grade bears a white label, A, a red label and B, a blue label. Each label gives the year of harvest, net weight in the package, name of the packer and the date of packing.

In the Agmark scheme of quality control very strong emphasis is laid on personal instruction and supervision. Frequent visits are paid by the Central and Provincial Marketing Officers and others to the premises of graders, distributors and retailers. Not only this, there are elaborate arrangements for well equipped laboratories where samples are analysed and checked under expert supervision.

Before concluding we would invite the attention of our readers to a very instructive and interesting publication on the subject, namely, "the Story of Agmark" issued by the Agricultural Marketing Adviser to the Government of India, Delhi, from which matter for this editorial has been culled.

We appeal to the public to co-operate with the Marketing Section so that greater profits may always be assured to the grower and good quality produce to the consumer. Our policy should be to buy only things with "AGMARK" and none else.

Results of Trial of Molasses as Manure on Swamp Paddy

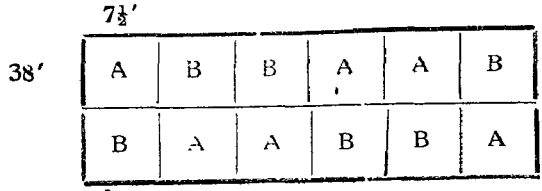
M. ANANDAN,
District Agricultural Officer, Tanjore,
T. K. BALAJI RAO,
Senior Science Assistant in Charge,
&
V. KRISHNASWAMI.
Assistant, Agricultural Research Station, Aduturai.

Introduction. On the Agricultural Research Station, Aduturai, there was a large quantity of molasses available as a bye-product, in connection with the trials for manufacturing white sugar by the open pan system with centrifugal machine. The trials were conducted during the years 1933—37. Part of it was fed to cattle, but the surplus let over could not be easily disposed of by sale in the locality. So, it was decided to try molasses as a manure on the swamp paddy on the station.

Soil and Cropping Season. The soil on the station is the alluvial clay of the Cauvery delta which cracks badly in summer months—March to May. The cultivation season starts with the receipt of water in the channels by the middle of June. The first crop which is a short duration variety of 3 to $3\frac{1}{2}$ months occupies the ground from the middle of July to the end of September. The second crop, usually a long duration variety of 5 to 6 months, is planted by the middle of October after harvesting the first crop and is harvested by the middle of February. In lands cropped with only a single crop, the sowing commences by the first week of July, transplanting being done 6 weeks later. This crop, generally comes to harvest in January.

The particular field F 5-a, where the experiment was under progress, was under double crop cultivation as detailed in the foregoing paragraph. Prior to starting of the trials, the field was devoted to the growing of bulk crops of paddy for seed multiplication without any experiment. The crop received green leaf at 2,000 lb per acre; bone meal was applied at the rate of 200 lb. per acre at the time of planting and Ammonium Sulphate at 50 lb. per acre was top dressed 15 days after planting.

Design of the Experiments. A preliminary trial was carried out in the year 1935 in a ten cent plot. Twelve sub-plots each measuring 38 ft. × $7\frac{1}{2}$ ft. (0·66 cents) were laid out in this field, with small bunds and 2 ft. inter-channels separating each plot. Six of the sub-plots received molasses at 2,000 lb. per acre and the other six plots were left as control, the arrangement being A B B A fashion as shown below:



A control.

B molasses at 2,000 lb. per acre.

The molasses was diluted with twice its volume of water and applied to each sub-plot with the help of an ordinary garden rose-can in the puddled soil, 13 days before transplanting the paddy crop. It was noticed that there was active fermentation of the manure for about 20 days, accompanied by the evolution of bad smelling gases. The paddy variety used in this experiment was Co. 1 a (pure line) strain evolved at the Paddy Breeding Station, Coimbatore, the planting being done 6" either way in lines with one seedling per hole. The yield figures are given below and from them it will be seen that the controls gave slightly higher yield than the treated plots, though the difference is not statistically significant.

	Molasses at 2,000 lb. per acre.	Control.	Difference of means.
Mean yield of 6 repetitions	17·9	19·2	1·3
Percentage of control	93·6	100·0	S. E. 1·05
Acre yield in lb.	2,734	2,934	**Difference of means not significant.**

During the same year, a more elaborate experiment was laid out in a bigger double crop field in F 5 a, measuring 46·9 cents in area. In this field, sub plots measuring 45′ × 13′ were laid out in two rows of 9 plots each, each plot being separated by inter channels 2′ in breadth. The application of molasses was done in two different doses (A) at 1,000 lb. per acre and (B) 2,000 lb. per acre, with unmanured plot as control. All the three treatments were randomised giving six repetitions to each treatment.

13′

45′

A	B	C	B	C	A	C	A	B
B	A	C	A	C	B	C	B	A

Channel 2′

The manure was diluted as in the first case and applied to the puddled soil a week before planting. The fermentation of the material and the evolution of bad smelling gases were noted for about twenty days in this case also. The variety used in planting was Adt. 2, a strain evolved on the station from the famous White Sirumani of Tanjore. The yield figures given below show that the increased yields of 2·5 per cent. and 2·8 per cent. given by 1,000 lb. and 2,000 lb. applications were not statistically significant.

	Molasses at 1,000 lb. per acre.	2,000 lb. per acre.	No. manure.	Gen. mean.	Z. Test. S.E P.O.01	Critical difference P.O.01.
	A	B	C			
Mean yield of 6 repetitions	27·6	27·7	26·9	27·4		
Percentage on General mean	100·6	101·0	98·2	100·0	2·09	**Not Sig**
Percentage on control	102·5	102·8	100·0			
Acre yield in lb.	1,935	1,942	1,888			

In the 1936—37 season, the experiment was repeated using the same plots as in the previous years, but the manurial doses were increased by applying 2 tons to the plots which received 1,000 lb. of molasses per acre and 4 tons to those which received 2,000 lb. per acre during the previous season. Both the crops received molasses at the above rates. Molasses was applied in the puddle to the first crop a week in advance of planting, the planting being done six inches either way. For about three weeks after the application of the manure, there was vigorous fermentation and evolution of foul smelling gases. Plants were also found to sicken and die away in numbers. The dead plants were counted in the differently treated plots and it was found that there were on an average 85 dead plants in each 2 ton plot, 350 in the 4 ton plot, while the number of dead plants in the unmanured plot was only 34. This clearly shows that it is not safe to plant the seedlings before the active fermentation of the molasses has taken place and completely subsided. The yield figures obtained are given below from which it would be seen that both 2 and 4 ton applications have given significantly higher yields than the controls, although the difference in yield between 2 and 4 ton applications is not significant when the loss in yield due to gaps is ignored.

But when the loss due to gaps is computed by the method of co-variance, it is found that even then the increase in yield of both 2 ton and 4 ton application is not significant though the 'Z' test is satisfied.

Recorded yields.

	1 Molasses at 2 tons per acre. A	2 Molasses at 4 tons per acre. B	3 No. manure.	Gene-ral mean. C	S. E.	Z. test P. O. ·01.	Critical difference. P. O. ·01.
Mean yield of 6 Repetitions.	42·2	41·6	37·7	40 5			
Percentage on General mean.	104·2	102 7	93·1	100·0	1·50	Sig.	4·7
Percentage on Control.	111·8	110·3	100·0				
Acre yield in lb.	3,004	2,963	2,689				
	Conclusion.	1	2 3				

Calculated yields including gaps (Yields adjusted by Co-variance.)

Mean yield of 6 Repetitions.	42·2	41·6	37·7			Sig.	
Percentage on control	111·9	110·0	100·0				
Acre yield in lb.	3,328	3,282	2,978				493
	Conclusion	1	2 3				

Thaladi or Second Crop. As already stated, molasses was applied at the same rate as for the first crop, but with this difference that the manure was applied to the plots 4 weeks in advance of planting in the puddled soil. During this period, the fermentation of the manure was complete when the crop was planted and there was no sign of fermentation with the

result that there were no abnormal deaths in the manured plots. Due perhaps to the absense of deleterious decomposition products, the crop grew quite normally in the manured as well as in the unmanured plots. The yield figures given below disclose that two ton application, for some unknown cause—had no effect on the yield, while four ton application gave 20·7% extra yield.

	1 Molasses at 2 tons per acre. A	2 Molasses at 4 tons per acre. B	3 No manure C	General mean.	S. E.	Z test P. O. ·01.	Critical difference. P. O ·01.
Mean yield of 6 Repetitions.	30·6	36·7	29·9	32·2			
Percentage on General mean.	95·0	114·0	92·9	100·0	3·22	Sig.	10·52
Percentage on Control.	102·3	120 7	100·0				
Acre yield in lb.	2,179	2,571	2,129				
	Conclusion	2	1	3			

During the 1937—38 season molasses was applied to the plots in the month of May, when summer was at its height and the land was completely dry and heavily cracked. The soil was untouched until the third week of June, when the plots were irrigated with channel water and ploughed for planting. The field was planted on 2nd July, exactly two months after the application of molasses. By applying the molasses to dry soil, there was no fermentation or evolution of foul smelling gases—and there were not any abnormal deaths of transplanted plants in the treated plots as in the previous cases.

So it seems to be a healthier and safer practice, to apply the molasses to the field when the soil is dry—rather than when it is in a puddled state. Moreover, the yield figures obtained also seem to point to the fact that it is advantageous to apply molasses to the dry soil, the beneficial effect of such application perhaps being due to increased activity of nitrogen fixing organisms in the soil.

	1 Molasses at 2 tons per acre. A	2 Molasses at 4 tons per acre. B	3 No manure C	General mean.	S. E.	Z test P. O. ·01.	Critical difference. P. O. ·01.
Mean yield of 6 Repetitions.	35 5	41·7	25·5	34·2			
Percentage on General mean.	103·8	121·9	74·6	100·0	1·62	Sig.	7·26
Percentage on Control.	139·2	163·5	100·0				
Acre yield in lb.	2,801	3,289	2,015				
	Conclusion	2,	1,	3.			

During the same season, the residual effect of molasses, if any, was tested on the second crop. Plots getting four tons of molasses gave a

significant increase of 19 % over the control, while the increase given by 2 ton plot was within the limits of error.

Mean yield of 6 Repetitions.	27·9	28·9	24·3	27·0			
Percentage on General mean.	103·3	107·0	90·0	100 0	3·15	Sig.	14·10
Percentage on Control.	114·8	119·0	100·0				
Acre yield in lb.	1,994	2.065	1,732				
	Conclusion	2,	1,	3.			

Discussion of results and conclusions. From the results of the above experiments, it is possible to draw the following conclusions.

1. The minimum dose of molasses required to give an appreciable increase in yield seems to be in the neighbourhood of 4 tons per acre—though in the 1937—38 season even a 2 ton application gave a fairly high yield over the control.

2. The best time for the application of molasses to a paddy field seems to be summer and when the soil is dry. Perhaps such application helps the nitrogen fixing organisms in their activity. But this method could be adopted only in the case of the first crop in double crop areas and to Samba (single crop), while in the case of a second crop, which follows immediately after the harvest of the first crop, it has necessarily to be applied in the puddle, as the Kuruvai crop is generally harvested in standing water and as it is also harmful to allow the fields to dry before planting the second crop. In such cases, molasses will have to be applied immediately after the harvest of the first crop, to allow it to complete its fermentation before planting a second crop. Where it is not possible to allow sufficient time for fermentation to complete before the second crop is put in, it is better to avoid the application of molasses to such fields altogether, as otherwise abnormally high death rates occur among the transplants.

Economics of manuring rice crop with molasses. Even assuming that a 4 ton application of molasses to a paddy field ensures an increase of 60% or 1,200 lb. of grain per acre by applying it to the dry soil in summer, it may not be economical to purchase and transport it to fields far removed from the place of production, as the cost of packing and transporting a liquid manure like molasses will be prohibitive. The molasses also should be obtainable at about Rs. 5 a ton, ex-factory, so that with the cost of transport included the cost of manuring should not exceed Rs. 8 a ton, if there should be a return of 25 per cent. on the capital invested on manuring, calculating the value of 1,200 lb. of paddy at 32 lb. a rupee. If molasses can be sold at a more remunerative price for other uses—there seems to be no future for it as a manure for paddy from an economic point of view. Even putting the price at Rs. 8 a ton, the initial expenditure on manuring comes to Rs. 32 per acre, whereas ordinarily the rice growers need not spend more than Rs. 6 to 10 per acre for manuring their paddy

crop with green manure and bone-meal and top dressing with Ammonium sulphate to get an increased yield of 1,200 lb. of grain per acre. The actual doses of the above manures recommended for application to Tanjore rice fields are 4,000 lb of green manure costing Rs. 2, 50 lb. of bone-meal costing Rs. 1-8-0 and 40 lb of Ammonium sulphate costing Rs. 4-14-0, or Rs. 8-6-0 on the whole; in round figure Rs. 9 per acre. In view of these facts, it is problematical whether molasses would ever be a popular manure for paddy crop, so long as it is available in the liquid state only. If it could be put on the market as a dry powder packed in gunnies, just as any other concentrated manure, by treatment with quicklime or any other chemical means, then the cost of packing, transport and of application to the fields could be considerably reduced.

