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EDITORIAL 33

The New Year Our greetings to the members and subscribers of the Madras Agricultural Journal. We solicit the same co-operation and patronage that they have been extending to us in the past. Another year of war has passed and we are commencing the new year with great hopes.

Meshanised and Collective Farming The crops and soils wing of the Board of Agriculture and Animal Husbandry in India at its fifth meeting resolved to recommend that consolidated farming achieved voluntarily or by compulsion was the most promising form of cultivation in the conditions of this country as tending to reduce the cost of cultivation of crops and increase their yield.

Collective farming is said to be a success in Russia, and competent observers who have made a study of it, like Sir John Russel and Harold H. Mann, aver that the conditions that have made the collective farming a success in Russia are peculiar to herself only. It might be that those conditions could not be duplicated in other countries. Foremost is the absolute control that the state exercises over all aspects of farming. The collective farming has made possible the use of power and machinery in a large scale. It must also be remembered at the same time that Russia is a large country with considerable areas of land under cultivation and extensive cultivable fallow that could be used for extending cultivation, may be for a long time to come.

The conditions in India, we fear, are entirely different. The lands are held by peasant proprietors, small and large, but mostly small, and the peculiar merit and value of ownership of the peasant holdings would be lost and the peasantry would receive a rude shock, from which recovery might be difficult. Contentment would give rise to discontent. This has been the case even in Russia. The peasants were not happy over the collective and communal farming and the Act since passed in 1936 has permitted the peasants to own ½ to 2 acres each about their homes, and which they could cultivate as they choose. This has eased the situation. Nextly, collective framing is said to economise labour and this implies that either there is a shortage of man-power or the existence of large areas waiting to be opened up and cultivated properly by utilising the available labour in the most economical manner possible and by the extension of the use of machinery

in the farm. These do not exist in this country and the prevailing conditions are just the reverse ; there is a large population which does not have enough work, and the extent of land under cultivation or that could be made available for cultivation are limited. It is difficult to see how collective farming could be fitted into this background of incongruities. It is also open to question whether collective farming would increase the yields. Rao Bahadur Dr. B. Viswanath, Director of the Imperial Institute of Agriculture, New Delhi, has during the course of the discussions of the board referred to this and remarked that extensive farming does not score over intensive farming. In thinly populated countries, with scope for extending cultivation the total production in the country as well as the production per head of labour might increase with the introduction of collective farming, but not necessarily the production per unit of area On the other hand in thickly populated countries as in India the chances of total production, as well as production per acre, being increased are greater with peasant ownership and cultivation, and the production in the country could be increased only in that way.

The claim that collective farming would make possible mechanised cultivation will not hold good in this country of small holdings. Most of the holdings are small and do not lend themselves for mechanical cultivation. The 'wet lands' divided into small sized plots with bunds are not suitable for power farming. There may be some holdings here and there which might be cultivated with power machinery. With the introduction of power in the farm, a large number of labourers would be thrown out of employment and the state of non-employment of the normal days would be accentuated further, tending to increase the competition for work among the labourers. There would not be sufficient work in the land for all the people in the country till alternative avenues are thrown open for diverting them, and we do not see much signs of that happening in any large measure in the near future. Even as it is, the agricultural labourer in our country earns only a minute fraction of what his compeers in other countries are earning, which is anything from 10 to 30 times more. Collective farming and mechanical cultivation have their places in countries which have extensive areas and a small labour force only, not able to attend to all the farm work. There is little scope for them in India, normally. But, in post-war schemes of absorbing demobilised soldiers in the agricultural development of the country and in new reclamation projects, however, where mostly inexperienced men have to be trained in the methods of farming, co-operative and joint systems of farming may help to utilise the capacities of the different individuals to the fullest benefit of the community both with regard to cultivation as well as other allied industries.

New Year Honours We are happy to note that P. H. Rama Reddi Esq., M. A., B. Sc., I. A. S., Director of Agriculture, Madras has been decorated with the C. I. E., in recognition of his very valuable services to the country in the field of agriculture, and felicitate him on this well-merited distinction.

A Review of the Manurial Experiments on the Agricultural Crops of the Madras Presidency for the Decennial Period 1930—40 (Contd.)*

By the Paddy Specialist and the Government Agricultural Chemist, Coimbatore

Sugarcane Next in economic importance to paddy is sugarcane, occupying an area of 111,040 acres scattered all over the Province with concentrated zones of cultivation in the Circars and South Arcot along the coastal areas and in Coimbatore and North Arcot in the central portion, besides many other small isolated regions. In view of this, considerable attention has been devoted to the manuring of this crop.

Manurial experiments have been in progress for the last ten years at Anakapalle and Samalkot in the Circars, at Palur in South Arcot and at Coimbatore in the central districts. The studies were confined to the investigation of the nature and quantity of nitrogen required for this crop and the best time of application of the manure. It has been definitely established that the application of nitrogenous manures increases considerably the tonnage of the popular varieties of canes tested. Phosphates, though not essential, have been found to influence the quality of jaggery obtained. At Anakapalle the relative merits of groundnut cake (640 lb.) and ammonium sulphate (260 lb.) on equal nitrogen basis were investigated. The plots were given basal dressings of cattle manure (5 tons) *plus* wild indigo (2,000 lb) *plus* super (1 cwt.) per acre. There was a control treatment receiving cattle manure (12 tons) *plus* wild indigo (2,000 lb) *plus* super (1 cwt.). On the average over four years the ammonium sulphate plots gave 17 per cent more yield and groundnut cake plots 6 per cent more than the control. Similar studies made at Samalkot over a period of three years compared the manurial effect of ammonium sulphate alone or in combination with groundnut or castor cake, on equal nitrogen bases (128·2 and 102 lb. N) with a basal dressing of bone meal and super at 2 cwt. each per acre. Ammonium sulphate applied alone or in combination with cakes was definitely superior to the control cake only.

To find out the optimum dose of nitrogen supplied equally by cake and ammonium sulphate, experiments were carried out at Anakapalle and Samalkot for three years with some of the promising types of canes, varying the nitrogen levels from 50 lb. to 200 lb. Increased yields were obtained with the higher doses of nitrogen, particularly 75 lb. and 100 lb. At Samalkot the increases due to 150 lb. and 200 lb. are not striking, when compared to that of 100 lb. Co. 419 has yielded 57 tons of canes with 50 lb. N and 72 tons with 150 lb. and the increase is significant.

* Continued from Vol. 31, p. 317.

Trials were made for 6 years at Palur varying the quantities of nitrogen (50 to 200 lb.) and the proportion of groundnut cake and ammonium sulphate in the mixture. The application of groundnut cake *plus* ammonium sulphate to supply 100 lb. nitrogen in the proportion of 4:1 or 3:2 was found to be efficient and economical. The increases were 40 and 52 per cent for the two proportions respectively over the 50 lb. groundnut cake nitrogen. Progressive increases were noted with the higher doses of nitrogen.

In a further investigation, for a period of six years, the comparative merits of sodium nitrate and ammonium sulphate applied as nitrogenous fertilisers, in conjunction with cake to supply 200 lb. nitrogen in the aggregate, as well as their interaction with phosphates (super) and potash (potassium sulphate), in relation to yield and quality on Fiji B cane were studied. Significant results have been obtained with cake alone or in conjunction with ammonium sulphate. With addition of super (100 lb. P_2O_5) and potassium sulphate 50 lb. K_2O) the response due to nitrogen supplied as cake and ammonium sulphate in the proportion of 3:2 is the greatest with a record increase in yield of 24 per cent over the plots receiving 200 lb. nitrogen as sodium nitrate. The sodium nitrate, applied by itself or together with other fertilisers, *viz.*, super and potassium sulphate in any proportion, causes a marked depression in all the years.

In the permanent manurial experiments at Coimbatore the effects of artificials, *viz.*, ammonium sulphate (1 cwt.) potassium sulphate (1 cwt.) superphosphate (3 cwt.) cattle manure (5 tons)—direct and residual—applied alone and in combination with and without a basal dressing of 2,000 lb. of cattle manure, were studied. The results are given below :—

TABLE VI. Percentage increase in yield of jaggery in the permanent manurial plots

Treatments	With basal dressing	Without basal dressing
Nitrogen	36·6	61·2
Nitrogen *plus* potash	68·3	28·6
Nitrogen *plus* phosphoric acid	32·8	112·3
Nitrogen *plus* potash *plus* phosphoric acid	91·9	149·7
Potash *plus* phosphoric acid	114·7	124·6
Potash	106·5	100·0
Phosphoric acid	88·6	75·5
Cattle manure (5 tons)	104·9	30·6
,, (residual)	36·6	77·6
No manure (control)	0·0	0·0

Note :—The yield of "no manure" plot is 2,940 lb. jaggery per acre.

Molasses supplying nitrogen from 26 lb. to 78 lb. was compared with 26 lb. nitrogen applied as ammonium sulphate, green leaf (*pillipesara*) or groundnut cake, for three years at Anakapalle. The molasses did not compare favourably in all doses.

Time of Application The Experiments in connection with the time of application of quick acting organic manures like oil cakes (groundnut cake)

and ammonium sulphate were in progress at Palur for over six years. Applying the manures in two doses, one at the time of planting and the other at the time of tillering (somewhere in June for March plantings) is definitely advantageous. Nitrogen applied as groundnut cake and ammonium sulphate in the proportion of 3:2 in two doses has given 9·7 per cent more yield than the single dose.

Seed bed Manuring This has been done at the Agricultural Research Station, Gudiyatham with the object of comparing the behaviour of seed material raised in intensively and poorly fertilised plots (intensive dose: 20,000 lb. cattle manure, *plus* 2,000 lb. groundnut cake, *plus* 400 lb. ammonium sulphate, *plus* 400 lb. super, plus 100 lb. potassium sulphate; poor dose: 10,000 lb cattle manure only). When planted out in fields treated with normal dose of manure (150 lb. nitrogen, half as groundnut cake and half as ammonium sulphate), and $\frac{2}{3}$ and $\frac{1}{3}$ normal doses, a progressive increase in yield with the increase in the amount of nitrogen applied to the main field in all the three years has been recorded for both the types of seed material. The intensively fertilised seed material has responded more favourably to all doses of nitrogen than the poorly fertilised seed material.

TABLE VII. Effect of manuring the seed bed on field performances

Manurial treatment in field	Yield of canes in tons per acre from	
	Intensively fertilised seed-bed material	Poorly fertilised seed-bed material
Normal dose	36·4	32·1
2/3 normal dose	34·0	31·5
1/3 normal dose	29·5	25·3

Note :—a basal dressing of 10 tons cattle-manure and 2 cwt. super per acre was applied to the field.

Indirectly, these manurial trials have revealed the beneficial effect of farm yard manure in improving the general character of the soil and enriching the quality of the juice and jaggery obtained. Though the inorganic fertilisers (e. g., ammonium sulphate) contribute to the increase in tonnage, these are not effective in improving the quality of the juice. A basal dressing of farm yard manure is to be recommended not so much for its nitrogen content as for its effect on the quality of juice, which is much improved.