A Simple Method of Preserving Seed Coconuts*

By C. M. JOHN,

Oil Seeds Specialist, Coimbatore

AND

G. V. NARAYANA

Superintendent, Agricultural Research Station, Kasaragod.

Seed coconuts harvested during the summer months from February to May alone are considered suitable for raising seedlings. They are sown in the nursery either at the commencement of the south-west monsoon rains in June or in some places with the north-east monsoon rains in October. During this interval, they generally get over-dry losing the water ('milk') inside and thereby become unfit for sowing. If the nuts are sown immediately after the harvest in summer, the watering charges will be high. Therefore it is necessary to preserve the seed nuts properly for some months till they are sown in the seed bed.

Usually no particular method is adopted or special care taken by *ryots* for preserving their seed coconuts. They are generally dumped in some odd place in the house or the holding till they are required for sowing. Since the seed nuts are harvested only when they are dead-ripe and the nuts have to pass through the hot summer months they become too dry and lose their germination capacity unless they are properly preserved.

A simple method for preserving seed nuts is as follows :—

As soon as the nuts are harvested or as early as possible after harvest, they are removed to a shed or verandah protected from direct sunlight. A layer of dry sand about three inches thick is spread on the floor and the seed nuts are placed on the sand close to one another with the base or stalk-end up. They are then covered up completely with dry sand till it fills up all inter-spaces among the nuts and stands some three inches above the nuts. The nuts are left in the sand till they are required for sowing; and they keep quite well without the milk or water in the nut drying up even for a period of five to nine months.

* Contribution No. 18 of the Oil Seeds Section of the Madras Department of Agriculture.

Trials at Kasaragod. In March 1938 the first trials on the preservation of seed nuts in sand were conducted at the Coconut Research Station, Kasaragod. One hundred seed nuts taken at random were preserved in sand as explained above Another set of 100 seed nuts picked at random and not preserved in sand but simply exposed on the floor of the shed formed the control.

Five months after the trials were started, the nuts were examined. In the sand-preserved lot all the nuts were in perfect condition but in the control only 62% of nuts were fit for sowing, the rest being over dry and unfit for sowing. The nuts were examined again four months later, i. e., nine months after the trials were started. It was then found that among the sand preserved lot only 9% of the nuts became dry while in the exposed control all the nuts became dry and unfit for sowing. Good germination—90% was obtained by sowing the seed nuts preserved in sand. This method of preserving seed nuts in sand has been extensively tried during the last three years at the Coconut Research Stations and found quite successful.

Trials at Tindivanam. The above findings were further verified under East Coast conditions at the Agricultural Research Station, Tindivanam (South Arcot District) where the summer is very severe with the maximum temperature going up to even 112°F. Seed nuts from Kasaragod, harvested during 1939 and 1940 seasons were utilised for the trials. Lots of 100 seed nuts were preserved in sand in shade with control as at Kasaragod. It was found that the seed nuts preserved in sand for five months from April to August gave 63% of germination while in the control not preserved in sand the percentage of germination was only one.

Conclusion. These trials clearly show that seed coconuts can be preserved in sand for a period of five to nine months without much deterioration in their germination capacity. This method of preserving seed nuts is being regularly adopted at the Coconut Research Stations where the nuts have to be stored for a maximum period of five months from January to May. The method is now, therefore, advocated for the use of the public interested in the proper preservation of seed nuts.

Incidentally it was also found that oranges (loose jacket), lime fruits, ginger, etc., could be preserved in sand without deterioration for appreciably longer periods than when they are exposed to the air and stored in the ordinary way.

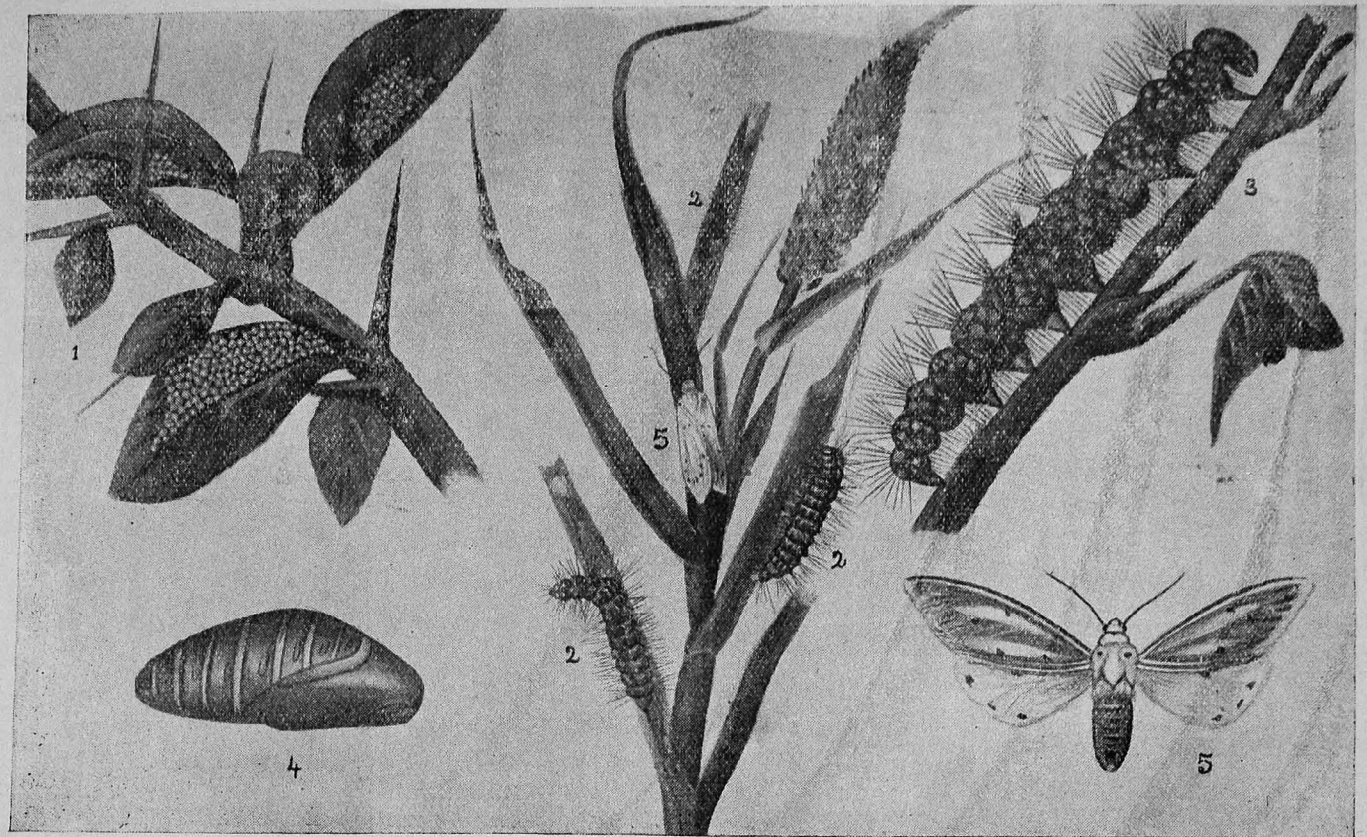
Two Major Insect Pests of the Deccan.

By T. V. RAMAKRISHNA AYYAR, B.A., Ph. D.
and
T. V. VENKAT KRISHNAN, L. Ag.,
Agricultural Department (Hyderabad-Deccan).

Among the different zoo-geographical regions into which India is generally divided the Deccan plateau, lying between the Eastern and Western Ghats, forms a very distinct and important region; and the greater part of this extensive tableland is included in the Indian State of Hyderabad. Though the flora and fauna of this region are in some respects similar to those of the adjacent coastal plains or the Indo-Gangetic alluvial areas, the peculiarities in the physical features and climate of this tract are found to exercise a considerable amount of influence on the plants and animals inhabiting this tract. In view of the fact that we have hardly any connected records of the insect fauna of this region, a preliminary attempt is made in this paper to present a brief summary of the general features and life habits of two insects which appear to rank as the most important forms which are of great economic importance in the area and which seriously affect the prosperity of the Deccanese farmer.

It may be noted that in the extensive upland areas of this plateau the majority of the cultivated plants are dry crops, and among these the millets (especially *Jowar--Sorghum* species) castor, and cotton appear to be very important; and of these *jowar* and castor occupy pre-eminent positions practically constituting the most important food and money crops of the Deccanese farmer. It may not perhaps be well known to many of us that the acreage under *jowar* in the Hyderabad State, which reaches upto nine million acres, is much more than that of any other single Province or State in India and that the acreage under castor in the Hyderabad State represents more than fifty per cent. of the total area under this crop in the whole of India. Though there are other crops grown in this tract like rice, cotton, fruit trees etc., with their respective insect enemies, the annual toll levied by noxious insects on these two crops—*jowar* and castor—is found to be very substantial; and during years similar to the last (1941) when vagaries of the weather were very conspicuous and the agricultural and local conditions became very abnormal, the loss caused by insects becomes appreciable and often a panic is created.

The Pests. Among the insects associated with *jowar* and castor there are two which are not only of outstanding importance in relation to these two crops but also rank as the two major pests (insect K. Ds.) of cultivated crops in the Deccan. These are, the one known as the Red-Hairy Caterpillar (*Amsacta albistriga*, M.) which feeds practically on all dry crops, and the second the castor semi-looper Caterpillar (*Achoea janata*, L.) a creature which has a special partiality to the castor oil plant and is commonly found



The Red Hairy Caterpillar (Amsacta albistriga M.)

1. Egg masses on wild plant.
2. & 3. Caterpillar young and full grown.
4. Pupa removed from soil.
5. Moth with closed and open wings.

feeding on the foliage of this plant. Though both the insects enjoy a wide distribution all over the greater part of India and, the castor semi-looper a still wider distribution,—having been recorded from almost all parts of the Indo-Ceylonese region,—these two insects are found specially conspicuous in the dry areas of Peninsular India.

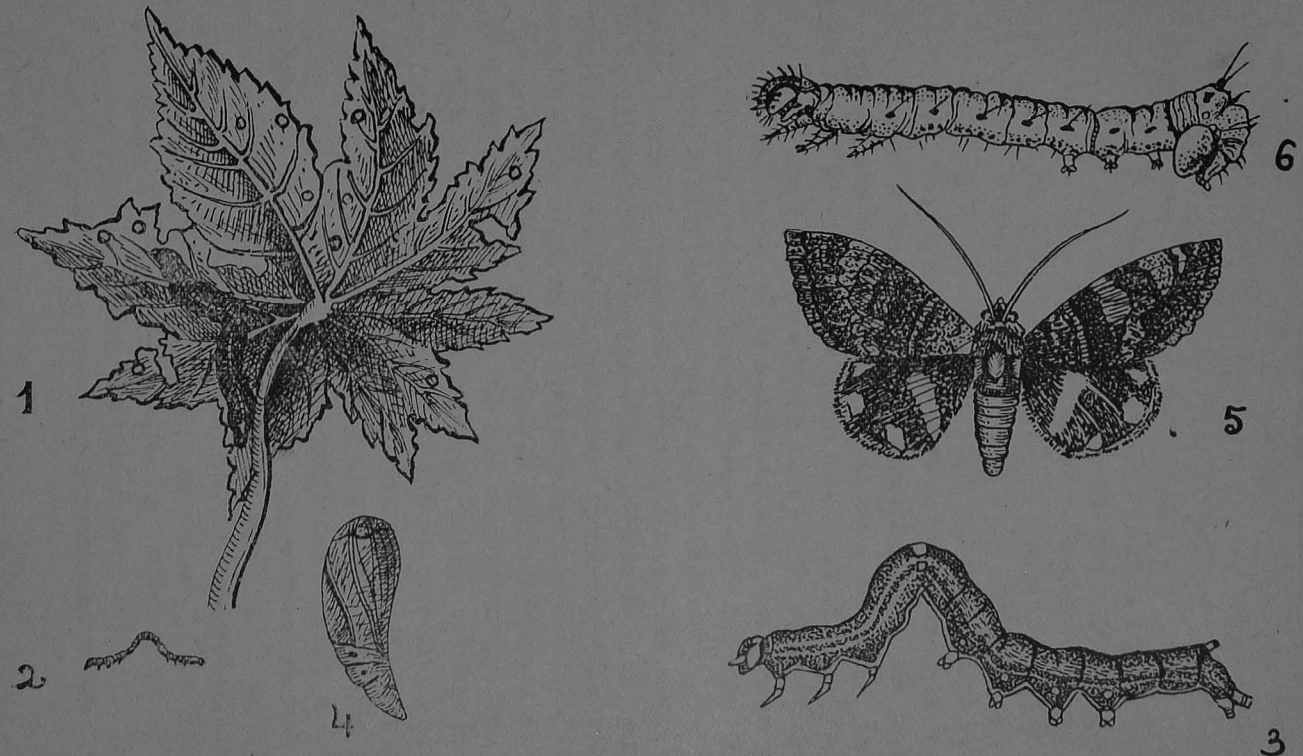
1. **The Red Hairy Caterpillar** (*Amsacta albistriga*, M.). Several species of hairy caterpillars are found all over India but it is found that the more important ones among the economic forms are found to have some localised distribution. The Red Hairy Caterpillar is found all over the Deccanese and Mysore tablelands, and in some dry areas of South India also especially the Coromandel districts, but is not common in Northern India. In the United Provinces, Bengal and Bihar the hairy caterpillar chiefly noted is a different one known as the Bihar hairy caterpillar (*Diacrisia obliqua*, W.); another one which holds its sway over North Bombay, Gujerat and North Indian areas is the one known as *katra* (*Amsacta moorei*, B). Each of these is a very important and serious crop pest in its respective area and causes appreciable damage to different kinds of cultivated crops.

The creature which the Deccanese farmer has to contend against viz., the Red hairy caterpillar, generally makes its appearance almost every year a few days after the first monsoon rains of May—June, and is commonly found on the fields for the next two months. It is found feeding on almost all dry crops and sometimes even on wild plants, if the former are not available in the vicinity. Among crops attacked, it is commonly noted on all kinds of millets, groundnut, gingelly, castor, cotton, red gram and other pulses;—it is practically a polyphagous creature, very few green plants being found escaping its attention. During certain years favourable to the creature, the caterpillar appears in great swarms as a regular plague, and apart from causing a considerable amount of damage to growing crops, it often becomes a regular nuisance in other ways; in rural areas numbers of these creatures in their eager search for food and pupating spots, infest huts and cottages adjacent to fields and come into contact with the bodies of inmates causing severe irritation and itching as a domestic pest; on one occasion a few years ago in South India the insect was found crossing a rail road in such enormous numbers as to stop a moving railway train abruptly. It was found impossible to run the train over the caterpillar-infested rails which became completely covered with the greasy crushed bodies of millions of the creature and the engine wheels could not move properly until after the rails were properly cleaned and made fit for the wheels.

Though to the layman farmer the insect appears all on a sudden as a plague of hairy caterpillars soon after the first monsoon showers, it has its own life history behind it, with the greater part of which most of our farmers are unfortunately unaware. The life cycle of the creature starts from eggs laid in groups on different young plants by the flying parent insect (the female moth) within a week or two after the early monsoon rains and each group contains 200 or more eggs; a single mother moth in captivity has

been found capable of laying as many as 800 to 1,000 eggs. From each of these eggs a small slender hairy worm-like creature hatches out within 4 to 6 days; the young hairy caterpillar which is dark in color feeds on grasses and the foliage of young plants of different kinds, grows in size and gradually gets a reddish brown color. In about a couple of weeks thousands of these caterpillars are found in the crop areas and it is only then that the cultivator first comes to realise the presence of the pest. At this stage the caterpillar is very active, extremely voracious, and in a month's time when it reaches its full growth it measures $1\frac{1}{4}''$ in length. The head is red and the body has a reddish or yellowish brown color with the surface covered with tufts of dark hair. Generally the body has dark bands towards each end of the body but there are variations noted in this coloration. The under surface, the six true legs and the ten false legs are dark in color. At this stage it stops feeding and seeks a favourable spot in the field especially along the sides of field bunds, and there enters the soil three or four inches underground. Under the soil, the caterpillar constructs an earthen cell around itself and enclosing itself by means of a crude cocoon of silk and hair it undergoes a sudden change in shape and enters on the resting or 'samadhi' stage. The changed form of the insect and its general shape and appearance and color resemble date seed. The remaining portion of the insect's life history is a closed book to the ordinary cultivator who naturally thinks that with the disappearance of the caterpillars from the field the pest has become destroyed. In this underground *samadhi* stage which is generally assumed by about August—September the creature remains without food or locomotion throughout the succeeding autumn and winter months—upto the month of May of the following year—8 to 9 months !!—a phenomenon which even some of our educated men often refuse to believe until after actual demonstration. With the first monsoon rains of the following year, from each underground pupa, a flying dark and red spotted active whitish moth (adult insect) emerges out of the soil and this is the adult winged moth we started the story with. There are both males and females among them; the latter, after connection with its partner, starts laying its eggs on the growing crops as stated at the beginning and a fresh cycle of the insect starts. In this way year after year fresh generations of the hairy caterpillar appear and during years favourable to the pest it is noted in unusually large number causing a good deal of trouble to the cultivators.

The Castor Semi-looper *(Achoea Janata* L) – This creature is also a caterpillar, but belongs to a family different from that of the red hairy caterpillar; in general appearance and life habits also it exhibits some marked differences. It is an elongated dark greyish brown,° smooth worm-like creature unlike the medium sized cylindrical, hairy caterpillar. In locomotion also there is marked difference between the two ;— while the hairy caterpillar is an actively moving form the castor insect moves slowly like a lame creature. As regards the fundamental features in development both



The Castor semi-looper (Achoea janata L.)

1. Castor leaf with eggs and caterpillar. 2. Young semi-looper. 3. Full grown Semi-looper.
4. Pupa. 5. Moth. 6 Parasitised semi-looper.

are similar passing through the four stages in their life history—the egg—caterpillar—pupa and the adult moth stage.

The life story of this castor insect begins as a minute spherical beautifully sculptured bluish green egg laid by the mother moth on the tender parts of the castor plant generally on the under surface of small tender leaves. The moth does not lay the eggs in batches like *Amsacta:* each egg is deposited separately in convenient spots, and in this way one moth has been noted to lay from thirty to hundred eggs. After an incubation period of nearly a week, from each egg a small very slender dark brown caterpillar emerges. Like the hairy caterpillar this creature also gradually grows in size, by feeding on the foliage of the castor plant, and when about to enter the pupa stage it measures about 2 to $2\frac{1}{2}$ inches in length. It is elongate, with the body surface smooth and having an ashy grey brown color with faint lateral stripes in some cases. On the upper surface of the tail end there are two small tubercular projections also. The body has a central dorsal hump, showing two pairs of pale tubercles. During locomotion as stated above the insect makes a half loop of the body as it moves, showing the central hump like a hunch back! This characteristic method of locomotion has earned for the creature the name 'semilooper'; we find other caterpillars also of this kind on different plants and even those which make full loops of their body during locomotion and which are popularly known as 'loopers' or measuring worms. This peculiar bending posture during locomotion with the curious whitish spots on its head, recalling the caste marks of orthodox Hindus has gained for the insect the rather appropriate name of *Dasari purugu* (a devotee worm) from the castor cultivators of the Deccan. After reaching this full-fed condition in about two weeks the caterpillar either goes down into the soil near about the food plant or encloses itself in the fold of a leaf and changes into the pupa stage covered over by a flimsy silken cocoon. The fairly stout pupa has a greyish brown color and is about $\frac{3}{4}$" to 1" long. Unlike that of the hairy caterpillar *(Amsacta)* the pupa *(the samadhi)* stage in this case does not last for a period more than 10—15 days; at the end of this period, from each coccon a stout dark greyish flying moth emerges and a fresh generation of the insect starts within a week's time. Since the pupal period in this case is very short the insect is able to pass through four generations during each castor season, from July—August to February—March. From these facts we can easily get some idea as to how, under favourable conditions and with such powers of rapid multiplication the insect could appear in its thousands, cause severe damage to the crop and bring about very substantial loss to the cultivators.

Remedial measures. The extraordinary numerical strength of their progeny and their remarkable powers of rapid multiplication under favourable conditions and especially the fact that these two pests appear at a time when the crops are all in their young and tender stages and liable to suffer serious damage, go to make these two insects extremely serious pests.

To control these two pests a knowledge on the part of the cultivators of the fundamental points in their life histories will be of the greatest help in taking proper measures to nip the pests in the bud. The most important points to note are the time of the year when these appear as pests and a familiarity with their different stages—especially in the case of the hairy caterpillar. With this knowledge preventive measures can be adopted at the proper time and a good deal of trouble and money saved.

In the case of the hairy caterpillar some of the features in its life habits offer facilities for dealing with it successfully in different ways. Though it is in the caterpillar stage that the insect actually causes damage to the crops, tackling the pest when it has already appeared on the crop on a large scale will be found rather a very difficult task. On the other hand the collection of the adult moths soon after their emergence from the soil after the first rains of May—June will be found very practicable and extremely economic. The black and red spotted whitish moths which are the adults of the caterpillar and which generally emerge in the evenings after the first monsoon rains are very conspicuous, harmless and very slow moving creatures; as such boys and girls could easily pick and destroy hundreds of them. When it is realised that one single moth can lay from six to eight hundred eggs, and the collection and destruction of a hundred female moths would be equal to the destruction of nearly a lakh of caterpillars, the value of this method can easily be appreciated. The intelligent cultivators of a tract who realise this, can employ even for small presents or cash little boys and girls to do this work and save the crops from a future outbreak of hairy caterpillars in their area. In the same way cultivators familiar with the pupal stage of this insect and the usual places in the fields where they are generally found underground, can also dig out from the soil hundreds of these reddish brown date-seed like pupae early in summer before the moths emerge out of them after the rains in May—June, thus preventing the emergence of moths. These two methods are the most practicable and extremely cheap ones. In addition to the collection of moths and the pupae, the former can also be attracted to light traps, because most of the hairy caterpillar moths show a tendency to come to lights in numbers after dusk. These traps should be set up sufficiently early to trap moths before they lay their eggs. Insecticidal methods against the hairy caterpillar have not been found successful nor are they practicable under our Indian conditions. If these preventive measures are missed at the proper time the cultivator can also attempt collecting and destroying the egg-masses but this may not give sufficiently successful results since the moths lay eggs in all kinds of plants and often even on inanimate objects. But when once the eggs have hatched and the caterpillars have started moving about in their hundreds, control measures become very difficult and do not prove very successful though mechanical methods of beating the creatures to death or making trenches to prevent the progress of the swarms may help a little.

In the case of the castor semi-looper, however, the feasible methods of control are rather different in view of the somewhat different habits of that creature. The adult moths with their protective dark brown color are very difficult to be observed in the fields and are not slow moving or have the habit of emerging at dusk in numbers like the hairy caterpillar moth. The only feasible method which can be adopted in the case of this insect with some good effect is the tackling of the caterpillar stage alone, especially during the younger stage and early in the season before the insect passes through its first generation and multiplies in numbers. Two methods can be adopted in this direction. The most effective and practically inexpensive one is that of hand-picking the caterpillars from the young castor plants and destroying them by dropping them into kerosenated water. Little boys and girls of the villages can be easily taught how to do this and in the long run the castor cultivator's own family folk can resort to this method and easily check the pest practically without any cost. The semi-looper, unlike the hairy caterpillar, is slow moving, quite smooth to the touch and absolutely harmless, and can therefore be safely collected with the hand by little children. The alternate method is to kill the caterpillars by the application of an insecticide, the usual stuff used against leaf-eating forms being an arsenic compound—generally lead arsenate. This stuff is mixed with water and the solution sprayed on the infested plants. The insecticide can also be applied in the form of a dust over the plants by means of dusters or rough hand bags. It might, however, be added that the application of an insecticide, while certainly effective under normal conditions, has unfortunately some defects which go against its recommendation in all cases—especially to our poor and illiterate cultivators. These are (1) the cost of insecticide application comes to about Rs. 2 or 3 per acre varying with the cost of the stuff, transport charges and the upkeep of spraying machines without adding the cost or hire for the latter. (2) A shower of rain soon after the application of the insecticide completely washes away the poison from the plants and makes the application wholly ineffective. (3) The insecticide usually used is a deadly poison to both human beings and domestic animals and has, therefore, to be handled with very great care to avoid risks of poisoning especially among illiterate farmers. It is very unsafe in the hands of our ryots at least for some decades to come. Nor is it now-a-days possible to easily get the necessary insecticides and spraying machines, especially the latter which are not easily available in India. Comparing these two methods of control any one can easily be convinced how practicable, cheap and effective the simple mechanical method of hand-picking is compared to the costly, tedious and often risky method of using an insecticide. Unfortunately, our cultivators are carried away more by external shows and applications of drugs than by simple and cheap methods, which are, however, not showy.