Plantain This is another important crop grown mostly in paddy soils with heavy irrigation. Its distribution is mainly restricted to the deltaic tracts in the Circars and Trichinopoly and Tanjore districts. Scattered areas under this crop are also met with in the central district of Coimbatore and Malabar in the West Coast, under irrigated and rainfed conditions respectively.

Manurial experiments on this crop have been in progress for some years at the Agricultural Research Stations at Palur and Samalkot. These have brought out the importance of nitrogen and potash for the crop.

Though most of the South Indian soils are well supplied with potash, additional application of this constituent has been found to improve the yield of the crop in all the trials. A greater need for the application of nitrogen has also been indicated. At Samalkot the effect of sulphate of potash alone and in combination with ammonium sulphate and super on the yield and quality of plantain has been studied for a year, over a basal dressing of 10 tons farmyard manure per acre. It is seen that a combination of ammonium sulphate 2½ oz. *plus* super 3½ oz. per plant has yielded best—both *Seethakattu* and *Tholakari* crops—with 15 per cent increase over the respective normal yields of 16 lb. and 12 lb. per plant. Potash by itself does not appear to have any influence on the keeping quality of the fruit.

In a second test, the supply of ammonium sulphate (1 lb.) with sulphate of potash (½ lb.) has given the maximum yield of 18 per cent over the 20 lb. yield for control plants receiving half a pound of ammonium sulphate. The residual effect of the manures on the ratoon crop is also significant; the increased yield was 15 per cent over the control, i.e., 18 lb.

When different doses of nitrogen were tested individually and in combination with single and double doses of potash, the average yields were slightly increased for double and treble doses of nitrogen for both the seasons. Potash tried in different doses has responded well only in combination with higher doses of nitrogen (viz. 1½ lb. per plant). Potash does not appear to affect the keeping quality or the flavour of the fruit. The results of application of nitrogen, with and without potash, as well as with and without a basal dressing of cattle manure, are furnished below.

TABLE VIII Results of manurial experiments on plantains.

Treatments	Average weight in lb. per bunch			
	Seethakattu January planting		*Tholakari* June planting	
	With cattle manure	Without cattle manure	With cattle manure	Without cattle manure
Single N. Series				
N (ammonium sulphate ½ lb)	39·8	38·0	15·9	17·0
N *plus* ½ K (potassium sulphate ½ lb.)	39·4	36·3	13·7	15·8
N *plus* K	38·6	36·7	15·1	14·9
Double N Series				
2 N	41·1	38·4	18·1	19·1
2 N *plus* ½ K	41·5	37·5	17·7	17·9
2 N *plus* K	39·3	39·9	19·3	18·2
Treble N Series				
3 N	40·6	37·5	18·2	20·1
3 N *plus* ½ K	39·7	37·9	18·0	20·5
3 N *plus* K	43·0	38·7	19·0	22·8

Again in a two year experiment at Palur cane trash equivalent to 1½ cwt. potassium sulphate per acre was tried alone and in combination with 5 cwt. groundnut cake and 2 cwt. super. Cane trash alone recorded an increase of 18 per cent over no manure which yielded 7,300 lb. of fruits per acre; while in combination with 5 cwt. groundnut cake *plus* 2 cwt. super the yield was nearly doubled with an increase of 95 per cent over control. Thus it is seen that the addition of potash, nitrogen and phosphate tends to increase the yield.

Irrigated Crops

Cotton The manurial trials on this important industrial crop under irrigated conditions are only very few. The available data show however, the beneficial effects of judicious application of manures specially nitrogen and phosphates in organic or inorganic forms. Continued application of bulky organic manures, viz., cattle manure and green manure, has also been found to inrcease the yield of the crop at Coimbatore during a three-year experiment. Cattle manure at 15 cart loads per acre gave an increase of 22 per cent over the control no manure plots; green manure ploughed *in situ* yielded 16 per cent more than the control plots.

In another experiment to test the relative effects of artificials,. viz. ammonium sulphate (60 lb. N) alone and in combination with potasium sulphate (40 lb. K_2O) and super (80 lb. P_2O_5) favourable results in two out of three years have been obtained with N *plus* P and N *plus* K *plus* P; the percentage increases being 40 and 34 respectively over an average yield of 560 lb. kapas. In the presence of cattle manure applied regularly over a number of years the response for the various combinations of the artificials is not significant.

Cotton was grown in an year in the 'new permanent manurial' plots, laid out 15 years back at Coimbatore to study the effects of artificials, viz., ammonium sulphate (1 cwt.), potassium sulphate (1 cwt.), and super (3 cwts), alone and in various combinations, besides cattle manure (5 tons)—direct and residual. There are 2 series of analogous plots; one series receives a basal dressing of cattle manure at 2,000 lb. per acre and the other dose not. Cattle manure and artificials, N *plus* K *plus* P only, in the no basal manure series, gave increases of 31 and 10 per cent respectively over the yield of 1,200 lb. of kapas in the no manure plot. A basal application of 2,000 lb. of cattle manure per acre increased the yields of all the treatments; the cattle manure plot yielding more than 100 per cent, while the other treatments gave 30 per cant more than the control plot with an yield of 950 lb. kapas. The response due to the basal dressing is also appreciable, being about 15 per cent.

In a similar experiment carried out in the old permanent manurial plots but without the cattle manure basal dressing series, plots treated with cattle manure, direct and residual, and artificials, N *plus* K *plus* P and N *plus* P, have given 155, 12, 35 and 68 per cent respectively over the control (no manure) yield of 426 lb. kapas per acre. These increases are probably due to the continuous manuring of each crop ever since the inception of the experiment in 1909.

Cereals The main crops which have received some attention with regard to manuring are *cholam, ragi, panivaragu* and wheat. Experiments were carried out at Coimbatore on all these crops for periods ranging from one to three years.

Cholam Experiments on this were confined to *Chitrai Cholam* only, and were conducted in the 'new' and 'old' permanent manurial plots referred to already, for a period of two years. Appreciable response due to the various treatments has been obtained in all the trials with and without cattle manure (2,000 lb. basal). The general mean yields of the basal and no-basal dressing of cattle manure series reveal the absence of any appreciable effect due to the basal application of cattle manure. The percentage increases of yield over control for the two series are given under.

TABLE IX Percentage increase in yield over the control, *cholam*.

Treatments	New permanent manurials		Old permanent manurials
	With basal cattle manure	Without basal cattle manure	Without basal cattle manure
N (ammonium sulpate 1 cwt.)	24·5	3·6	4·1
N *plus* K (potassium sulphate 1 cwt.)	25·0	10·2	No increase
N *plus* P (super 5 cwt.)	61·7	45·1	364·0
N *plus* K *plus* P	56·8	37·3	333·0
K *plus* P	41·2	37·0	233·0
K	23·7	2·1	No increase
P	52·2	35·9	do
Cattle manure direct (5 tons)	70·5	48·6	299·0
Cattle manure residual	31·1	No increase	Nil
General mean yield	2486 lb.	2322 lb.	—
Yield in control plot	1749 lb.	1911 lb.	526 lb.

Ragi This crop has been studied at Coimbatore and Palur to test its response to organic and inorganic manures under irrigation. At Coimbatore the trials were restricted to the permanent manurial plots. The average yields for five seasons indicate that with a basal dressing of cattle manure at 2,000 lb. all the treatments give significant increases ranging from 20 to 72 per cent over the control plots; in the no-basal series the increases range from 7 to 57 per cent except in the case of nitrogen, potash and cattle manure residual plots which have given lower yields than the control. In the 'old permanent manurials', striking response has been observed for treatments N *plus* P, N *plus* K *plus* P, K *plus* P and cattle manure; the increases are more than 200 per cent over the control; the treatments P, K and N *plus* K show smaller increases ranging from 24 to 16 per cent. Nitrogen by itself does not seem to be in any way better than 'no manure', the yields being alike.

At Palur, the effects of Indore compost and farmyard manure (to supply 80 lb. nitrogen) on *Kulla ragi* were beneficial, the percentage increases being 53 and 37 respectively over the control with an yield of 1,540 lb. per acre. In another experiment, ammophos (1 cwt.) with a basal dressing of 5 cart loads of cattle manure for a single year gave 31 per cent increase over cattle manure with *Perum ragi*.

Cumbu (Fodder) An experiment was conducted in the red soils at Koilpati with this crop under irrigation. The application of ammonium sulphate at 2 cwt. per acre increased the yield considerably for two years, with a record increase of 70 per cent over the control yield of 2,700 lb. dry fodder.

Panivaragu In a two year experiment on this minor millet in the 'permanent manurial' plots, cattle manure gave an increase of 23 per cent over the control no manure; other treatments comprising artificials, viz., N, K and P, individually and in combination with a basal dressing of cattle manure (2,000 lb. per acre) did not show any response except ammonium sulphate alone which gave an increase of 19 per cent over control. Basal application of cattle manure appears to have a depressing effect to the extent of 25 per cent on the general mean yield of 500 lb. in the no-basal manure series.

In the 'old permanent manurials' maximum response was had in the case of N *plus* P closely followed by K *plus* P and cattle manure, all yielding 400 per cent over no manure (101 lb. grain per acre). The other treatments, viz, P, K, N *plus* K *plus* P and cattle manure (residual) have given increased yields ranging from 23 to 196 per cent.

Wheat The cultivation of this cereal under irrigation occupies only an insignificant area in the Coimbatore District. In the few experiments that were conducted in the 'permanent manurial' plots old and new, a good response was had to all treatments except nitrogen. Though this may appear strange at first sight, the reason for the poor response of nitrogen alone is not far to seek. Owing to continuous cropping in the absence of other plant foods—phosphoric acid and potash so necessary for grain formation, nitrogen by itself cannot be expected to function efficiently. Without the basal dressing of cattle manure, the increase in the several cases ranges from 25 to 65 per cent over no manure. Cattle manure by itself was the best; nitrogen alone has given slightly lower yield than no manure. The addition of 2,000 lb cattle manure per acre to all the plots has not resulted in any significant increase in the yields of the treated plots. Response was had with N *plus* P and N *plus* K *plus* P alone with increases of 20 and 15 per cent respectively, over no manure. Excepting cattle manure (residual) and nitrogen (ammonium sulphate) all the other treatments in the 'old permanent manurials' gave very good results with N *plus* K *plus* P topping the list with an increase of 391 per cent over no manure closely followed by N *plus* P (328%); P gave the least response (13 per cent).

Groundnut This is one of the major crops of economic and industrial importance in the Province. This is extensively cultivated in South Arcot under irrigation, either pure or mixed with *ragi*. Manurial experiments on this crop were mainly conducted in the earlier years at Palur and later at

Tindivanam. Being a leguminous crop capable of fixing atmospheric nitrogen it can be expected to establish itself well in normal conditions in light sandy soils provided lime, phosphate and other esential ingredients are present in the soil in sufficient quantities. Another peculiarity with this crop, as in common with other legumes is, that when grown in association with cereals, the latter thrive better than when cultivated alone, due evidently to the nitrogen enrichment of the soil by the legume. The 'Mauritius' variety, when first introduced in this tract, came up well even in the poorest soils which received no manure.