In this connection it may be interesting to note that the Agricultural Department of H. E. H. the Nizam's Government has been paying some special attention to these two pests for some years in the past in the way of

propaganda, demonstration and substantial help to cultivators by making cultivators of the pest infested areas fairly familiar with these two pests, and also the methods, but unfortunately, as is the case everywhere in India, the average farmer is indifferent to these advices and suggestions, and makes a hue and cry when the pests appear in serious proportions and when it becomes too late to carry out any cheap and effective control measures. This last season (1941) the Government arranged to give special help to the castor farmers to control the semi-looper which had appeared as a serious pest due to abnormal climatic conditions in the important castor areas of the Dominions. The measures suggested were chiefly hand-picking of the worms by village children for small rewards and spraying wherever it was found necessary and feasible under the supervision of trained hands.

It may be added that, in course of time, as further intensive studies which are intended to be carried on in connection with these two important pests progress, other methods of tackling the pests more successfully may be evolved—especially methods of biological control which are now-a-days being tried in various parts of the world against different crop pests which defy the ordinary methods usually adopted.

In conclusion, it may be remarked with some strong emphasis that in the case of both these pests, however, the control measures suggested will prove extremely effective, and quite satisfactory only when there is sufficient co-operation between all the adjacent farmers of any infested area, and the work is carried on at the proper time by all the cultivators in harmony. Meantime, of course, it is the duty of the entomologist and the agricultural propagandist to properly educate his clientele and bring home to them both by preaching and demonstration the salient facts in the life stages of these creatures and the proper time and methods to control them effectively and economically. In course of time, if they succeed in these attempts and the cultivator realises and enjoys the results of these methods, apart from the gratitude they earn from him, they have the satisfaction that they have done their duty and added their quota to diminish the miseries of the poor Indian farmer.

SELECTED ARTICLES

Rural Reconstruction in Madras.

The pivot of rural reconstruction work in this Province is the Collector. Collectors of districts convene periodical conferences of district officers and members of the legislature resident in the district once a quarter to consider proposals for the utilization of the Government of India grant and to discuss matters pertaining to the administration of the district. The planning of rural improvements best suited to the needs of the district is the duty of the conference. The agencies to carry out the improvements are the Revenue, Irrigation, Co-operative, Forest, Agricultural and Veterinary Departments, whose activities are controlled and co-ordinated by the Collector.

The Government of India grant is utilized on the following objects:

(1) Improvement of rural water supply including bore-wells;

(2) Improvement of rural sanitation ;

(3) Improvement of village communications including the bridging of irrigation canals and channels at places where they are needed ;

(4) Encouragement and development of co-operative loan and sale societies by giving partial grants for the construction of godowns (with or without village halls-*cum*-reading rooms) and in specially deserving cases grants towards the cost of the staff required to run the societies for the first few years;

(5) Formation and encouragement of co-operative societies for consolidation of holdings ; and

(6) Improvement of livestock.

An experimental scheme of intensive rural health work in a group of 25 villages round about Poonamalle was started in October 1935, financed partly by the Government of India and partly by the Rockefeller Foundation. The subvention from the Foundation was withdrawn at the end of five years and the scheme is now run entirely with the aid of the Government of India grant. The object of the scheme is to educate the *ryots* in the art of healthy living. to teach them that disease is preventible and, in a word, to make them "health-conscious". The health unit is in charge of every aspect of public health in the area, including vaccination, vital statistics, health education, maternity and child welfare and sanitation including water supply.

Prohibition has been introduced in the districts of Salem, Chittoor, Cuddapah and North Arcot. In these districts the organization of sports and amusements as a counter-attraction to drink has been combined with a rural uplift drive. Rural uplift schools have been held to train rural uplift workers, or village guides and physical instructors have been appointed to control and co-ordinate the activities of these guides. Special Development Officers have also been appointed for tackling more effectively the social and economic problems that have arisen in these districts as a result of the abolition of drink and for building up of a programme of life for the villagers, which is both utilitarian and attractive.

Rural indebtedness. The Madras Agriculturists Relief Act, 1938, which came into force on 22nd March 1938, provides for relief of indebtedness among agriculturists. To enable them to have their debts scaled down under this Act without the trouble and expense involved in going to civil courts, the Government have established under the Madras Debt Conciliation Act, 1936, 92 debt conciliation boards generally at the rate of one for each revenue division.

In order to afford sufficient credit to agriculturists after the passing of the Madras Agriculturists Relief Act, the Government have removed the ban on the registration of a large number of societies. The number of societies registered in 1939—40 was 932 against 828 in 1938—39 and 446 in 1937—38.

The Government have introduced a comprehensive scheme of rural water supply with a view to making pure drinking water available to the people in every village in this province.

In 1924, the Government inaugurated a scheme for opening subsidized rural dispensaries with a view to bringing medical relief within easy reach of the rural population. Under the scheme qualified practitioners of western and Indian systems of medicine are given small subsidies as an inducement to settle down in selected villages and set up private practice. The liability of the Government on account of the scheme is restricted to the payment of subsidy for the medical practitioner and midwife. The cost of medicines and other contingent charges are met by the local boards concerned. The grant of subsidy

is subject to the condition that the medical practitioner should treat the necessitous poor free. The practitioner is at liberty to accept such fees for medical attendance and medical treatment as he can get from well-to-do patients. Some of the rural dispensaries are maintained entirely from the funds of local boards. The number of rural dispensaries working at the end of 1940 was ; 89 maintained entirely by the local boards and 435 subsidized by Government. The Madras Public Health Act, 1939, is a very important measure and the first of its kind in India. Though the Act provides for the advancement of public health in the whole of this province, it will be particularly helpful in improving public health in rural areas. Organized propaganda undertaken in collaboration with private and public effort with a view to giving publicity to the Act and its provisions is expected to have far-reaching results.

Village communications. The Government have ordered the preparation by each district board of a well-defined five-year programme for the improvement of village communications in its area. Programmes from 21 district boards have already been received and approved. These programmes will ensure an orderly development of village roads and thereby lead to an improvement in the economic condition of the villagers.

A seven-year programme of road development estimated to cost Rs. 118·61 lakhs has been prepared. It consists of the more urgent and important schemes included in Mr. Vipan's scheme of road development which was estimated to cost Rs. 6·12 crores. The seven-year programme is to be financed mainly from the subventions received by this Government from the Central Road Development Fund. The sanction of the Government of India has been obtained for the execution of most of the schemes included in the programme.

Two supplementary programmes of road development, one costing about Rs. 35 lakhs and the other about Rs. 65 lakhs, have also been prepared. They are also to be financed mainly from this Government's share of the Central Road Fund.

Relief of Unemployment. With a view to providing relief of unemployment among the agricultural and labouring classes in areas affected by adverse seasonal conditions, the Government have issued instructions to the district boards exhorting them to undertake road works of permanent utility in the localities affected and to utilize their railway cess accumulations and general funds for the purpose. In cases where district boards are not able to take up such relief works without financial assistance, the Government give grants to the extent they consider necessary.

All local bodies have been requested while sanctioning works or when selecting for execution out of several sanctioned schemes to give preference to buildings, roads, bridges and other works which lie in areas affected by the failure of rain, so as to provide employment for labourers in those places. They have also been informed that when any work can be carried out by manual labour as well as by mechanical appliances which may displace manual labour, the object of providing (as far as possible and without detriment to the proper execution of the work) employment for manual labourers should be kept in view.

To improve the moral condition and the material prosperity of the people, the Madras Prohibition Act, 1937, has been enacted. The Act aims at the prohibition, except for medicinal, scientific, industrial or such like purposes of the production, manufacture, possession, export, import, transport, purchase, sale and consumption of intoxicating liquors and drugs in the province of Madras. The Act has been in force in the Salem district from 1st October 1937, in the Chittoor and Cuddapah districts from 1st October 1938, and in the North Arcot district from 1st October 1939.

The seasonal conditions during the current Fasli 1351 (1941—42) have not been very favourable and some distress has been reported in the districts of Bellary, Kurnool, Kistna and West Godavari.

The Collectors of all East Coast Districts have been asked to get into touch with local boards and to undertake road works to provide employment where necessary. Road works have already been opened in the Kistna district, and at the request of the Collector of Kurnool the Government have permitted the district board, Kurnool, to utilize a sum of Rs. 3 lakhs from the Railway Cess Fund for expenditure on the construction of 13 road works in the Kurnool district. Similar permission for the utilization of the railway cess amounts has been accorded in the case of the Kistna and West Godavari districts also.

Ten more road works have also been undertaken in the Kurnool district to provide employment for unskilled labourers. The District Board has been asked to meet the expenditure from the additional toll compensation sanctioned to it. In the Bellary district two test works were opened under the Famine Code in the middle of January and converted into relief works at the beginning of February. A third test work was opened at the beginning of February. Grain depots have been opened in the affected areas of the Kistna district.

Distress has also been reported in a number of districts among weavers due to fluctuations in the price of yarn and loss of markets and lack of shipping facilities. The Government of India have proposed a scheme for control of yarn distribution to stabilize prices. The Madras Government are examining it in consultation with Collectors. The Government have also opened weavers' relief centres in the Salem district and have sanctioned gratuitous relief to the unemployed weavers of Chingleput, Tinnevelly and North Arcot districts pending organization of the other relief measures. The Government are also examining the possibility of turning weavers of *lungis* whose markets have been affected by the War to production of other kinds of cloth for the Supply Department or for the local markets. The Government are closely watching the position of weavers in all districts and the Collectors have been instructed to consider departmental purchase of yarn and the formation of co-operative societies wherever possible.

Relief of indebtedness. Special provision has been made in the budget each year from 1938—39 onwards for the grant of loans to agriculturists for the relief of indebtedness. Special rules were framed with reference to the provision of the Madras Agriculturists Relief Act, 1938, to regulate the grant of these loans and came into force on 1st October 1938.

The following are some of the special conditions applicable to the grant of these loans:

1. Only agriculturists as defined in the Madras Agriculturists Relief Act, 1938, who own lands or the occupancy right in lands, the value of which, free of encumbrances does not exceed Rs. 5,000, are eligible for loans under the scheme.

2. Loans are granted only on the security of immovable property belonging to the applicant and to discharge either the entire debts of the applicant, or for a portion of the debts of the applicant, in cases in which the discharge of such portion of the debts would cancel the total encumbrance of a definite part of his property.

3 In all cases, loans are granted only where the scaled down debt to be so discharged does not exceed Rs. 2,000 or fall below Rs. 100.

The rate of interest charged on such loans is the same as that charged on ordinary *taccavi* loans which is at present 6 per cent. The loans are repayable

in equal annual instalments discharging both principal and interest. The first instalment is payable not later than twelve months from the date of disbursement of the loan. The loan should be repaid in not more than 20 instalments ordinarily or 30 in special cases, the number of instalments being fixed in each case by the Loans Officer with regard to the repaying capacity of the borrower.

The scheme has not been as successful as it was hoped it would be. The Government are examining suggestions to make it more popular and more useful to the agriculturists. (*Indian Farming* Vol. III, No. 4, April, 1942 pp. 201—204).

Sense and Statistics.

In a delightful essay called 'Asking Questions', George A. Birmingham describes a case in which the Education Office wanted to know the measurements of a school room. After Birmingham had answered this same query for two successive years he became annoyed, and when the query came the third year he doubled the dimensions previously given. The next year he repeated the process. In the course of five or six years the school room grew larger than St. Paul's. Then he suddenly reduced the dimensions to less than those of a sentry box. No comment was made. If statistics had been compiled from figures including these returns, the result would have been grotesque.

We may take it that before embarking on statistical analysis we must be sure that our data are reliable. In agricultural field experiment work it ought to be possible to get true data, so far as accurate weighments of the yield of known areas are concerned. However, it is not possible to supervise everything, and a rigid scrutiny of actual figures is essential. There is the human element of recording, and the recorder, while stifling a yawn in the middle of a hot afternoon, may accidentally alter a digit that will upset the final results as much as Birmingham's deliberate leg-pulling.