The manurial problem with this crop did not present much difficulty in the earlier years. Later, however, continuous cultivation of this crop in the same land affected the yields and application of manures in the form of lime, farm yard manure, sulphur and bone meal was resorted to, and trials were conducted to assess the exact manurial needs of this crop. In an experiment at Palur it was noticed that application of super (1 cwt. per acre) *plus* ammonium sulphate (2 cwt.) increased the yield by about 20 per cent over 'no-manure' with an yield of 1,130 lb. pods per acre. Manurial experiments were started at the Agricultural Research Station, Tindivanam, with the aid of a grant from the Imperial Council of Agricultural Research to test the effect of artificials supplying nitrogen, phosphoric acid and potash, individually and in combination, with and without a basal dressing of cattle manure. Significant results have been obtained consecutively for two years in favour of the full combination of artificials N *plus* K *plus* P, the increase being 12 per cent over the control with an yield of 950 lb. of pods per acre. Basal dressing of cattle manure at 3 tons per acre did not show any effect on yield.

(To be continued)

Preliminary Trials with Oil Emulsions for the control of Insect Pests

By M. C. CHERIAN and E. R. GOPALA MENON,

Agricultural Research Institute, Coimbatore

Introduction The non-availability of chemical insecticides due to the prevailing war conditions has induced Economic Entomologists in India to endeavour to find out suitable and efficient indigenous substitutes. During the investigations carried out at the Agricultural Research Institute, Coimbatore, Cherian and Ramachandran (1941) have reported that the kernels of *Thevitia neriifolia* Juss are found to possess insecticidal properties of a high order In the course of these experiments there were indications that vegetable oil emulsions as a class possessed valuable insecticidal properties. A considerable amount of valuable work has been done in other countries in respect of mineral oil emulsions but there is very little on record regarding investigation on the insecticidal properties of vegetable oil emulsions against crop pests. It was thought that such a study would

be of material advantage in the field of economic entomology in India especially under the existing conditions when oils of mineral origin are difficult to procure Accordingly studies were undertaken with castor oil, groundnut oil and neem (margosa) oil. This paper gives a short account of the preliminary trials conducted under laboratory conditions. The information gathered so far, gives encouraging indications as to the possibilities of utilising such oil emulsions for the control of insect pests of crops.

Materials and methods The raw, unpurified oils of castor, groundnut and neem available in the bazaars were taken as the basic material for the trials. Stock emulsions were first prepared by taking ½ oz by volume of each of the oils and shaking this in a bottle for a fixed time with ½ oz. of soft soap dissolved in 500 cc. of soft water. Immediately after the emulsification they were further diluted with soft water to make up one gallon of the spray fluid. The emulsions were then used for spraying. The effect of emulsifying the cold extract prepared from the kernels was also studied, for which a known quantity of the kernels was well mashed in a mortar and allowed to soak for 24 hours. The cold infusion was then filtered through fine-meshed gauze, a known weight of soft soap added and the concentrated cold extract thus obtained, diluted to give one gallon of the spray fluid. The trials were conducted on sucking and biting insects like the caterpillars of *Eupterote mollifera* W, grubs of *Epilachna 12. punctata* M., nymphs of *Urentius echinus* D., *Aphis malvae* K, *Aphis gossypii* G and *Aphis medicagenis* K. In the case of *Aphis* and *Urentius* infested leaves freshly removed from the plants were used. The caterpillars and the beetle grubs used for the trials were selected as far as possible of the same stage of development. All the insect specimens were exposed on muslin to the spray for 20 seconds at an average pressure of 6 kg per sq. cm. The sprayed insects were removed to glass cages and examined after 24 hours. Population and mortality counts were made by taking the counts of aphids in unit areas of 3 sq. cm. each, selected at random. The caterpillar and beetle grubs were examined at the end of 24 hours and again at the end of 48 hours, mortality counts being recorded both times and the latter count being taken as final.

The effect of spraying kernel infusions with and without the addition of soap Experiments were conducted to study the effects of the cold extracts prepared from the kernels of castor, groundnut and neem seeds with and without the addition of soap. Different dosages of the kernels and soap were tried. The results are given in Table I.

The results in general indicate that kernel infusions of oil seeds are fairly efficient as insecticides and that their toxicity is increased by the addition of soap.

TABLE I. Effect of kernel infusions on insect pests, with and without soap

Pests concerned	Insecticide tried	Quantity of insecticide per gallon	Quantity of soap used per gallon	Mean percentage of mortality with soap	Mean percentage of mortality without soap
Eupterote mollifera (Moringa hairy caterpillar)	Castor seed	1 oz.	½ oz.	81	86
Epilachna 12-punctata (Brinjal lady bird)	,,	1 oz.	,,	86	86
Aphis gossypii G (Cotton aphid)	,,	¼ oz.	¼ oz	91	71
Eupterote mollifera	Groundnut seed	1 oz.	½ oz.	83	41
Epilachna 12-punctata	,,	1 oz.	,,	78	42
Aphis gossypii G.	,,	¼ oz.	¼ oz.	91	43
Eupterote mollifera	Neem seed	1 oz.	½ oz.	86	72
Epilachna 12-punctata	,,	1 oz.	,,	94	69
Aphis gossypii G.	,,	¼ oz.	¼ oz.	75	82

The effect of oil emulsions on insects Spraying trials were conducted with the emulsions of castor, groundnut and neem oils. In the preparation of the oil emulsions soft water has been used. The emulsions with hard water bring in precipitation of calcium salts and thereby bring about the liberation of free oil and thus reduce the efficiency of the spray fluids. The three emulsions have given high mortality figures in respect of most of the insects tried. The results are indicated in Table II.

TABLE II. Effect of oil emulsions on insect pests

Pests concerned	Insecticide tried	Quantity of insecticide per gallon	Quantity of soap per gallon	Percentage of mortality
(1)	(2)	(3)	(4)	(5)
Aphis gossypii G. (Cotton aphid)	Castor oil	½ oz.	½ oz.	96
do.	Groundnut oil	,,	,,	100
do.	Neem oil	,,	,,	100
Urentius echinus D. (Brinjal lace wing)	Castor oil	,,	,,	33
do.	Groundnut oil	,,	,,	77
do.	Neem oil	,,	,,	91
Saissetia nigra N. (The black scale)	Castor oil	1 oz.	1 oz.	100
do.	Groundnut oil	,,	,,	77
do	Neem oil	,,	,,	61
Eupterote mollifera W.	Castor oil	½ oz.	½ oz.	100
do.	Groundnut oil	,,	,,	94
do.	Neem oil	,,	,,	96
Achoea janata L. (The castor semilooper)	Castor oil	,,	,,	83
do.	Groundnut oil	,,	,,	89
do.	Neem oil	,,	,,	45

Plusia peponis F. (The snake gourd semi-looper)	Castor oil	,,	,,	80
do.	Groundnut oil	,,	,,	75
do.	Neem oil	,,	,,	97
Atteva fabricella (The Alanthus caterpillar)	Castor oil	,,	,,	93
do.	Groundnut oil	,,	,,	70
do.	Neem oil	,,	,,	93
Epilachna 12-punctata	Castor oil	,,	,,	95
do.	Groundnut oil	,,	,,	93
do.	Neem oil	,,	,,	91
Tetranychus telarius (The castor mite)	Castor oil	,,	,,	84
do	Groundnut oil	,,	,,	94
do.	Neem oil	,,	,,	98

Comparative trials with oil emulsion and kernels infusions Trials were conducted to study the comparative efficiency of oil emulsions and the cold extract of the respective oil seeds. The latter possessed the advantage of easy preparation even with hard waters with a minimum of curdling, a phenomenon rather prominent in the case of oils. The results are given in Table III.

TABLE III Effect of oil emulsions and kernel infusions on insect pests.

Pests concerned.	Insecticide tried.	Mortality in seed: Quantity of seed used per gallon	Mortality in seed: Quantity of Soap used per gallon	Mortality in seed: Average % of mortality	Mortality in oil: Quantity oil used per gallon	Mortality in oil: Quantity of soap used per gallon	Mortality in oil: Average % of mortality
Eupterote mollifera W.	Castor	½ oz.	½ oz.	100	½ oz.	½ oz.	100
Epilacha 12-punctata M.	do.	,,	,,	100	,,	,,	100
Aphis malvae K. (The cucurbit aphid)	do.	,,	,,	94	,,	,,	100
E. mollifera W.	Groundnut	,,	,,	69	,,	,,	100
E *12-punctata* M.	do.	,,	,,	86	,,	,,	100
Aphis malvae K.	do	,,	,,	100	,,	,,	98
E. mollifera W.	Neem	,,	,,	66	,,	,,	94
E. 12-punctata M.	do.	,,	,,	86	,,	,,	100
Aphis malvae K.	do.	,,	,,	97	,,	,,	100

The oil emulsions were found to possess in most cases toxic values of a higher degree than the extracts prepared from the seeds. All the three oil emulsions would appear to possess toxic values in an equal degree.

Effect of treatment on foliage It has been found that a maximum dosage of ½ oz. of oil per gallon of water would be sufficiently toxic in the case of most insects. At this strength the emulsions were sprayed on the leaves of mango, citrus, sapota, guava, brinjal, cow-pea, lab-lab and cucurbitaceous plants. No deleterious action was noticeable in any case.

Reference

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SELECTED ARTICLE

Agriculture in the U. S. A.

Sir JOHN BOYD ORR And W. L SIMPSON,

Rowett Research Institute, Aberdeen

The effect of the present war on American agriculture should be studied in the light of the past history of the industry. In the nineteenth century, agriculture was by far the most important industry in America. By the end of the century, farm exports to Europe had reached an annual total of 850 million dollars. With increasing industrialisation, the relative importance of agriculture declined, as in this country a century earlier.

The Effect of the 1914—18 War The outbreak of war in 1914 was followed by a boom in agriculture which reached its peak shortly after the end of the war. The wheat acreage rose from an average of 47 million acres in 1909—13 to 74 million in 1919. The number of cattle increased from between 30 and 40 to over 50 million and the head of swine from 53 to 64 million. The export of beef increased from 150 million lb. in 1914 to 954 million in 1918. Total farm exports increased by 45 per cent. This gigantic expansion of American agriculture was a response to Europe's war and post-war needs which were increased by the elimination of Russia from the world markets.

The Effect of the World Economic Crisis in 1929 After the war America was a creditor nation and exports were continued up to 1928 against loans, of which the Dawes Loan is perhaps the best known. After 1928, however, loans were withdrawn, high tariffs prevented exchange of goods, foreign markets were blocked and American external trade declined. Consequent on a decline in prices and volume of movement the value of imports plus exports fell between 1929 and 1932 from 9496 to 2907 million dollars. This reduction in external trade, which was one of the fruits of the World Economic Crisis, was accompanied by a reduction in industrial output, a fall in wages and a rise in unemployment. Hence, to the fall in exports, there was added a fall in home consumption due to decreased purchasing power.

Urban industry adjusted itself to the crisis by reducing output by about half. This course was not open to the individually organised farming community which continued to produce regardless of profit or loss. The result was that, while the price of goods and services purchased by the farmer came down to about pre-war level, farm commodity prices dropped to about 50 per cent of that level. It was this disparity in the change of the price levels between industrial products and farm products which put agriculture financially in a worse position than other industries. Apart from the armies of destitute unemployed, the farmers were the poorest section of the community.

The farmers in Britain had good cause to complain of the fall in price following the World Economic Crisis of 1929, but their plight was not so bad as that of the American farmers. The slump in trade was not so great in the United Kingdom as it was in America. The comparable figures to those given above were from 8956 to 3561 million dollars. The fact that the United Kingdom was forced to maintain the import of food prevented the slump in trade from being so severe as it was in America, and social measures, such as the housing schemes, provided some employment; others, such as unemployment insurance and old age pensions, helped to maintain purchasing power.

The Effect of the 'New Deal' on Agriculture Roosevelt's 'New Deal' was designed to bring recovery, reform and relief to industry, agriculture and finance. The Agricultural Adjustment Administration was specially designed to help agriculture. Production was restricted and farm produce was actually destroyed in an attempt to bring supplies into a better relationship with effective demand. The ploughing up of 10 million acres of cotton, the premature slaughter of five million pigs and later, of 200,000 sows gave an indication of the extreme measures used to raise prices. These drastic measures to get over what was probably the worst agricultural crisis in history were supplemented and ultimately replaced by measures devised by the Surplus Marketing Administration to enable the surpluses to be sold. The Secretary for Agriculture was given an appropriation equal to 30 per cent of the gross receipts from duties collected under the customs laws, to encourage increased home consumption among poor persons, to increase exports and to re-establish the farmers' purchasing power.

In May, 1939, there was introduced the Food Stamp Plan. Before the end of 1940, food stamps were being given to four million families whose average weekly income was below $ 10. The stamps enable these families to buy for a given amount of money 50 per cent more food and also a greater variety of foodstuffs. This measure relieved the farmer of his supluses and increased his income. His increased purchasing power improved the market for industrial products. The scheme increased the trade of the grocer, relieved poverty and improved the health of low income families. In addition to this Food Stamp Plan, the Surplus Marketing Administration initiated a School Lunch Programme which provided food for six million children at a cost of about $ 7 per child per year. Similar schemes, such as 'Nickel Milk' and the provision of food at Summer Vacation Camps help further to put their surplus food into the empty bellies. In addition to the benefit to agriculture and trade, it claimed that these schemes have resulted in a great improvement in the health and physique of American children.

These schemes, designed to benefit both producer and consumer, mark the beginning of a new social and economic ideal in the United States. As President Roosevelt put it, "economic measures are not ends in themselves". They must be adjusted to social needs. The cure for increasing production is increasing consumption. As Claude Wickard, the Secretary for Agriculture, said in an address in 1940: "We know now that to find a workable way of generating economic well being we have to begin at the bottom by increasing the purchasing power of the lowest income groups" Though these low-income groups could not provide an effective economic demand for food, they have an urgent need for the food. According to this new idea the limit of production is the need for food. Effective economic demand must be adjusted to this need.

Application of the 'New Deal' to war conditions This new view of the national purpose of agriculture and the new method of estimating the extent of the outlet for agricultural commodities affect war production. When the urgent need for food for this country arose, the amount of food to be sent across the Atlantic was determined not by the amount of money we could pay, but by the need of the people of Britain and the exigencies of the shipping situation. It is being sent under the Lease Lend Act which post-pones the question of when it will be paid or how it will be paid. For the first time in the history of international trade human needs are put before economic consideration, and production is now being stepped up earlier in anticipation of needs and more rapidly than it was during the last war.

Farm Production for Victory American agriculture is now organised for maximum production of the commodities needed for war. Mr. Wickard, Secretary-for Agriculture, has called for maximum production of the foodstuffs needed

by America and its Allies. "Every acre of land, every hour of labour, every bit of farm machinery, fertiliser and other supplies" are to be used to the full.

In spite of the depression between the last war and this, American agriculture is in a better position to produce than it was in 1914. In recent years, land conservation schemes, designed to restore fertility in land which had gone derelict, for example, in the "dust bowl," have been carried out with great vigour. Agricultural research and education have led to greatly increased efficiency. Hence although the acreage of crops has fallen between 1930 and 1939 from 370 to 343 million and the number employed in agriculture has decreased by over 5 per cent total production has actually increased by 10 per cent during the past decade. The decrease in the number of workers has been compensated for by increased mechanisation. In the last ten years, the number of tractors has increased from 920,000 to 1,545,000. There has also been an increased output per acre and per animal. The yield of potatoes per acre, for example, has increased by 26 per cent, of cotton by 23 per cent and of eggs per hen by over 30 per cent. In America, as in this country, agriculture was much more efficient at the beginning of this war than it was at the beginning of the 1914-18 war.

The increase aimed at is in accordance with a carefully planned schedule drawn up in anticipation of war needs. Owing to the reserves of wheat held by Canada, there is no need to increase wheat production. The acreage of winter wheat is in fact, being reduced from 45,663,000 to 39,318,000. In the same way, it is anticipated that there will be sufficient cotton and tobacco; so these crops are not being increased. On the other hand, owing to the cutting off of supplies of oil seeds from the Pacific area, there is a great demand for fats and oils. The acreage of soya beans is being stepped up from about 5½ million in 1930—1939 to 10 million in 1941, and of pea nuts from two million to three million. Our country urgently needs foodstuffs which have a high caloric and health value per cubic foot so that the maximum use can be made of available shipping space. Excellent examples of these are dried milk and dried eggs. America itself needs more fruits, vegetables and animal products to maintain and improve the health of its population and the vigour of its workers. Increases in these products have accordingly been planned. The goal in milk production in 1942 is set at 125 billion pounds as compared with 117 billion produced in 1941. All the increase in milk will be needed for cheese, evaporated milk and dried skim milk. 200 million pounds of dried skim milk are required for shipment to Great Britain under the Lease Lend Act. This represents an increase of about 50 per cent in the production of dried skim milk over last year. It is estimated that similarly egg production will be increased by 10 per cent. A considerable part of the increased egg production will reach this country in the form of dried egg. Pig production will increase by nearly 20 per cent. An important part of the programme is an increase in fruits and vegetables. The 1942 programme provides for a 45 per cent increase for canning. The goal of 40 million cases of canned tomatoes is about a fourth higher than the 1941 output and 38 million cases of canned peas is about a third higher than in 1941. There is also a campaign for an increase in vegetables to be used in the fresh state. The goal is "a garden on every farm", i. e., a total of 5,760,000 farm gardens. In addition, there is a drive for the creation of community and school gardens. These gardens are regarded as a vital part of the Food-for-Freedom programme.

The increase in beef production will probably not be as great as in the last war. Production in 1941 was 20 per cent above the 1935 - 39 average. But the 1942 output may show a slight decrease in numbers and almost certainly a reduction in the proportion of well-finished cattle. Nor is there likely to be any increase in the out-put of mutton. Owing to the need for wool, many lambs are being carried on for a year for wool production.

There is little doubt that the increases in production aimed at will be obtained. In 1918, food production in Britain (estimated in calories) was 24 per cent above the pre-war level. On the whole, agriculture in America is not so intensive as it is in this country so that, provided fertilisers and labour are available in sufficient amounts, it should be as easy to increase output per acre or per animal in America as it was in this country in 1916 to 1918. Further, America has still available great potential resources of food production which have not yet been adequately tapped. The increase in production aimed at for 1942 is nearly twice as high as the increase for 1941. Everything that can be given in the next two or three years will be urgently needed for this country, and even more urgently needed to feed a starving Europe as soon as Nazi-ism is defeated.

Inducements to the farmers The farmer has confidence in increasing out-put to the utmost because assurance has been given that prices will be supported by Government commodity loans, by purchase under the Lease-Lend Act, and by food distribution programmes in the United States. There has already been a rise in prices comparable with what has taken place in this country. The index number of prices received by the farmer increased by about 42 per cent between December 1940 and December 1941. There has been an increase in farm wages, but that amounts to only about 30 per cent, and the increase in prices paid by the farmer for what he needs for his farm has increased by only about 17 per cent, so that, on balance, he has a much wider margin of profit this year than last. Like the British farmer, he is required to file Federal Tax Returns provided his gross income be more than $ 750 if single and $ 1500 if married. But he does not need to include in his income the value of food produced and consumed on the home farm nor is the rate of tax so high as it is in this country. Congress has established by law the parity of 110 per cent as an official goal for farm prices, although this may be adjusted in an effort to avoid inflation.

The American farmer has, therefore, every inducement to go all out for maximum production. He is no longer working in despair against a glutted market where he must dispose of his goods at throw-way prices. His market is now guaranteed and prices are high enough to cover all reasonable costs and leave a profit. He has the further incentive that he knows that the food he produces is urgently needed, and that every ounce of food he can produce will improve the health of the people of the United States or be exported to maintain the food supplies of the people of this country or to save from starvation the people on the Continent of Europe as soon as supplies can be sent to them.

Post-War Agriculture We have referred above to the ruinous collapse of American agriculture which followed the boom during and immediately after the 1914—18 war. The dislocation caused to world trade by the present war is much greater than that of the 1914—18 war. If, this time, the course of events be the same, the collapse in agriculture, both in America and in this country, will be much worse than it was last time. But American statesmen have given the world a lead which if followed by the nations, will prevent any such calamity happening. They aim to build a new world in which every person will be adequately fed.

To get an idea of the extent to which production would need to be increased to enable the whole population of the United States to be adequately fed, the Home Economics Division of the Department of Agriculture carried out extensive dietary surveys to ascertain the levels of consumption of different foodstuffs at different income levels. The results were compared with the amounts of food known to be necessary for health. It was found that there was a shortage of the foodstuffs, such as milk, fruit, vegetables and eggs, which are of special value

for health. It was estimated that, if agricultural out-put were to be adjusted to health requirements, production of a number of foods would need to be increased by from 10 per cent in the case of some to as much as 100 per cent in respect of others. This increase was needed not for exports, but to provide sufficient food to enable malnutrition to be eliminated from the United States. Similar results have been obtained from investigations carried out in this country. These are the two wealthiest countries in the world. If freedom from want is to be brought to all men in all lands, we must recognise that there was, before the war, an appalling world food shortage which will be even greater after the devastation of war.

In the meantime, with a generosity unprecedented in the world's history, America is sending to this country the very health foods which she needs for her own population. If all the United Nations show the same spirit, we will have, after the war, a world food policy based on human needs. The point in time when production would be in excess of human needs is so far distant that it is beyond the range of present day practical politics.