But an experiment must also be such that a real result can be got from it. Here commonsense is of as much importance as statistical knowledge. Statistics are no mystery, no magic wand or machine for turning out fool-proof conclusions from any sort of data. They can only be used if some commonsense has been employed in the plan of the experiment, which is a question asked of Nature. If one asks frivolus questions of Nature she is apt to answer the fool according to his folly.

Are such questions asked? In H. G. Wells' delightful book, *Men like Gods*, the professor mentioned in the opening chapter is dealing with the problem of *The Diurnal Variations in the Butting Frequency of the Young Bull Calf*: To see that this is not very far over-drawn one may study the subjects of some of the M. Sc. theses listed by Flexner in his book *Universities, American, British and German*. Moreover, one often comes across ponderous essays with pages of statistics on matters that are plain enough without statistics or not worth wasting statistics on. The author has seen the correlation between the number of seeds in a certain kind of fruit and the size of that fruit worked out to the fourth decimal place. The question was supremely unimportant, but the fourth decimal place seemed so exact!

This really brings us to the heart of the matter. Before launching out on an experiment which is to be statistically interpreted we should ask ourselves the questions.

1. Is the knowledge we propose to acquire really worthwhile ?

2. Are the methods we propose to use such as to give figures that can be statistically interpreted ?

And if we have answered these questions in the affirmative, there is another question that we had better ask ourselves :

3. Do we understand the limitations of the *merely statistical* interpretation of such figures as we propose to produce? For the elucidation of this last question we cannot do better than quote from the first edition of that helpful book *The Principles and Practice of Field Experiment* by Engledow and Yule. The passages are as follows :

" A firm agricultural reservation must always be attached to yield trial results. The results of any trial are valid only for the precise cultural, soil and climatic conditions of the trial. And small yield difference, though statistically significant, have not necessarily an agricultural importance ".

'Judgment of all the characteristics of a variety involves close acquaintanceship with it. For this, study must be made at every stage of growth. Trials that consist simply of sowing, harvesting, and calculating are, as a rule, sadly imperfect .'

The important point is that in any field experiment the worker must know his crop and must watch it throughout its whole growth carefully, lovingly, and with a notebook that will contain a picture of its vicissitudes. The writer has seen field books that contained nothing but the date of sowing, the date of germination, a few vague remarks such as 'Crop in good condition', and then the weighment. What a poor record! If there has been the right watching in recording, the results that will appear in the statistics can almost be prophesied. Moreover, priceless information will have been obtained as to the reaction of the crop to sun and shower, heat and cold, interculture, insects and a host of other influences.

So far as plant-breeding is concerned, no amount of statistics will replace what, for want of a better term, we may call the Luther Burbank touch, i. e. the ability to spot a winner, to choose from an original field of unselected crop, or from an early generation of a hybrid the one plant that will be the ancestor of a new and valuable race. This flair is more likely to be found in the naturalist type than in the mathematical type of individual.

The writer has no desire to 'debunk' statistics. They have their worth. But they are not a substitute for plant-breeding ability, nor for commonsense. In fact they will have no meaning, unless a definite object—*raison d' etre* of an investigation—has determined the scope and nature of their compilation. So far as the statistics of agricultural field experiments are concerned, they offer us :

1. A guide to so designing experiments that chance meets chance and *as far as possible* cancels out environmental effects (but the environment may be very varied, and accidents to individual plots considerable, and then we are bound to get a result which is not generally valid).

2. A mathematical routine for dealing with the figure produced by an experiment. This routine is a tool, a technique the best available for the moment, and should be so used and understood, and not handled like a sacrament.

(*Indian Farming* Vol. III, No. 2 February 1942, pp. 59—60).

ABSTRACTS

The Royal Agricultural and Horticultural Society of India. Percy-Lancaster, S. *Indian Farming*, Vol. 2 (1941): 188--191.

There are not many institutions in this country that can look back to a century or more of service. To Rev. Dr. Carey the society owes its origin. It was first named "The Agricultural Society". The addition of the name "Horticultural" took place shortly after the founding of the society. The objects of the society were the promotion and improvement of agriculture and horticulture in all its branches in India and the Rev. Dr. Carey hoped that by pooling their information and experience, every individual would be in possession of the sum total of knowledge thus acquired.

The society's first gardens were started at Alipur, the spade work in agriculture was certainly done by the society. Rev. Carey found that the cereals, the vegetables and fruits of the country were of very poor quality, and immediately interested members in his scheme to import seeds from all parts of the world for free distribution. The following deserve mention--sugarcane from Mauritius and other sources, cotton from America, West coast of Africa, China, Manila etc. Patna cauliflower is the result of seed which the society obtained from the Cape of Good Hope and passed on to local cultivators and the famous Naini Tal and Shillong potatoes owe their origin to imported English strains. Fibres, tans, dyes, oils, fats, etc. were all items that the society took up; various fodder crops such as Guinea grass, reana and lucerne first reached the Indian shores through the society. Where the society did not actually introduce certain products it can claim to have brought them very prominently to the notice of the Government and cinchona is one such. In 1821 the society issued a questionnaire to members of the society and other-keen gardeners in India on matters connected with soil, climatic conditions, crops, etc., and the replies were published in the transactions of the society. Improvement was maintained by the award of gold medals and prizes for the introduction or improvement of coffee, cotton, fruits, etc. Essays were called for on many agricultural subjects and handsome premia awarded to the writers of the selected ones. Exhibitions were of annual occurrence and generous prizes both in cash and medals offered for competition. For the first 20 years of its existence members only received the Transactions and Journals of the society telling of the experimental work carried out, and it was not till 1840 that a direct return on their money was given in the way of a packet of seeds and a few plants. These privileges have since been extended till at the present time the society is one of the few institutions in the world unsupported by Government aid, providing generous advantages in seeds, plants and literature. Keen members started branches of the society all over the country; in 1835 in Lucknow followed soon afterwards by those in western India, Madras and Dinapore, Bangalore, Hooghly, Meerut and as far a field as Singapore. In its early years the society practically did the work of the Agricultural Department but this had to be given up as the society lacked staff and fund for this purpose. No monetary assistance is received from the Government, or any other public body and the membership subscriptions and sales to the public helps the society to keep it going. The Marquis and Marchioness of Hastings were the first patrons of the Society and since then several Viceroys have been successive patrons. There are over a thousand members. Since the great war and the altered conditions of life, the society has introduced a B class membership with a lower subscription and carrying fewer privileges to suit people who have small income. The society maintains a Free Enquiry bureau on matters connected with horticulture. A valuable library of over 2,000 volumes dealing with

agri-horticulture in all its branches is open to members for consultation. Many of the books are out of print. The Dictionary of Economic Products of India contains copious extracts from the society's journals and proceedings. Grape fruit from Florida, pomelos from Java and seedless *lichi* from China have been lately introduced by the society. By the introduction of a number of new flowering trees, shrubs and climbers it has helped to make India beautiful. Much good work has been done on the horticultural side and the improved types of Canna, *Cooperanthes Hibiscus*, Ixora to name a few which have emanated from the society are world famous. In 1935 His late Majesty King George V graciously granted the Society the privilege of using the title "The Royal" in recognition of its long and useful work. —*Editor.*

Digestibility of coconut oil. Recent work on the rate of digestion of fats (*Biochem. Jour.* 1938, 32, 462), seems to favour coconut oil in this respect. The rate of digestion of various fats by pancreatic lipase was measured, the fat being prepared in the form of 'reconstituted cream' so that the fat was in the form of minute globules and the conditions comparable with those of actual digestion in the organism. The results are of particular interest and some of the conclusions worth quoting *in extenso* :—

Coconut oil was digested more rapidly than any other fat including butter. Almond oil, cocoa butter, groundnut oil, bacon fat, beef fat, oleostearine, cod liver oil, cotton seed oil, lard, mutton fat, olive oil, soya bean oil, hardened whale oil and hardened groundnut oil were disgested at a much slower rate than butter and all at approximately the same rate.

It seems possible that if margarine contain this fat (coconut oil) it may be more rapidly digested than butter. Coconut oil may prove a more valuable food than has hitherto been supposed '. (*Trop. Agriculture*, 17 (1940) 60).

EXTRACT

Artificial Synthesis of Wheat. By combining two dissimilar relatives of wheat, E. J. Britten and W. P. Thompson, of the University of Saskatchewan, have obtained a 'synthetic' hybrid plant closely resembling the common cultivated species (*Triticum vulgare*) (*Science*, May 16). Ordinary cultivated wheat has forty-two chromosomes. It is commonly believed that it originated as a natural hybrid between two other species with lower chromosome numbers. To test this theory, Dr. Britten and Prof. Thompson hybridized a fourteen-chromosome species of wheat (emmer, *Triticum vulgare*) with a wheat-like grass (*Aegilops speltoidei*) with only seven chromosomes. This hybrid plant had twenty-one chromosomes, but was completely sterile. The authors then treated the hybrid intensively with a solution of colchicine, making daily injections with a hypodermic needle. This eventually resulted in the formation of heads of grain that had the chromosome number of cultivated wheat (forty-two) and were fully fertile. In external characters also, the artificially produced plants showed considerable resemblance to ordinary wheat. (*Nature*, July 26, 1941, page 116.)

Gleanings.

Methods to combat ants. As is usual during the summer season, the Division of Entomology, Science Service, Dominion Department of Agriculture, is receiving many enquiries dealing with ants and their control. Some of these enquiries concern ants which invade kitchens and pantries in search of food; others refer to species which nest in and cause injury to lawns; still others relate to ants which cause damage to woodwork.

Ants will feed on many kinds of foodstuffs, but are particularly fond of sweet and fatty substances, and will quickly find their way into homes where their favourite foods are left exposed. One common and troublesome species, a tiny reddish ant known as Pharaoh's ant, frequently establishes its nests indoors, between the walls or in other secluded places where it is difficult to find.

The common large black carpenter ant, although normally an outdoor species nesting principally in decaying wood, frequently occurs in dwellings, particularly frame houses and summer cottages, and may cause injury to woodwork as well as annoyance by its presence. The work of these carpenter ants is often mistaken for termite damage. Termites cause serious losses farther south; but in Canada they have been found only in a few localities, notably in British Columbia, and, so far, they are of no importance in this country.

In addition to the ants mentioned there are several common species which make their nests in lawns and gardens. These, too, often enter houses in search of food.

To discourage ants from invading dwellings it is important not to leave attractive food materials exposed. Shelves, tables and floors, especially in dining rooms, kitchens and pantries should be kept clean and as free as possible of crumbs and other food fragments.

One of the most effective insecticides to control ants is sodium fluoride which may be purchased from druggists or seed merchants in the form of a fine white powder. This powder should be scattered or dusted in places frequented by the ants and left undisturbed until the insects have disappeared. As sodium-fluoride is a poison, care should be taken to prevent children or pets from having access to it, and it should not be put near foodstuffs.

A safer material which has been used recently with success is powdered Derris. This is made from the ground roots of certain tropical plants and contains a very potent insecticide known as rotenone. Derris is comparatively harmless to humans and may be dusted around wherever the ants occur. It is reported to destroy ants in nests outdoors as well as indoors.

A poisoned bait trap which has given good results, especially against the tiny red Pharaoh's ant, may be made by taking a small tin can with a tight lid, punching several holes in the sides and top and introducing a small piece of sponge and a small quantity of a syrup prepared by mixing one gram of sodium arsenite, 8 oz. of sugar and ½ oz. of honey in one pint of hot water. The worker ants are greatly attracted to the bait, and take it to their nests to feed the larvae and queens. Thus whole colonies are destroyed.

Whole ant colonies in the garden or lawn may be destroyed by puncturing holes in the ground and pouring in several tablespoonfuls of carbon bisulphide. Heavy gas is given off by this liquid and its effect may be enhanced by covering the nest with an old coat or sacking. Care should be taken not to expose carbon bisulphide near fire as it is very inflammable.

Calcium cyanide dust is frequently used for destroying ant colonies. Holes are punched in the nest several inches apart to a depth of about six inches; a teaspoonful of the dust is poured into each, and the holes are plugged with soil, and the nest covered with bags or similar material to retain the gas. The cyanide should not be allowed to come into contact with the grass as it may burn it. The quantity to use depends on the size of the nest. Calcium cyanide is extremely poisonous and should be handled with great care.