But those engaged in food production cannot be expected to work for a wage which gives them a lower standard of living than men of equal skill in other industries. Prices to the farmer and wages to the farm worker are now being raised to that level. If we have, after the war, a food policy based on human needs which will provide a market for all we can produce for many years ahead and if, at the same time, the present policy of paying adequately those who produce the food be maintained, then agriculture, both in America and in every other country, can look forward to a new era of prosperity — (*Scot. J. Agri. 24, 9—14, 1942*).

The Storage of Eggs

By P. RUMBALL, POULTRY EXPERT

Eggs are preserved, on the commercial scale, almost universally by means of cold air storage. For the small producer or consumer, such a procedure is generally impracticable and resort has been made to simpler methods. Packing the eggs in sand, bran, ashes, lime, or salt was once used, but these methods have now been abandoned in favour of storage in solution in which the eggs are immersed and held until required for use.

The choice of a suitable solution is determined by certain considerations. The shell of the eggs and its adhering membranes are permeable to water and certain dissolved substances; so care has to be taken lest the preserving solution contains an ingredient likely to pass into the eggs, thereby affecting its flavour or contaminating it in some way. Various substances have been tried and rejected for different reasons, so that, at present the two solutions most commonly used are a solution of sodium silicate, better known as water glass, and lime water. An excellent alternative method is known as buttered eggs.

Fundamentally, egg preservation still requires a certain degree of cold, and, although for satisfactory results constancy of temperature is unnecessary, it is essential that the eggs should be stored in a cool place where, if possible, the temperature should always be in the range of 33° to 50° F.

Water Glass Method A strong solution containing approximately equal parts by weight of sodium silicate and water is sold commercially. It is very viscous and has a specific gravity of 1·7. A five per cent solution of this is a convenient concentration to use.

Lime Water Method Four parts of finely-slaked lime are mixed with twenty parts of cold water and the whole well stirred at intervals for several days to ensure saturation. One part of salt is then added and the clear solution decanted

and poured over the eggs, which should be placed in suitable wooden, cement or galvanised containers.

Buttered Eggs This is one of the easiest methods of storing eggs. It should be done soon after they are laid. Only good, fresh butter should be used, as inferior butter is likely to impart an objectionable flavour to the eggs. The process is quite simple. A small portion of butter is rubbed in the palm of each hand and the egg is then rolled between the hands, care being taken to ensure that every part of the egg is smeared. When the eggs are completely smeared they should be placed in the holes of a perforated tray, broad ends upwards, and stored in a cold place which is not subject to much variation of temperature.

Preservation Principles and Practice If the egg storage containers are open to the atmosphere, the carbon dioxide in the air reacts with the solutions, giving a white precipitate. In the case of lime water, it is simply a precipitate of calcium carbonate, while with the water glass, silica itself is precipitated because of the neutralisation of the alkali. It is advisable, therefore, in order to maintain the solutions at the required strength, to cover the containers and so limit the ingress of carbon dioxide.

In each case, the eggs to be preserved should be clean and new laid and should not at any time have been subjected to a temperature much higher than 60°. It is advisable, therefore to candle the eggs and reject cracked ones, or any below the standard of freshness. Slightly soiled eggs may be cleansed with a damp cloth but not washed, and in no circumstances should badly soiled or cracked eggs be included. The receptacle in which the eggs are preserved should be perfectly clean and scalded with boiling water. Most investigators claim that water glass is the more satisfactory solution.

Using the solutions described, and in addition storing the eggs at a temperature of 32° to 35° F., eggs have been preserved in the course of experiments for twelve months in both solutions with good results. The taste of the eggs stored in water glass was excellent, the air chamber was the same size as before storage, and the white had all the consistency of a new laid egg. The eggs fried and poached well, but nearly always cracked on boiling unless the shell had been first pierced at the broad end. The only other point was that the shells had a slight crusty deposit, which was not removed on washing with water

The eggs stored in lime water were not so good, although the flavour was excellent. In all cases the air chamber had completely disappeared and the white was more fluid and tended to spread when the contents of the egg were emptied into a dish. The shell in every case was markedly thinner and appeared rough. In general, the shell cracked on boiling, even though pierced. Presumably, the action of the lime water had made it very brittle.

The efficacy of water glass and lime water as a means of preserving eggs is without question. Used in connection with a rough system of cold storage (i. e., paying no particular regard to constency of temperature but merely temperature limits), either method gives excellent results, with the preference, so far as present experiments show in favour of water glass. The cost of the water glass is small and apart from the extra labour involved—*e. g*, the washing of the eggs on removal from the solution—the only disadvantages are that the surface of the shell is marred and there is every possibility of the shell cracking on boiling. It would seem, however, that further research might reveal ways of removing these objections. Moreover, there appears to be no reason why, if clean eggs alone are used, the same preserving liquid should not be used for severel storage seasons. Lime water, possibly, has the advantage in this respect, as it is definitely antiseptic and is less likely to develop mould and bacterial contamination than water glass under the same conditions. (*Queensland Agri. J. 57,242-43, 1943*).

Extracts

Bacterial quality of market milk and the conditions under which it is handled

The number and type of bacteria found in milk are the best index of the conditions in which it is produced, handled or stored. From public health point of view, the above aspect is of considerable importance. A sample of milk may be chemically pure and unadulterated but on account of faulty handling or exposure to contamination it may be grossly objectionable and even dangerous to use from the bacteriological stand point. In other countries ever-increasing stress is laid on clean production and handling of milk under hygienic conditions. In some of them bacteriological standards are also fixed for market milk and for milk sold under different grades.

In India although the defective, filthy and often dangerous methods employed in the production, handling and distribution of milk are generally well known to all including the public health authorities, little or no biological work has been done so far to bring to light the real state of affairs or their effects on public health.

As far as is known the credit of making the first bacteriological examination of market milk in India goes to Dr. L L. Joshi, M. D., Municipal Analyst, Bombay some 25 years ago. All his findings are published in the *Milk problem of Indian cities* (1916); but these have unfortunately remained as items of academic interest only. The table below is compiled from the above memoir.

Number of bacteria per c. c. of raw milk in Bombay.

Set	*Particulars of milk samples*	*Average no. of bacteria per c. c*
I	Two samples obtained from healthy animals milked after thoroughly scrubbing and washing them. The udder and flanks were washed with antiseptic solution and finally with sterile water. The hands of milkmen were rendered surgically clean. The milk was drawn in sterile glass bottles and subjected to an immediate examination	292
II	68 samples collected from city milk stables with ordinary precautions 3 to 4 hours after milking	17,103,000
III	240 samples of market milk at random from dairies, milk shops, cattle sheds, milk hawkers, 6 to 9 hours after milking	36,000,000

Another interesting set of figures indicating the bacterial counts in milk at Bombay and in sewage of London and Boston are reproduced below.

Sample	*City*	*Bacteria per c. c.*	*Name of investigating authority*
Milk	Bombay	36,385,000	Joshi
Sewage	London	2 to 11 million	Rosenau
Sewage	Boston	2,800,000	Rosenau

Too much stress cannot be made on the above comparison as different methods would have been adopted. At any rate Bombay enjoys the dubious honour of standing first in the above list.

With a view to examining factors affecting the bacterial count in the production and handling of milk as well as exercising day to day control on its bacterial quality, the Imperial Dairy Institute, Bangalore, made certain bacterialogical studies on farm produced milk. Samples of milk were examined in different stages.

Hours	*Stage after milking*	*Count per c. c.*
—	In milking pail	6,800
¼	In weighing pail	27,300
1	In container (churn)	91,300
2	In bulked milk before pasteurisation	2,25,000
2½	After pasteurisation	9,400
3	After bottling	15,000
18	In returned milk	1,21,000

Even without having a series of comparative figures from other farms, the above study is of enormous value to show that under farm conditions it is possible to produce quite clean milk. It also shows the efficiency of pasteurising in making the milk safe, extending its saleable life.

The comparison of the number of bacteria found in the raw milk 3 hours after milking (2,25,000) with that found by Joshi in the milk obtained after 3 hours (17,103,000) shows how grossly contaminated the Bombay milk supply is.

Bacterial standards for market milk in other countries— England

Grade Certified	Herd to be tuberculin tested every 6 months. Maximum microbes to be 30,000/c.c. and no B. Coli in 1/10 c.c. No treatment by heat permitted.
Grade A (TT)	Herd to be tuberculin tested every 6 months Maximum microbes to be 2,00 000/c.c. and no B coli in 1/100 c.c. No treatment by heat permitted.
Grade A.	Herd to be subjected to clinical examination every 3 months. (same as A (TT). No heat to be applied; if pasteurised becomes Gr. A pasteurised.
Pasteurised	Maximum microbes to be 1,00,000/c c. No treatment more than once by heat allowed.

Increasing attention to bacterial quality is paid to market milk in most countries. Quality control really commences with the cow itself, particularly in the case of tuberculosis. The first attempt for bacterial standards was made in 1900 in New York by the Board of Health. Originally it prescribed a minimum of 1,000,000 bacteria per c.c., but later this was considerably modified. The legal standard for Boston is now 5,00,000 microbes per cc. Under the Milk Special Designations Order, 1923, in England the above standards are prevalent. (Vide table above)

The requirements under the grade standards for market milk in England and in Bombay shows how unhygienic is the latter's supply. Bacterial standards by themselves will not solve the problem unless there is practical and effective control on the production, handling and sales of market milk. Before suggesting suitable standards a good deal of study of the conditions and the practicability of application and effecting improvements is needed and the Health Department should give increasing attention to the subject of bacterial quality of milk.

For testing bacteria in India it would be advisable to adopt the 'methylene blue reduction test' for bacterial counts.

This test has been used in Europe for many years but is now intensively used by all the dairying countries for determining the bacterial quality of raw milk. The results are considered reliable and as reliable as those obtained by the method of plate counts.

The test is based on the fact that bacteria have the power of reducing various dyes, including methylene blue. If therefore methylene blue solution is added to milk, the bacteria present react and the blue colour eventually disappears. The greater the number of bacteria in a sample of milk, the more rapid would be the loss of colour. The process for the test is simple and inexpensive and

elaborate apparatus and qualified workers are not required. 1 c.c of the methylene blue solution of a specific strength is added to 10 c c. of milk. The sample tubes are placed for incubation in a water bath at a temp of 98° to 100°F. The following classification is used—

Standard classification for bacterial quality of milk based on the methylene blue reduction test

Grade		*Time taken and the approximate number of bacteria per c.c. of milk*
1	Good	Not decolourised in 5½ hours, containing as a rule ½ million baceria per c.c.
2	Fair average qulity	Decolourised in less than 5½ hours but not less than 2 hours containing as a rule ½ to 4 million per c c.
3	Bad	Decolorised in less than 2 hours but not less than 20 minutes, containing as a rule 4 to 20 million bacteria per c.c.
4	Very bad	Decolorised in 20 minutes or less, containing as a rule over 20 million bacteria per c.c.

(*From Report on the marketing survey of milk in India, 1943.*)

Fundamental Economics of Export Crops The Industrial Revolution is familiar to all of us, but how many of us have ever stopped to think out the implications of the astonishing Agricultural Revolution which has accompanied it? Let us look back for a moment.

Trade in agricultural products, like trade in manufactured goods, is no creation of the last century and a half. Both have existed through history. It is their scale and the conditions under which they are carried on which have been revolutionized beyond all recognition. But while the social and economic consequences of the Industrial Revolution are inescapably obvious all round us, the true nature of the Agricultural Revolution seems to have remained hidden behind the different problems it has raised, which have appeared as separated though often inter-connected difficulties instead of being recognized as different manifestations of one basic problem.

As a result we tinker—can we really call it more?—with our problems of soil erosion, dust bowls, floods, droughts, diminishing fertility, wasteful and shifting cultivation, without thinking out the fundamental principles of the process in which we are engaged. Baldly, what we have built up is an elaborate system for exporting fertility from the tropics and dumping it into the sea *via* the sewers of great cities.

The great industrial populations of the earth clamour for foodstuffs to use and finally dispose of in their cities. The farmers of the civilized world, constantly feeding the precious fertility of their land to the cities in the form of dairy products, meat and vegetable foods, clamour for feeding materials and plant nutrients from distant lands. The manufacturers of the industrialized world clamour for the raw materials and the crops of tropical and other farming countries, to transform them into products of which only a minute proportion eventually returns to the countries and so to the soils that produced them. At the producing end, the governments of agricultural communities dream of annually soaring export figures accompanied by corresponding imports of manufactured goods (most of which unfortunately do not greatly help the hungry land), abundant revenue and a prosperous and contented community. Scientific methods of farming and that noble animal the cow will, it is held, look after the land

But there is an unfortunate, and it may well prove tragic, oversight in all this. We cannot escape the law of conservation of matter. With all our science and with all our cows we can only transform, transport, redistribute, conserve

plant nutrients, we cannot create them. If we export them faster than nature can replace them, we must either import them from somewhere else or reap a harvest of failure. Our proudly quoted export figures, besides being a measure of our income, also represents a loss to the soil which must be made good from somewhere before we can justifiably start talking about our profits.

We read, for instance, of a thousand tons of paddy rice being sold in some market at fifteen cents a kilo, and we probably think of this transaction solely in terms of the £ 7,500 which the fortunate growers receive. We usually forget that there has been exported from the cultivators' land some twelve tons of nitrogen, six hundred and sixty pounds of calcium oxide, the same quantity of potash, thirteen hundred pounds of sodium oxide, two tons of phosphorus, seven hundred and fifty pounds of chlorine, thirty tons of iron, quantities of sulphur, magnesium, iodine and traces of certain other substances.

Fortunately a number of plant nutrients—carbon, oxygen and hydrogen—are available in the atmosphere, so that given rain and air our supplies of these elements are inexhaustible. The same is true of nitrogen, provided conditions are such as to allow of its fixation by means of leguminous plants, but when we come to the other essential soil constituents, the minerals, we find a very different state of affairs These substances are derived from the weathering of the rocks and the available supply is limited by four factors, the composition of the rocks, their rate of weathering, the proportion of decomposition products that reaches the surface layers of the soil and the rate at which this occurs. If by over-cropping we remove them from the surface layers faster than they arrive, sterility must ensue.

Let us consider how this works out in East Africa. The African with his primitive methods has long ago discovered that a given piece of land will not yield a crop indefinitely, and has therefore adopted the system of shifting cultivation at which so much abuse is so constantly hurled. It is, however, only fair to point out that the native does not move for fun. He dislikes it immensely. It involves him in a great deal of heavy labour. He moves because he has to and would starve if he did not.

Having worked out one piece of land he selects another plot, his choice depending in many cases on the type of vegetation upon it, which he has come to associate with certain soil properties. He then cuts down the trees and grass and fires the lot, which causes the European heart-burning, but provides him with a much needed supply of ash as fertilizer. When the plot is worked out he leaves it. Bushes and trees grow up, their deep roots tapping the sources of minerals in the sub-soil and conveying salts to the leaves, which eventually fall and restore fertility to the impoverished soil so that barring destruction by erosion before vegetation has had time to cover it again, it becomes once more fit for cultivation.

Nowadays, the African is being taught that this system is wasteful and various schemes have been set on foot to make a respectable farmer of him. Side by side with a drive towards more and yet more crops, he has been urged to farm the same plot year after year by adopting rotations, which are invaluable as a means of supplying organic material and nitrogen to the soil, but can in no wise increase its mineral content because the essential salts come only from the weathering of the rocks. He has been urged to adopt scientific methods of mixed farming and composting, with which none could pick a quarrel were their limitations duly taken into account. But a misapprehension appears to have arisen that if only one has a cow all things are possible agriculturally. The wretched beast has had supernatural powers ascribed to her. She has become a sort of fertility symbol, and it has been forgotten that though a cow may be very useful

in transforming matter or transporting it in her belly, she is quite incapable of creating it. She cannot defy the law of the conservation of matter, and consequently nothing can come out of her which does not first go into her.

Let us take an example. A peasant farmer is given twenty acres and a cow. He grows a cash crop, say cotton, food for himself and fodder for his beast. He is an industrious man and produces perhaps half a ton of seed cotton and a surplus of food which he sells. He buys a bicycle and puffs out his chest with pride and is held up as a shining example to his less enlightened brethren. Year by year he toils, the ideal pains-taking farmer—rotations, paddocks, legumes, catchcrops, milk sales, fodder crops, contour ridges—sheer joy to his teachers. But his yields fall, his cow sickens and dies, and one day, alas! he says he must move. What has happened? Every year he has been exporting minerals from his land, exporting at a greater rate than weathering has been able to replace them. In spite of his conservative methods, he has been, not an intelligent progressive farmer, but a poor fool living on capital. He has spent not a penny on importing fertility, but has squandered his plant nutrients on bicycles, trunks and clothes—trash so far as the land is concerned.

Rotations, mixed farming, anti-soil erosive measures and so on are essential if the best use is to be made of the land, because they help to conserve plant nutrients and prevent their wastage. But the conservation of nutrients is one thing, their creation quite another, and what we must realise is that no system of farming, however advanced, can possibly put certain essential minerals into the land which are not there, unless they are imported from elsewhere. Not even the poor cow can overcome this, for all she can do without imported feed is to assist in the transference of soil nutrients from the paddock to the arable land, with the consequent impoverishment of her own food supply. In Europe the process of deterioration is arrested by the use of "artificials" and by feeding the herds on cotton seed and groundnut cake taken from our peasant cultivator's land, a process which is in fact transferring the essentials of the black man's existence to the white man's pastures, thence, as we have already pointed out, to the millions in the towns and eventually *via* the sewer into the sea.

Without the importation of fertility in some form or other this process can go on indefinitely only so long as the fertility exported does not exceed the annual increment of fertility produced by the weathering of the rocks of the country, and one of the most necessary pieces of research is an investigation into the value of that increment. Naturally it varies from place to place. Much of our river valley land possesses considerable powers of recuperation; other areas like the central plateau country in Tanganyika are very slow in regaining lost fertility; and it is perhaps unfortunate that the richest land we possess is often unhealthy and sparsely populated.

* * * * *

The same process can be observed in other parts of East Africa; does not one even hear of agricultural settlements barely a few years old already in difficulties over soil fertility? It is madness to blind ourselves to the grim truth that we are not only allowing, but earnestly encouraging, natives to export what is in fact more than the annual increment of soil fertility. They are living on capital and heading inexorably for agricultural bankruptcy in many areas.

The various schemes for introducing better farming methods prevent waste and encourage the more economic utilization of our resources, but they are mere palliatives so long as our export trade continues unbalanced by any adequate return of lost plant nutrients to the land.

There are only two economic ways open to us. Either the crop exports from any area must be reduced to balance the annual increment of fertility from

weathering—and it seems likely that this would mean a very considerable reduction in many cases—or imported fertilizers must be applied to the land to make good the deficit. The former is unlikely to commend itself, while to the latter it will indubitably be replied that "artificials" are expensive and we cannot afford them. Are we any better able to afford to live on our capital?

"With adequate knowledge", says Professor Soddy, "of the physical realities that dominate the economic affairs of the peoples, the road is clear for unlimited progress and the attainment of universal peace and prosperity." He strips the science of economics right down to its basic priniciples, the fundamental physical realities, of which the ordinary economist too often stops short in his thinking, and sums up in a few words: "The production of wealth.....obeys the physical laws of conservation and the exact reasoning of the physical sciences that can be applied. Wealth cannot be produced without expenditure, and a continous supply of wealth cannot be supplied as the result of any expenditure once for all. Its production demands a continuous supply of fresh energy."

Our modern economic system has fundamentally altered the conditions of agricultural production in such a way as to draw recklessly on the stored resources of the land, too often without adequate provision for maintaining a balance between what is drained from it and what is put into it, either by natural processes or by human agency; and where individual pieces of land are well tended, it is all too often achieved simply by robbing some other pieces, perhaps the pastures next door, perhaps the fields of a distant continent, of their plant nutrients. We have become a generation of unparellelled wasters of capital, the loss of which is likely to eventually hit the peoples of the world in a tender spot.—A. T. Culwick, M. B. E., M. A. (*E. Afri. Agri. J. Oct. 43.*)

Gleanings

New method of seed extraction* In Australia and the United States of America, the usual method of tomato and cucumber seed extraction involves the fermentation of pulped well ripened fruit for 24—48 hours in order to free the seed from the plup. This process is time-consuming, and is not always entirely satisfactory.

An officer of the Division of Plant Industry, C. S. I. R., has discovered a simple and inexpensive new method which overcomes many of the disadvantages inherent in the old method of seed separation by fermentation. The principle of the new method is to add commercial hydrochloric acid (muriatic acid) to the pulped fruit after which the seed is washed out in the usual way. Tomatoes should be pulped in a wooden barrel or galvanised iron container painted inside with quick-drying bituminous paint, as the acid attacks galvanised iron. Cucumbers are mechanically crushed before placing in the container or are cut lengthwise and the seed-containing flesh scraped into the container, the skins being discarded. The pulp should be well stirred while the acid is acting. If any difficulty is experienced in incorporating the acid into the mixture, the acid can be diluted with about twice its volume of water before mixing with the pulp. After one hour the seed can be washed out in the usual way.

With tomatoes the acid is added at the rate of 1½ gallons per ton of fruit, which is equivalent to 62 c. c. or one-tenth pint per box of 25 lb. of fruit.

With cucumbers, where the whole fruit is crushed for seed extraction, the same quantity of acid used with tomatoes is satisfactory. Where the seed-containing pulp only is used, 2½ gallons acid per ton of plup which is equivalent to

*Information supplied by the Commonwealth Council for Scientific and Industrial Research

125 c. c. or one-fifth pint per 25 lb. of plup is needed. The cost of acid per ton of pulp is in the vicinity of 4s. with tomatoes and 8s. with cucumbers, buying acid in 3-gallon jars.