Small nests may be treated by injecting into them a small quantity of fly spray. Derris powder when scattered on the nests is also reported to be effective. —*Press Note, Dominion Department of Agriculture, Canada.* (*Indian Farming.* Vol. III, No. 3, March 1942, pp. 161 and 162).

Research Notes.

Eichhornia crassipes Solms—The Water Hyacinth. This year there was a luxuriant growth of Water Hyacinth covering an area of nearly half a square mile in the Vaalaamkulam tank on the south-eastern side of the Coimbatore town. This luxuriant growth was due to the municipal sewage water which is being emptied into this part of the tank where the plant is growing. As the summer is advancing now, the water in the tank is receding, leaving behind a large number of these plants. Cattle that passed by picked up these plants which formed a good fodder. Seeing this cattle owners are now removing the leaves of this plant with the petioles for feeding their milch cows with good result. In other places, where this plant is available its usefulness as fodder for cattle may be tried.

Agri. Res. Ins.
11—4—42.

K. Cherian Jacob.

Press Notes.

A note on Agricultural Associations, formation, working, etc. It was found that the improved methods of Agriculture advocated by the Department have not been spreading rapidly in the ryots' holdings for the reason that the demonstrator has not been able to meet a large number of ryots during the short period he stays in a village. Without free exchange of ideas and understanding of one another and without practical demonstration of improved methods and use of improved seed, implements and manures, it was found difficult to effect improvements over the age-long practices adopted by the ryots. So it was considered desirable to form Agricultural Associations in the villages particularly in the centres of work of the taluk demonstrator so that the educated and the forward members of the Agricultural classes may sit together with the demonstrator, explain their situation, hear what the demonstrator has to say, give a trial to his proposals at least on a small scale if they have a doubt, gain experience and then take up the useful ones. The demonstrator does these trials more or less at the expense of Government in the holdings of ryots, gains experience of the useful things, finds out the opinion of the ryots, prepares a programme of work to be conducted in a particular centre, entrusts certain works to each of the members for demonstration, holds meetings of ryots now and then so that the members of the Agricultural Association may give their opinion about the improved methods, seeds, etc., and then arranges for their introduction on a mass scale. Agriculturists of all communities, rich or poor, can become members of the Association. They need not pay any subscription. But the members have a moral binding, namely, that they should work the trial and demonstration plots carefully and get the results for their benefit and for the benefit of others. The requirements of the ryots—seeds, implements, etc., and the grievances connected with their industry will all be taken up at the meeting time and the resolutions passed will be communicated by the demonstrator to the District Agricultural Officer who will arrange for the supply of the required things or takes them to the notice of other departmental officers for necessary action either in person or through periodical conferences held by the District Collector. The demonstrator arranges for the issue of loans to the poor ryots who are willing to go in for improved seeds ploughs, etc. This and all other arrangements will be discussed with the members of the Association at the meeting time, the whole transaction being recorded. The demonstrator holds meetings as often as possible. It is therefore in the interest of the ryot to join the Agricultural Association, attend meetings without fail and take part in its proceedings, because he gains knowledge, gets the benefit of improvements and on the top of all this stands a pioneer

in his industry, without the least chance of spending or losing money as is mostly the case in the present day local politics. When a certain number of ryots who are members of the Agricultural Association adopt improved methods, other ryots in the village follow their example and have the benefit of improvements, Thus there is scope for rapid expansion of agricultural improvements and larger production of foods and other materials.

Supply of food crops in the Madras Presidency. In my previous talks over the Radio, I have already explained to you methods of increasing the production of food crops and how to manure your lands to get a higher yield. I will now explain to you whether the present production of food crops in this province is sufficient to meet the demand and if not how to increase our production.

Rice, millets, pulses, groundnut, etc., are the chief crops grown in our presidency. The production of these crops is not equal to consumption. Before the outbreak of the present war we were importing rice from Burma, Thailand and Cochin-China and millets from Hyderabad, Central and United provinces. Since the spreading of the war into Burmah, the import of rice from other countries was affected. Unless we increase our production by any means to the extent we were importing from other countries our people will have to suffer. Therefore, Government have already taken up necessary steps to increase the production of food crops. Further proposals are also under consideration. Food crops are grown in an area of 2 crores and 75 lakhs of acres in our province. Of this area, rice is grown in over a crore of acres. Still, our production is not sufficient to meet our demand. About 50 lakhs of tons of rice are produced per annum, provided the seasonal conditions are favourable, there are timely rains and the crops do not fail. This quantity was more or less sufficient for our demand. When the average production for the past six or seven years is taken into consideration, it is seen that our rice production was not very much above 47—48 lakhs of tons, due to adverse seasonal conditions, untimely rains and failure of monsoon. That is to say, we were so long importing 2—3 lakhs of tons from other countries.

Not only this. Rice produced in Cochin and Travancore states is not sufficient to meet the demand of their people. They were, therefore, importing a portion from our province and a major portion from Burmah and other countries. The Ceylonese also were purchasing over a lakh of tons of rice from our province every year. Like us, they too cannot get rice from other countries. Hence, the people in Cochin, Travancore and Ceylon are now depending on us for at least the quantity they were importing from our province. We were, so far, exporting 3½ lakhs of tons of rice to these states. That is to say, we are to produce 56 lakhs of tons of rice if we are to meet our own demand and demands of states like Cochin, Travancore, etc. Of course this depends on seasonal conditions and timely rains. We should, therefore, increase our production by 8 lakhs of tons over the quantity produced during the past six or seven years.

You may ask whether it is possible to increase our production to such an extent. If only we co-operate with each other and make an effort it is not at all impossible. Since the outbreak of the war, Government have been taking interest in the increase of production of food crops. Consequently the production has increased by 5—6 lakhs of tons during the past two years. It will not, therefore, be a surprise if the production is further increased by 5—6 lakhs in the same manner. But the co-operation of the ryot is essential for this. Otherwise nothing tangible can be done.

What are the ways and means to increase the production of food crops? First there are cultivable lands lying waste here and there for some reason or other. Such lands should be immediately brought under cultivation by any

means. Secondly the area of wet lands should be increased by improving water facilities required for paddy cultivation. Government are taking necessary action in the matter. Thirdly the growing of commercial crops like sugarcane should be reduced. Fourthly improved strains of paddy capable of higher yields should be used. Lastly manure should be applied according to the requirements of the crop. By the above means we can certainly increase our production to meet our demand.

Some of the lands lying waste now belong to Government and a few to Patta holders. Steps are being taken for the immediate transfer of Government waste lands on pattas or on agreement as far as possible. It is also possible to grow crops in poromboke lands adjoining the railway line, as was done during the last war. There are extensive compounds, to some of the bungalows belonging to Government. It is proposed to bring a major portion of these lands under cultivation this year. Waste lands in the possession of patta holders should some how or other be brought under cultivation. That is, no land suitable for cultivation should be allowed to lie waste. If the soil is too poor at least horsegram should be grown.

How to improve water facilities. We should economically use the water flowing from canals and tanks and see that more areas are irrigated with the same quantity of water. Government are making arrangement for the grant of Takkavi loans on a more liberal scale for repairing breaches in tanks, sinking of new wells and repairing old wells. Arrangements are also being made to finance Inamdars and Zamindars for the above purpose. If any Inamdar or Zamindar is unwilling to carry out the repairs, it is under consideration to get such works done at Government cost and recover the amount from the Inamdar or Zamindar in annual instalments.

The price of jaggery is not so very attractive at present. The area under sugarcane can therefore be reduced to some extent. In the same way the production of cotton, groundnut and tobacco should be reduced and food crops like Jonna and Korra should be increased. Though the production of rice is far below in the districts of Bellary, Anantapur, Cuddapah and Kurnool, people in these districts take to eating rice more and more. The nutritive value of Jonna, Sajja, etc., should be explained to these people and they should be made to consume these grains in preference to rice.

The quality and quantity of any crop depends on the seed used. Good strains yield better crops and inferior strains mean lower yields The Madras Agricultural Department has evolved improved strains of paddy, jonna, sajja and ragi suitable for particular lands and particular seasons. Such improved strains yield about 10—15 per cent. over the local varieties. About 25 lakhs of acres are now under improved strains of paddy. Such of the ryots as are using the improved strains are getting good profits. If other ryots also go in for these seeds, the production of food crops can be considerably increased. They will be contributing to the National cause. Incidentally, their profit will also be increased. You can obtain your seed requirements through your Taluk Agricultural Demonstrator.

The importance of manure is a matter known to you all. Nobody can expect a bumper crop from a land not well manured, unless the land happens to be in a deltaic tract. Unless manure is applied judiciously according to the requirements of the land, the yield will be poor. Green manure is quite essential for the paddy crop. As the green manure crops are grown in the ryots' own lands it can be cheaply obtained. To help the ryot to raise green manure crops, the Irrigation Department is prepared to let in sufficient water as far as possible. If bonemeal is applied along with green manure very good results can be obtained. A good crop can also be obtained by applying oil cakes, especially groundnut

oil cake as manure in cases where green manure is not available. Chemical manures like Ammonium Sulphate and Super phosphate can also be applied. But they are not available now and even if available the price is prohibitive. The ryot cannot afford to go in for them. The yield can be increased by 10—15 per cent by applying green manure, bonemeal or groundnut cake as manure. Ryots who are unable to find ready cash for purchasing manures like groundnut cake and bonemeal can apply to their taluk Agricultural Demonstrator, who will arrange to issue loans under the Takkavi loan system. If the five methods explained by me are adopted immediately we can solve the problem of increased production of food crops in our province.

I have not dealt with the dry land crops like Jonna, Sajja, etc., because they mainly depend on rainfall. Unless rains are received in time it is not possible to raise them Further, there is not much demand for these crops from other countries or provinces. They are mostly consumed in localities where they are grown. However, if these crops are grown largely they can replace rice to certain extent.

Crop & Trade Reports.

Crop—Groundnut—1942—First Report. The area sown with summer or irrigated groundnut during the three months January to March 1942 is estimated at 33,700 acres. When compared with the estimated area of 33,500 acres for the corresponding period of last year, there is an increase of 0·6 per cent.

Figures by districts are given below ;—

District.	Estimate of area sown with irrigated groundnut from January to March.		Increase (+) or decrease (-) of the area in col. 2. as compared with the area in col. 3.
	1942	1941	
1	2	3	4
	Acs.	Acs.	Acs.
Anantapur	100	200	- 100
Cuddapah	1,000	1,500	- 500
Nellore	100	100	...
Chingleput	4,000	5,000	-1,000
South Arcot	20,000	16,000	+4,000
Chittoor	2,000	3,500	-1,500
North Arcot	1,000	1,000	...
Trichinopoly	1,000	800	+ 200
Tanjore	1,500	1,900	- 400
Madura	2,000	2,500	- 500
Ramnad	1,000	1,000	...
Total.	33,700	33,500	+ 200

The wholesale price of groundnut shelled per imperial maund of 82⅔ lb. (equivalent to 3,200 tolas) as reported from important market centres on 14th April 1942 was Rs. 4—15—0 in Salem, Rs. 4—14—0 in Guntur, Rs. 4—12—0 in Vizianagaram and Adoni, Rs. 4—11—0 in Nandyal and Bellary. Rs. 4—10—0 in Cuddalore and Vellore, Rs. 4—8—0 in Hindupur and Rs. 4—7—0 in Cuddapah. When compared with the prices published in the last report, i. e., those which prevailed on 5th January 1942, these prices reveal a rise of 23 per cent. in Salem, 10 per cent. in Adoni, six per cent. in Hindupur, five per cent. in Guntur, three per cent. in Vellore and one per cent. in Bellary, the prices remaining stationary at Vizianagaram, Cuddapah and Cuddalore.

Gingelly—1941-42—Fourth and final 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 in 1941—42 is estimated at 683,400 acres. When compared with the area of 752,400 acres estimated for the corresponding period of last year, it reveals a decrease of 9·2 per cent. The present estimate reveals a decrease of 13·1 per cent. when compared with the finally recorded area of 786,079 acres in 1940—41. The area in an average year is estimated at 778,740 acres.

One hundred and forty seven thousand and six hundred acres have been reported as sown since the previous forecast was issued in January as against 194,100 acres during the same period last year. These late sowings were mainly on wet lands in Vizagapatam, East Godavari, West Godavari, Cuddapah, South Arcot, Salem, Trichinopoly and the South where gingelly was raised as a second crop after paddy.

The estimated area is the same as that of last year in South Kanara. An increase in area is estimated in Vizagapatam, West Godavari, Kistna, Bellary Trichinopoly, Madura and Malabar and a decrease in area in the other districts of the Province, especially in South Arcot (–20,500 acres), North Arcot (–20,500 acres), Salem (–15,500 acres) and Tinnevelly (–34,400 cres).