Apart from the considerable saving in time, the new method has the advantage of producing a brighter, cleaner seed sample, which is free from all traces of pulp. Germination is not adversely affected in any way, but is rather improved because of the absence of traces of flesh which carry mould spores and other organisms which interfere with germination, and which can cause disease in the plant. Fruit at all stages of ripeness can be treated with equal success, so that fruit can be picked and processed as soon as it is ripe. Seed yields tend to be higher with the new method, as a better extraction is obtained. It is possible to treat tomatoes or cucumbers and have the seed dried and bagged the same day. *(Queensland Agri. J. October, 1943)*

Storing Sweet Potatoes Farmers are aware that sweet potatoes rot very rapidly after being dug (especially in the hot weather). The following experiment indicates a method of preserving them indefinitely.

About 50 lb. weight was put in a drum on 17th July, 1942, with alternate layers of fresh wood ash. Monthly tests indicated that they were keeping well. The drum was finally tipped out on 27th November and only two or three small potatoes were found to be decomposed.

As illustrating "That there is nothing new under the sun", a Northern native assistant informed me that his people frequently dug sweet potatoes in August, dug a hole in the ground, put in a layer of sand, then filled the hole with alternate layers of potatoes and wood ash finally covering with earth. He claimed that they kept in good condition until the following February. *(E. Afr. Agri. J. October, 1943)*

Should you plant by the moon? Because statements are frequently made by farmers that planting crops during certain phases of the moon is conducive to favourable plant growth, the following extract from the report of the Australian Association of Scientific Workers should be of particular interest.

"It is often claimed that the germination of seeds and growth of the resulting plants are most successful when they are sown at some favourable time, as determined by astrological aspects, particularly the moon. As this would be of great agricultural importance if true, exact scientific experiments were carried out in recent years

"At the State Botanical Institution at Munich in 1937 and 1938, seed was sown on days designated as favourable or unfavourable according to the Moon Calendar of Lorenz and Bauer. Otherwise the plants were treated in a normal manner. Results showed clearly that radish, common radish, cucumber, tomato and certain other plants produced equally good crops irrespective of whether the day of sowing was 'favourable' or not.

"Experimental trials were carried out at the John Innes Horticultural Institution in 1940. Radishes, cabbages, beans, carrots and onions were sown four times during every lunar cycle, the seeds being placed in the ground two days before the dates on which each of the four quarters of the moon fell. Seed was sown both in and out of doors. The results showed that outdoors temperature had a greater effect than any other factor. There was an improvement in April, due to rising temperature and a large fluctuation in late June, probably due to low rainfall which effect had been minimised by watering the drills, before sowing. The June drought had the greatest effect on the smallest seeds (carrots); the larger seeded radishes, cabbages and beans showing progressively smaller fluctuation. No correlation was found between speed of germination and phases of the moon, a phase giving good germination in one month but giving poor germination in other months.

"It was found that indoors, the speed of germination was much more constant than outdoors owing to greater control over the conditions of temperature and moisture. Here also no consistent effect of the moon was observed.

"Thus sowing in good conditions of soil and weather will always give good results, while sowing with the moon will convey no advantage, and may result in a sacrifice of some of the proven advantage of good soil and weather conditions."

It should be noted that the investigations quoted were conducted by research institutions of international standing.—S. L. Macindoe, Plant Breeder.

(Agri. Gaz. N. S. W. October, 1943)

Correspondence

To

The Editor, Madras Agricultural Journal.

My experiences in green-manuring paddy

Sir,

I started growing green manure crops in my village some ten years ago and to-day out of 400 acres nearly 300 acres are under green manures. Having a variety of soils the green manure crops *Dancha*, *indigo*, *Kolingi*, and *Pillipesara* have been under cultivation in my lands. Before the introduction of green manure crops I used to get on the average about 1200 lb of paddy from an acre. By constantly growing green manure crops year after year the yield began to rise up gradually until a few years ago, when the yield doubled. Now on the average I get about 2500 lb. of paddy per acre. In conjunction with green manures I always use artificial fertilisers. As the green manure crops are not completely adequate for the supply of the essential elements they should be supplemented with artificial fertilisers like sulphate of ammonia, ammonium phosphate, bone meal or super. Now as no other fertiliser is available in the market I use large quantities of Parry's paddy fertiliser with good results. Certain alkaline soils which were once uneconomic wastes have been completely reclaimed by growing green manure crops in them. In short the yield of paddy in all my lands has been doubled and in some plots the yield has even exceeded this limit.

There is a practice in these parts to sow pulses like blackgram or greengram in the standing crops of paddy a week or even earlier previous to harvest of paddy. Many are under the mistaken impression that there is no chance to raise a green manure crop, when a pulse crop which is paying very well on account of the rise in price now-a-days is to be taken. In fact a green manure crop and a pulse crop can be mixed and sown. The yield of the pulse is not affected nor the growth of the green manure crop spoiled. By the time the pulse is harvested the green manure crop would have made a few inches of growth and only after the pulse is harvested the green manure crop puts on growth. I have always been getting a good yield of blackgram even when mixed with a green manure crop. In lands of average fertility the yield of blackgram is only 200 lb. an acre. But I get an average yield of 450 lb. due to green manuring my wetlands in conjunction with artificials. Lands which were not giving an yield of even 50 lb. of pulse are now capable of a return of above 400 lb. Indigo and black-gram can be mixed in the ratio of 1:3 and sown. *Pillipesara* also can be sown in the same proportion.

In conclusion I say once again, that green manures are indispensable for enriching the soil and thereby increasing the production of crops. They lighten the burden of cost of production of crops under the present day war conditions and ensure an increased return to the cultivator. In short they are a great blessing and a 'God-send' to him to replenish his impoverished soils.

Keelaparambai,
Chidambaram Taluk,
S. Arcot

Yours etc.
B. Sivaloga Mudaliar, B. A.

Water-divining

Sir,

With the idea of improving the existing sources of water supply in my estate, I have on various occasions sunk bore wells with the help of hand boring and power drill sets of the Industries Department without much success. All my efforts were in vain as no good springs were met with and I had to give up my efforts after having spent large sums of money.

About the middle of last year, having come to know from some friends about the water divining powers of Mr. Tharyan, the Industrial Engineer with the Government of Madras, I decided to seek his advice and help. Early in July 1943, Mr. Tharyan visited my estate and selected three sites in three villages and suggested boring with a power drill. The work was started in October through the kind co-operation of Mr. Somaraju, the Assistant Industrial Engineer at Bezwada. Within 3 feet of the ground level granite rock was met with. Though this caused some discouragement and made me doubt about the soundness of the advice of the 'water diviner', Mr. Tharyan assured me that the appearance of rock at that level need not discourage me and that at a depth of 61 feet water springs will be met with. The work was continued. The hard rock was passed at 50 feet and the first spring was tapped at 59 feet and the water level rose to 30 feet. Having met with this initial success Mr. Tharyan was approached for further instructions. He suggested that as considerable quantities of water were required for irrigation purposes, the boring may be continued to a depth of 300 feet from ground level where good springs would be met with. Already three springs have been topped within 75 feet of ground level and this has given me confidence in what Mr. Tharyan has to say. Hence I have decided to take this bore down to 300 feet and also to try boring operations on the other sites selected by him.

I am sure that many big land holders and the ryots who may have had similar experiences in spending large sums of money on futile boring operation will be very glad to learn that here is a man who can help them. Mr. Tharyan's powers in locating springs, are something uncanny. He is able to tell you the existence of under-ground water springs as he is driving or walking along the ground. He usually locates the water springs without the aid of the so-called divining rods. He is a naturally gifted water diviner and generally selects sites where there is an interception of more than one spring. He is also able to say whether a spring will be good or saline. I suggest that his service may be availed of by one and all in selecting sites for boring operations and for the sinking of wells and I trust that my brother land lords and agriculturists will avail themselves of the opportunity. He has retired from service and has settled down at "Clemens Villa", Modavakkam Road, Kilpauk, Madras.

Yours faithfully,
N. Venkataranga Rao
Raja of Munagala.

11th January 1944.

Crop and Trade Reports

Statistics—Ginger—1943—Final Report The area under ginger in 1943 is estimated at 13,000 acres in Malabar and 700 acres in South Kanara as against the actual area of 10,349 acres and 627 acres respectively in the previous year.

The crop is reported to have been affected to some extent in parts of Malabar by 'soft-rot' disease, and by continuous heavy rains in South Kanara. The seasonal factor is estimated at 95 per cent of the normal in both the Districts as against 95 per cent in Malabar and 100 per cent in South Kanara in the previous year. On this basis, the yield is estimated at 4640 tons of dry ginger (4,400 tons in Malabar and 240 tons in South Kanara) as against 4,040 tons in the previous year (3,900 tons in Malabar and 140 tons in South Kanara). (*From the Commissioner of Civil Supplies, Madras*)

Statistics—Castor—1943—First or Final Report The average area under castor in the Madras Province during the five years ending 1941-42, represents 18.5 per cent of the total area under castor in India.

The area under castor in the Madras Province up to 25th November 1943 is estimated at 252,000 acres When compared with the area of 273,300 acres estimated for the corresponding period of last year, it reveals a decrease of 7 8 per cent. The estimate of last year was less than the actual area of 277,288 acres by about 1.4 per cent.

The crop is grown on a large scale in Guntur (25,500 acres) the Deccan (122,800 acres), Nellore (38,000 acres), and Salem (19 000 acres). It is not grown in Chingleput. The area estimated for the current year is the same as that of last year in Tanjore and South Kanara. An increase in area is estimated in Vizagapatam Bellary, Trichinopoly, Tinnevelly and Malabar and a decrease in area in the other disfricts of the province.

The yield per acre is expected to be below normal in Vizagapatam, Anantapur, Chittoor, Malabar and South Kanara and normal in the other districts of the province. The seasonal factor for the province as a whole is estimated at 97 per cent of the normal. On this basis the yield is estimated at 24,400 tons as against 24,800 tons estimated for the corresponding period of last year and 23,000 tons estimated in the season and crop report of last year.

The wholesale price of castor per imperial maund of 82 ⅔ lb. as reported from important markets on 18th December 1943 was Rs. 15—9-0 in Vizagapatam Rs. 15—1—0 in Vizianagaram, Rs. 14—7—0 in Cuddapah, Rs. 14—4—0 in Nandyal, Rs 14—1—0 in Guntur, Rs. 12—9—0 in Bellary and Rs 11—2—0 in Hindupur. When compared with the prices which prevailed on 21st December 1942, those prices reveal a rise of approximately 58 per cent in Ballary, 51 per cent in Vizianagram, 38 per cent in Cuddapah, 29 per cent in Nandyal and 19 per cent in Hindupur. (*From the Commissioner of Civil Supplies, Madras.*)

Statistics—Cotton—1943-44—III Forecast Report The average area under cotton in the Madras Province during the five years ending 1941-42 represents 9·8 per cent of the total area under cotton in India.

The area under cotton up to 25th November 1943 is estimated at 1,681,400 acres. When compared with the area of 1,931,000 acres estimated for the corresponding period of last year, it reveals a decrease of 12·9 per cent. The decrease in area is attributed partly to the prohibition of the cultivation of pure mungari cotton in the Deccan and partly to the preference given for the cultivation of food crops in the central districts.