The yield is estimated to be normal in Guntur, Coimbatore, Madura and South Kanara and below the normal in the other districts especially in South Arcot (80 per cent.). The condition of the late sown crop is reported to be generally fair except in South Arcot and the South.

The seasonal factor for the Province as a whole works out to 92 per cent. of the average as against 96 per cent. in the Season and Crop Report of last year. On this basis, the total yield works out to 85,900 tons. This represents a decrease of 16·2 per cent. when compared with the estimate of 102,540 tons in the Season and Crop Report of last year. The yield in an average year is estimated at 105,320 tons.

The wholesale price of gingelly seed per imperial maund of 82$\frac{2}{7}$ lb. (equivalent to 3,200 tolas) as reported from important markets on 14th April 1941 was Rs. 7—8—0 in Tinnevelly, Rs. 7—7—0 in Cuddalore, Rs. 6—15—0 in Trichinopoly, Rs. 6—12—0 in Salem, Rs. 6—11—0 in Tuticorin, Rs. 6—1—0 in Rajahmundry and Ellore and Rs. 5—14—0 in Vizianagram. When compared with the prices published in the last report, i. e., those which prevailed on 2nd February 1942, these prices reveal a rise of approximately seven per cent. in Cuddalore, six per cent. in Salem, and three per cent. in Tinnevelly and a fall of approximately two per cent. in Ellore and one per cent. in Tuticorin, the prices remaining stationary in Vizianagram, Rajahmundry and Trichinopoly.

Cotton—1941-42—Fifth and final forecast Report. The average of the areas under cotton in the Madras Province during the five years ending 1939—40 has represented 9·7 per cent. of the total area under cotton in India.

The area under cotton in the Madras Province in 1941-42 is estimated at 2,541,400 acres as against 2,390,600 acres for the corresponding period of last year and 2,472,800 acres according to the forecast report issued in February. The present estimate for the Province represents an increase of 4·1 per cent. as compared with the finally recorded area of 2,440,464 acreas in 1940-41. The final estimate of last year fell short of the actuals by 2·0 per cent.

The increase in area in the current year as compared with the area in 1940-41 occurs in all the important cotton growing districts of the Province outside Guntur. The increase is marked in Anantapur, Salem and Madura (plus 42,500 acres). The area estimated in respect of Coimbatore is the highest reported in recent years.

Picking of cotton is in progress and may be finished in about a month.

The crop was affected to some extent by the attacks of insects in parts of Tinnevelly and by drought in parts of the Deccan, South Arcot, Chittoor, Madura, Ramnad and Tinnevelly.

Normal yield is expected in East Godavari, Nellore, Chingleput, North Arcot, Salem, Coimbatore, Trichinopoly, Tanjore, Ramnad (Cambodia cotton only), Tinnevelly (Cambodia cotton only), Malabar and South Kanara. A yield below the normal is reported from the other districts of the Province.

The seasonal factor for the Province as a whole works out to 92 per cent of the average for both irrigated and unirrigated cotton, the corresponding figure according to the Season and Crop Report of last year being 98 per cent. On this basis, the yield works out to 559,700 bales of 400 lb. lint as against 533,630 bales of last year which represents an increase of 4·9 per cent. The yield in an average year is estimated at 549,020 bales. It is, however, too early to estimate the yield, with accuracy as much will depend on further weather conditions and their effect on the second crop and on the amount of damage done by insect pests.

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

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

Variety.	Area.		Corresponding Yield.	
	1941—42.	1940—41.	1941—42.	1940—41.
1.	2	2	3	4
	Acs.	Acs.	Bales.	Bales.
Irrigated Cambodia	3,016	2,726	1,868	1,572
Dry Cambodia	3,258	2,503	677	502
Total, Cambodia ...	6,274	5,229	2,545	2,074
Uppam in the Central districts...	222	176	36	26
Nadam and Bourbon	331	264	17	13
Total, Salems ...	553	440	53	39
Tinnevellies (a)	7,210	7,047	1,681	1,592
White and Red Northerns ...	1,500	1,800	169	173
Westerns	8,710	8,170	943	957
Warangal and Cocanadas ...	1,082	1,135	196	189
Chinnapati (Short Staple) ...	85	85	10	11
Province. ...	25,414	23,906	5,597	5,035

(a) Includes Karunganni cotton in the Coimbatore District and Uppam, Karunganni and mixed country cotton grown in the South.

The table below gives final information so far as it is available on the crop of 1940—41.

(Figures in hundreds of bales of 400 lb. lint i. e., 00 being omitted.)

Item and Particulars.	South		Deccan	Cocanadas and others	Total.
	Tinnevellies and Salems.	Cambodia.	Northerns and Westerns.	Rest of the Province.	
1	2	3	4	5	6
1. Pressed at presses and loose cotton received at mills in 1941-42	1,776	3,024	1,597	257	6,654
2. Subtract crop of 1939-40 pressed at presses and loose cotton received at mills in 1941-42 i. e., stocks of loose cotton held by the trade ginneries, presses and mills on 31st January 1941	258	339	59	24	680

3. Add loose cotton of the crop of 1940-41 held by the trade, ginneries, presses and mills on 31st January 1942 ...	Information not available.					
4. Add estimate of extra factory consumption	37	Nil.	38	25	100
5. Total crop of 1940-41 ...	1,555	2,685	1,376	258	5,874
6. Yield as estimated in April 1941	1.631	2,074	1,130	200	5,035
7. Yield as estimated in the season and crop report of 1940-41	1,674	2,195	1,261	206	5,336

Note 1. The year 1941-42 relates to the period February 1941 to January 1942 when the crop of 1940-41 generally comes to the market. The early sown crop in the Deccan, however, generally comes into the market from December in each year. The figures are taken from the weekly returns furnished by mills and presses.

Note 2. Items 2 and 4—The figures are approximate.

The average wholesale price of cotton lint per imperial maund of 82$\frac{2}{7}$ lb. equivalent to 3,200 tolas as reported from important markets on 14th April 1942 was about Rs. 14—13—0 for Cocanadas, Rs. 17-6-0 for White Northerns, Rs. 16-5-0 for Red Northerns, Rs. 13—2 -0 for Westerns (Mungari), Rs. 19—2—0 for Westerns (Hingari), Rs. 20—4—0 for Coimbatore Cambodia, Rs. 25—5—0 for Coimbatore Karunganni, Rs. 22—4—0 for Southern Cambodia, Rs. 19—12—0 for Tinnevellies, and Rs. 21—4—0 for Nadam cotton. When compared with the prices published in the last report, i. e., those which prevailed on 9th February 1942, these prices reveal a fall of about 45 per cent. in the case of Coimbatore Cambodia, 22 per cent. in the case of Coimbatore Karunganni, 21 per cent. in the case of Westerns (Mungari), 16 per cent. in the case of White Northerns, 14 per cent. in the case of Nadam, and 10 per cent. in the case of Cocanadas, Red Northerns and Westerns (Hingari). (*From 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 1942 to 8th May 1942 amounted to 154,741 bales of 400 lb. lint as against an estimate of 563,800 bales of the total crop of 1941-42. The receipts in the corresponding period of the previous year were 195,801 bales. 198,275 bales mainly of pressed cotton were received at spinning mills and 1,362 bales were exported by sea while 70,505 bales were imported by sea mainly from Karachi and Bombay.

(*Director of Agriculture, Madras.*)

Moffussil News & Notes.

Mecheri Car Festival and Cattle Fair, Omalur, Salem Dt. A small Agricultural Exhibition was put up between 3rd and 7th March, 1942 during the car festival and cattle fair at Mecheri. Improved strains of departmental seed grains, labour saving implements, specimens of groundnut cake, fungicides and insecticides, apiary appliances, posters depicting improved agriculture which were on show attracted a large crowd of interested agriculturists whose enquiries were suitably answered. Advantage was availed of the District Board van for rural uplift work in the dissemination of agricultural knowledge by songs and lectures through the microphone. The importance of increasing food grains was stressed on the audience.

Car Festival Thirthamalai, Harur Taluk, Salem Dt. An exhibition of all agricultural implements and seeds was held at Thirthamalai from 6th to 10th March 1942, during the car festival. The daily visitors to the stall averaged about 250 who were benefited by the Departmental activities explained to them. Besides these, practical demonstrations of light iron ploughs, roll—easy mhote wheel and chaff cutter were held. Lectures on war matters were also delivered when *ryots* were advised to bring more area under food crops.

Rural Uplift Tournament, Namakkal, Salem Dt. An agricultural exhibition was put up from 20—3—42 to 22—3—42 in the Namakkal play grounds. Improved strains of crops, green manure seeds, samples of ragi malt, cream jaggery, specimens of Co. 419 canes, honey, live colony of bees, sample manure pit, dry earth shed and trench systems were exhibited with explanatory notes and posters. Besides samples of *ryots'* produce of grains, vegetables and fruits from the Kolli hills were also put up on show. Two prizes and several certificates of merit were awarded for the *ryots'* produce.

The exhibition was opened by the Revenue Divisional Officer, Namakkal, on the 20th and closed by the Collector of Salem on the 22nd. On both the days the Headquarters Deputy Director of Agriculture and the District Agricultural Officer were present. On the closing day the Headquarters Deputy Director of Agriculture addressed a huge gathering of about 2,000 people on increasing the production of food crops which was rendered into Tamil by the District Agricultural Officer, Salem.

Rural Exhibition, Attur, Salem Dt. A small exhibition of departmental specimen seeds and improved implements together with pictorial and word posters were put up on show from 25th to 29th March, 1942 under the auspices of the local Rural Uplift Association. Models of different methods of preservation of manure were also included in the show. Live specimens of green manure crops, sugarcane varieties of Co. 419, Co. 213 and P. O. J. 2878 were also obtained and put up. Every day a large gathering of *ryots* visited the stall who were explained the several exhibits and posters in addition to advising increasing area under food crops.

Cuddapah. On the occasion of the Annual Car Festival of Sri. Chennakesavuluswami on the 18th, 19th and 20th of April 1942, a big agricultural exhibition was held at Pushpagiri, Cuddapah taluk, where thousands of people from the surrounding villages and taluks gather in large numbers. Prominent feature of the exhibition was the wide demonstration of all the improved agricultural implements, models of the manure preservation on proper lines, and standing crops of green manure and fodder crops grown in pots. The field demonstrations attracted very large crowds, when they were explained about the purpose of and informations regarding each implement. Improved strains of paddy, millets, oil seeds, fibre crops, green manures and other money crops and fertilizers were prominently exhibited with suitable labels tastefully arranged. Pictorial and word posters on agricultural topics in Telugu were prominently mounted. Show cases of mounted insects and necessary for the control of plant diseases and insect pests created much interest in the minds of the visitors. Bee-Keeping appliances were an added feature. Bulletins and Villagers' Calendars were always ready for sale, while leaflets on current agricultural topics were distributed and the contents were explained. Pictorial and letter posters of the department were pasted in all convenient places on the walls of the domestic buildings, choultries, temples, etc., to serve to the public as useful reading material.

A cheap and efficient method of controlling cattle lice. There is a local practice in some of the black soil areas of Tinnevelly District of introducing cattle

Egret- cranes—in cattle yards for controlling cattle lice. They peck at the lice and feed on them. Their wings are clipped off periodically to prevent them from flying away. This is being practised for the past three or four years by a *ryot* and he reports that this is an efficient and cheap method of controlling cattle lice. This is also reported to be copied by others. M. A. B.

College and Estate News.

Sir T. S. Venkatraman, Imperial Sugarcane Expert, is on leave preparatory to retirement from 1st May and on the eve of his leaving the station, he was entertained by his staff.

Rao Bahadur Sri G. N. Rangaswami Ayyangar, F. N. I., I. A. S., Millets Specialist and Geneticist and Principal, Agricultural College who retired on the 19th of this month was met by the Gazetted officers of the Agricultural College and Research Institute at Tea on the 17th and by the staff of the Millets Section on the 18th.

The Association of Economic Biologists. The Annual Meeting of the Association of Economic Biologists was held on May 15th in the Agricultural College when the members met after light Tea and elected unanimously the following office bearers for 1942-43.

President: Mr. N. L. Dutt. *Vice-President:* Mr. C. M. John. *Secretary*: Dr. N. Parthasarathy. *Committee Members*: Rao Bahadur Sri V. Ramanatha Ayyar and Sri V. Gomathinayagam.

The retiring President, Rao Bahadur Sri V. Ramanatha Ayyar addressed the gathering on "Food Production in Madras".

B. Sc. Ag. Examination 1942.

List of successful candidates.

First Examination. Ammi Raju, P. Appalanarasayya, K. Chellam Vincent, E. R. Chockalingam, C. D. Edward Balraj. Francis Gurubatham. Janardana Rao, K. Krishnamurti, P. A. Muthukumarappa, S. Narasimha Doss, T. Narasimhan, R. Narasimha Rao, G. Narasimha Sastri, V. L. Narayanaswami, K. R. Nargunam, W. R. Navaneethakrishnan, T. V Padmanabha Pillai, D. Priyavartha Rao, S. B. Raghavan, N. Rajagopalan, K. Raja Rao, N. V. Ramanjaneyulu, S. Rama Somayajulu, M. V. Rami Reddi, D. Sankara Reddi, G. H. Somayajulu, P. L. N. Srinivasa Ayyar, P. A. Suryanarayana, G. Suryanarayana Sastri, M. Syed Ahamedulla. Thyagarajan, N. Vasudeva Reddi, C. Venkataramana Reddi, T. Venkataswami, T. Venkataraya Pai, T. Ibrahim Ali, S. A.

Second Examination. Devadas Kamath, V. Dhanvantari Reddi, M. Gopalakrishna Sarma, M. V. Govindaswami, C. V. Krishnamurti, C. Kuppuswami, B. S. Mirza Anser Baig. Narasimhamurti, Y. V. S. S. S. Narasimha Reddi, R. Padaki, G. R. Palaniswami, T. V. Ramakrishna Sastri, K. Rama Rao, V. Ramesh Adyanthaya, N. Sridhara Sastri, D. Srinivasan, C. Subrahmanyan, R. Sundara Rao, Y. R. Suryanarayanamurti, K. V. S. Tiruvenkadam, C. R. Ummerkutti, O. V. Venkataraman, T. M. Venkataramanan, C. R. Ramanamurti, P. V.* Anantakrishnan, N. Edward, J. J. D. Hanumanta Rao, K. Jagannadha Rao, Y Krishnamurti Rao, S. Kutumba Rao, V. V. Mrutyanjaya Sastri, R. Ramaratnam, W. S. Ranga Rao, K. Subrahmanyam, J. Syed Muhammad, D. A. Venkataramana Reddi, G.

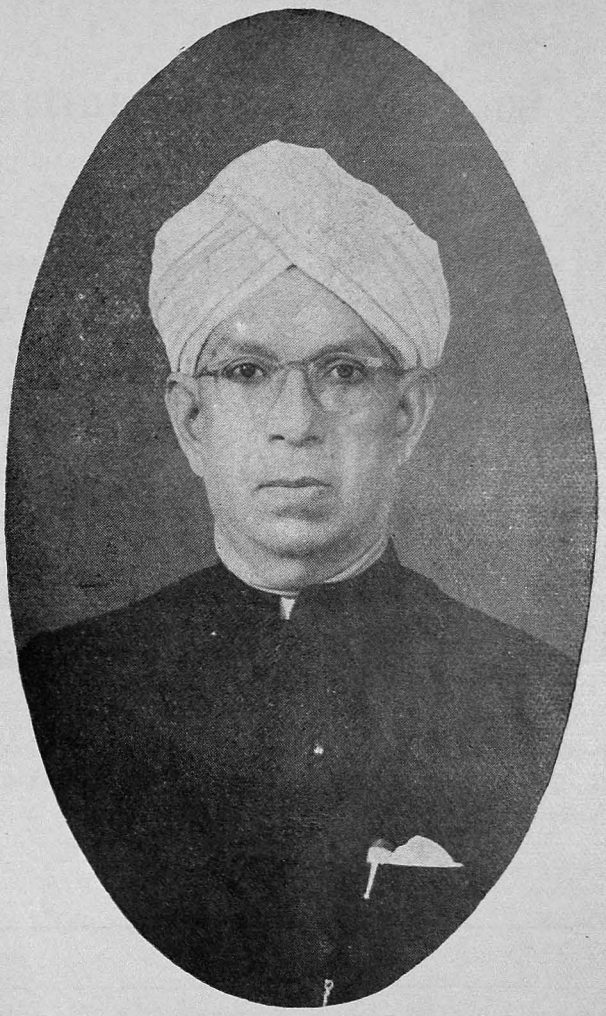
* Already passed the Final Examination.

Final Examination. Edward, J. J. D. Hanumanta Rao, K Jagannadha Rao, Y. Krishnamurti Rao, S. Kutumba Rao, V. V Mrutyanjaya Sastri, R. Subrahmanyam, J. Syed Muhammad, D. A. Adivi Reddi, A. Dharmakkan Isiah Duraiswami, K. N. Gurubasavaraj, H. Krishnan, B. S. Mahimaidas, V. Narappa Reddi, D. Pitcheswara Rao, M. Raja Rao, K. Ramakanta Reddi, G. Ramamohana Rao, K. Sankara Rao, C. Santanaraman, R. Sethuraman, M. S. Sivasubrahmanyan, P. K. Srinivasa Rao B. Subba Raju, A. Subrahmanyam Reddi C. Subrahmanyan, A. Sundararajan, C. E. Suryanarayana, K. S. Suryaprakasa Rao, P. V. Theophilus Chellappa. Vijayaraghavan K. S. Yagneswara Chintamani, P. Achutarama Raju, I. Kulandaiswami, M. S. Radhakrishna Rao, D. Ramana Rao, D. V. Sambamurti, K.

RETIREMENT

Sri G. N. Rangaswami Ayyangar, I. A. S.

From the 19th of May 1942, Rao Bahadur Sri G. N. Rangaswami Ayyangar, F. N. I., I. A. S., Principal, Geneticist and Millets Specialist, retires from service. Mr. Ayyangar studied in the Madras Christian and Presidency Colleges and graduated with Botany as his science subject. In 1911—12 he was Lecturer in botany at the Pittapur Rajah's College, Cocanada. He joined the Agricultural Department in December 1912. He worked with Mr. Parnell on rice and cotton. He was gazetted as Assistant Economic Botanist in 1920. In 1921 he was promoted to the Indian Agricultural Service and appointed to the new post of Millets Specialist in which he worked till his retirement. He rose to the highest post in the Agricultural College and Research Institute and was the Principal for about a year. He was promoted to the Selection Grade of the Indian Agricultural Service. As Geneticist he was in charge of Botany teaching at the College and of the Herbarium with its Systematic and Economic Botany activities and helped in the restoration of the old Lecturing and Systematic Botany Section as an independent unit of the Institute. A number of improved strains of rice, millets and pulses have been evolved as a result of his labours. In his review of agricultural work in India, Sir John Russell paid a tribute to his ability. The United States Department of Agriculture Year Book in its review of Sorghum work in the World acknowledges Ayyangar's work at Coimbatore as extensive and comprehensive. Mr. Ayyangar and his co-workers have numerous publications to their credit and have added considerably to the knowledge on millets, the food crops of the poor. The Rao Bahadur has been connected with the Madras University for a long time. He is a Fellow of the National Institute of Sciences, Calcutta, National Academy of Sciences, Allahabad, The Indian Academy of Sciences, Bangalore and of the Indian Botanical Society. He was connected with the Indian Science Congress from its inception and was the President of the Agricultural Section in 1932. He is editorial co-operator of the two premier Indian Scientific Journals "Current Science" of Bangalore and "Science and Culture" of Calcutta. He was awarded the tittle of Rao Bahadur in 1935 and received the Coronation Medal in 1937. He has been a Member of the Botanical, Millets and Pulses Committees of the Imperial Council of Agricultural Research, New Delhi. He has served the Madras



Rao Bahadur Sri. G. N. Rangaswami Ayyangar, F. N. I., I. A. S.,
Principal, Geneticist and Millets Specialist.
Retires from 19th May, 1942.

Agricultural Students' Union as Editor of this Journal, as Vice-President and finally as its President. He was Secretary of the Officers' Club and its President. He was keen on the improvement of the College Estate. Mr. Ayyangar is well read, a good penman and can speak with effect. He is industrious and sincere in all his undertakings and has a very warm heart. In his retirement the Department will be losing the services of a valuable Public Servant. We wish Mr. Ayyangar good health and all happiness in his retirement.

Departmental Notifications.

Gazetted Service.

Appointments.

Sri C. Vijayaraghavacharya, Temporary Gazetted Assistant to the Principal, Agricultural College, Coimbatore, is appointed to officiate as Millets Specialist from 10th March 1942.

Sri P. S. Jivanna Rao, Lecturer in Botany, Agricultural College, Coimbatore, on return from leave is posted to his permanent appointment as Lecturer in Botany, Agricultural College, Coimbatore

Sri K. K. Raghavan, Farm Manager, A. R. S., Koilpatti is appointed to act as District Agricultural Officer, Tinnevelly.

Sri S. Ramachandra Ayyar, Assistant in Entomology, and a probationer in the Madras Agricultural Service is appointed to officiate as Assistant Entomologist to be in charge of the Sugarcane Insects Scheme of the I. C. A. R.

Transfer.

Sri M. A. Balakrishna Ayyar, D. A. O., Tinnevelly, to Vellore.

Leave.

Sri S. N. Chandrasekhara Ayyar, Offg. Lecturer in Botany, I. a. p. for 1 month and 20 days from 25—5—42.

Subordinate Service.

Transfers.

Name of officers.	From	To
Sri C. Krishnamurthi,	A. D. Kovur,	A. D. Nellikuppam.
,, P. K. Nambiar,	F. M. Nileshwar,	A. D. Tellicherry.
,, P. Kannan Nambiar,	A. D. Tellicherry,	A. D. Manjeri.
,, K. Sivasankara Menon,	A. D. Perinthalmanna,	A. D. Badagara.
,, V. M. Ramunni Kidavu,	A. D. Badagara,	A. D. Perinthalmanna.
,, M. S. Subbiah,	Asst. in Entomology, Tinnevelly,	Kodaikanal.
,, K. R. Nagarajan,	Asst. in Mycology, Coimbatore,	Asst in Entomology, Tinnevelly.
,, K. Brahmachari,	Asst. in Entomology, Coimbntore.	Sugarcane Pests Scheme, Nellikuppam.

Leave.

Name of officers.	Period of leave.
Sri G. Ganapathi Ayyar, Asst. to the Govt. Agri. Chemist, Coimbatore,	L. a. p. for 1 month and 11 days from 27—4—42.
„ T. V. Krishnaswami Rao, A. D. Vizagapatam,	Extension of l. a. p. on m. c. for 1 month from 11—4—42.
„ K. Rama Rao, A. D. Rayadrug,	Extension of l. a. p. for 1 month and 5 days from 27—4—42
„ K. Ramanujachari, A. D. Atmakur,	L. a. p. for 1 month from 1—5—42.
„ N. Krishna Menon, Sub Asst. in Entomology,	L. a. p. for 2 months from 4—5—42.
„ P. Govinda Rao, Asst. in Mycology, Masulipatam,	L. a. p. for 30 days from 4—5—42.
„ M. Narayana Iyer, A. D. Hosur,	L. a. p. for 1 month from 15—5—42.
„ V. K. Kunhunni Nambiar, A. D. Udamalpet,	L. a. p. for 2 months from 4—5—42.
„ P. Sudarsanam Naidu, F. M. A. R. S. Guntur.	L. a. p. for 3 months from 24—4—42.
„ V. Kumaraswami, A. D. Kandukur,	L. a. p. for 1 month from 20—5—42.
„ R. Narasimhachari, A. D. Saidapet,	L. a. p. for 2 months on m. c. from 20—4—42.
„ B. N. Padmanabha Ayyar, A. D. Puthur,	Extension of l. a. p. for 3 months on m. c. from 7—5—42.
„ P. S. Athmarama Iyer, A. D. Avanashi,	L. a. p. for 2 months from the date of relief.
„ K. Varadachar, A. D. Gooty,	L. a. p. for 49 days from 13—5—42.
„ N. Srinivasa Rao, A. D. Kollegal,	L. a. p. for 6 weeks from 20—5—42.
„ D. Bapayya, Agricultural Subordinate (on leave),	Extension of leave on half average pay onm. c. for 2 months from 13—4—42.
„ C. K. Subramanya Ayyar, Sub Asst. in Entomology, Coimbatore,	L. a. p. for 1 month from 23—5—42.
„ M. P. Gourisankara Iyer, A. D. Lalgudi,	Extension of leave on m. c. for 2 months from 1—6—42.