The estimated area is the same as that of last year in Tanjore and South Kanara. An increase in area is estimated in East Godavari, Nellore, Chingleput and Tinnevelly and a decrease in area in the other districts of the province. The variations are marked in Guntur (—14,000 acres), Kurnool. (—45,000 acres), Bellary (—72.000 acres), Anantapur (—14.500 acres), Cuddapah (—23 000 acres), Salem (—38,600 acres), Coimbatore (—57,800 acres) and Tinnevelly (—47,900 acres).

The area under irrigated cotton, mainly Cambodia, is estimated at 209,300 acres as against 225,900 acres in the corresponding period of last year, which represents a decrease of 7·3 per cent.

The yield per acre of the Mungari or the early sown crop in the Deccan is expected to be generally normal. The condition of the Hingari or late sown crop is satisfactory.

Normal yields are expected in all the districts except Vizagapatam, Guntur, South Arcot, Chittoor and Tinnevelly. The seasonal factor for the province as a whole works out to 100 per cent on the average as against 90 per cent for the corresponding period of the previous year. On this basis, the total yield is estimated at 406,500 bales of 400 lb. lint as against 393,900 bales estimated for the corresponding period for the previous year, representing an increase of 3·2 per cent. The crop is young and it is too early to estimate the yield with accuracy.

The estimated area and yield according to varieties are given below :—

(Area in hundreds of acres i.e., 00 being omitted ; yield in hundreds of bales of 400 lbs. lint i. e., 00 being omitted.

Variety	Area from 1st April to 25th November		Corresponding yield.	
	1943	1942	1943	1942
	Acres	Acres	Bales	Bales
Irrigated Cambodia	2 606	2,159	1,426	1,350
Unirrigated Cambodia	1 936	2,714	534	577
TOTAL CAMBODIA	3 942	4,873	1,960	1 927
Uppam in the Central Dists.	108	191	18	31
Nadam and Bourbon	193	340	9	17
TOTAL SALEMS	301	531	27	48
Tinnevellies *	3,636	3,280	913	819
White and Red Northerns	1 470	1,850	184	185
Westerns	6 475	7,640	809	765
Warangal and Cocanada	934	1,060	165	186
Chinnapatty (Shortstaple)	56	76	7	9
TOTAL	16,814	19,310	4,065	3,939

* Includes Karunganni in Coimbatore, Uppam, Karunganni and mixed country cotton in Madura, Ramnad and Tinnevelly.

The local cotton trade is not generally active at this time of the year. The average wholesale price of cotton lint per imperial maund as reported from important markets on 11th December 1943 was Rs. 37—1—0 for Cocanadas, Rs. 34—13—0 for White Northerns, Rs 34-9—0 for Red Northerns, Rs. 23—14—0 for Westerns (Mungari), Rs. 26—12—0 for Westerns (Hingari), Rs. 68—13—0 for Coimbatore Cambodia, Rs. 56—15—0 for Coimbatore Karunganni and Rs. 37—4—0 for Nadam cotton. When compared with the prices published in the last report i. e., those which prevailed on 8th November 1943, these prices reveal a rise of approximately 27 per cent in the case of Westerns (Hingari) and a fall of approximately 2 per cent in the case of Cocanadas, 12 per cent in the case of Westerns (Mungari), 4 per cent in the case of Coimbatore Cambodia and 5 per cent in the case of Coimbatore Karunganni, the prices remaining stationary in the cases of White and Red Northerns and Nadam Cotton.

(from the Commissioner of Civil Supplies, Madras).

Cotton Raw, in the Madras Province The receipts of loose cotton at presses and spinning mills in the Madras Province from 1st February 1943 to 31st December 1943 amounted to 4,14,269 bales of 400 lb. lint as against an estimate of 4,06,300 bales of the total crop of 1942-43. The receipts in the corresponding period of the previous year were 7,08,948 bales. A total quantity of 6,34,167 bales mainly of pressed cotton was received at spinning mills and 4,543 bales were exported by sea while 2,46,568 bales were imported by sea mainly from Karachi and Bombay. *(From the Director of Agriculture, Madras).*

College and Estate News

Students' Corner *Students' Club.* Under the auspices of the students' club Sri K. C. Ramakrishnan, M. A., Lecturer in Agricultural Economics gave a lecture on "Walchand nagar—an agri.—industrial enterprise' on 17th January 1944 Sri C. Ramaswami Nayudu, M. A. (Cantab), Deputy Director of Agriculture, Coimbatore occupied the chair.

Students' Tour The students of B. Sc. (Ag.) class II were on an educational tour from 4th to 11th visiting Pattambi, Calicut, Trichur and Ernakulam.

Games. *Cricket.* The match with officers' XI on 12th December '43 ended in a draw: officers' XI 161 all out (C. Ramaswami 78, A. S. Krishnan 5 for 40.) versus students' XI 97 for 9 (S. Muthukumarappa 34).

In another match with the British Evacuees played on 19th December 1943 the students' XI lost by 2 runs. The British Evacuees XI 124 all out (Kannayaram 50, R. Narasimhan 3 for 32) versus students XI. 122 all out (R. Narasimhan 38).

Football. In the match played on 21st December 1943 against Minerva Club the students lost by 4 goals to nil.

M. Sc. Degree. We are very glad to note that the University of Madras has awarded the degree of M Sc. to Sri A. Mariakulandai, B. Sc., B. Sc., (Ag.), Assistant in Chemistry for his thesis on the "Fluorosis of cattle in the Madras Presidency ', to Sri M. K. Venkatasubramanyam, B. Sc. (Ag), Assistant in Paddy Section, for his thesis on "pollen and pollen tube studies in rice" and to Sri K. Lakshmanan, B. Sc. (Ag.). We offer our hearty congratulations to them all.

Patron The Managing Committee have enrolled Gurdial Singh Sidhu, of Lahore, Punjab as Patron of the Madras Agricultural Students' Union. We are glad that the son of a military officer, Capt. Subba Singh Sidhu envincing keen interest in our affairs and has become our Patron.

The Annual College Day Sports 1944. The Annual College Day Sports was conducted on 29—1—44. Mrs. C. Shiva Rao kindly distributed the prizes. The sports sub-committee consisting of Messrs. B. S. Moorthy (Convenor) H. Shiva Rao, Y G. Krishna Rao, A. Mariakulandai, N. M Naidu, K. Ramaswami, K. R. Narayanaswami, Sankara Reddy and R. Narasimham made the necessary arrangements.

Deputation to the Director of Agriculture At the suggestion of some of the members of the Madras Agricultural Student's Union, the Managing Committee deputed 5 members of the Union led by Sri C. Ramaswami Nayudu, to represent

to the Director of Agriculture, the case of the unemployed graduates of the Agricultural College. The representation included suggestions for utilising the technical knowledge of these graduates by employing them in the Food department, Civil supplies department panchayats, Rural development boards etc., and in addition, the experienced officers for war propaganda work. Suggestions were also made for initiating certain new schemes for post war Agricultural development. The Director of Agriculture has kindly agreed to look into the various suggestions made.

Departmental Notifications

Gazetted Service Appointments

Sri K. Varadacharya, Agricultural Demonstrator, IV Grade and Sri M. Narasimham, Agricultural Demonstrator, IV Grade, on Foreign Service under the Bezwada Tobacco Market Committee, are appointed to act temporarily as Assistant Marketing Officers, in the scheme for the purchase and distribution of seeds and manures.

Posting

Sri V. Achyutaramayya, Special D. A. O. Tokra Scheme, Guntur to be D. A. O. Cocanada, *vice* Sri U. Vittal Rao granted leave.

Sri P. N. Krishna Ayyar, Assistant Entomologist, on return from leave will resume his post of Assistant Entomologist Coimbatore.

Sri V. Marghabandu, Off Assistant, Entomologist, to act as Assistant Entomologist from 6—1—44, *vice* Sri S. Ramachandran granted leave.

Sri P. A. Venkateswara Ayyar, Agricultural Demonstrator, to be D. A. O. Ellore, *vice* Sri K. Venkataraman granted leave.

Sri R. Swami Rao on return from special duty under the commissioner of Civil Supplies to act as D. A. O on special duty (Tokra Scheme) Guntur Janab M. K. Adevi Sahib, D. A. O. under training to be in charge of Vizagapatam subcircle.

Leave

Sri T. G. Anantarama Ayyar, D. A. O. extension of l. a. p for 2 months and 15 days from 1—1—44.

Subordinate Service—Transfers and Postings

Names of officers	From	To
Sri D. Shanmugasundaram	A. D. Arupukotta	A. D. Koilpatti
„ M. C. Krishnaswami Sarma	A. F. M. Palur	A. F. M. Koilpatti
„ G. Doraiswami	F. M. Koilpatti	A. D. Arupukottai
„ N. K. Thomas	Botany Asst. S. R. S. Gudiyattam	A. D. Coimbatore Dt.
„ N. S. Rajagopala Iyer	A. D. Cheyyar	A. D. Rasipuram, in charge of Co. 3 Cotton Scheme work
„ V. V. S. Varadarajan	A. D. Ongole	A. D. Guntur
„ G. Kameswara Rao	A. D. Bheemavaram	A. D in charge of the Muthyalapalli Lozari Guntlapadu Land Colonisation Scheme, West Godavari Dt.

Sri P. M. Appaswami Pillai	A. D. Omalur	A. D. in charge of the Uthumalai Woddapatti and Maganurpattai land colonisation scheme, Salem Dt.
„ C. S. Seshagiri Ayyar	A. D. Perambalur	A. D. in charge of the Mettupatti and Kanavoipudur land colonisation scheme, Salem Dt.
„ G. Sitarama Sastry	Food Inspector, Cocanada	A. D. Gurzala
„ K. Srinivasachariar	A. D. Kallakurichi	F. M. A. R. S. Palur
„ L. Krishnan	F. M. A. R. S. Palur	A. D. Vridhachalam
„ K. Rama Mohna Rao	F. M. A. R. S. Samalkotah	Food Inspector, Bhimavaram under Grain Purchase Officer, Tadepalligudem
„ K. Ramakrishna Sastry	A. D. (under training) Nellore Dt.	Food Inspector, Cocanada under Grain Purchase Officer, Tadepalligudem
„ P. Lakshminarayana Sastry	Food Inspector, Bhimavaram	A. F. M., A. R. S., Samalkottah
„ V. Venkatasubramaniam	Asst. in Entomology, Coimbatore	Entomology Asst. A. R. S. Tindivanam for the I. C. A. R. Scheme of Research on pests and diseases of groundnuts
„ M. Gopala Chetti	A. D. Shiyali	F. M. A. R. S. Guntur
„ D. S. Subrahmanya Ayyar	A. D. Srivilliputhur	A. D. Chingleput.
„ E. S. Kothandaramanan	Agri. Marketing Asst., Madras	Agri. Marketing Asst. under grain purchase officer, Chidambaram
„ M. Ramanarayana Menon	Asst. in Entomology, Coimbatore	Agri. Marketing Asst. Madras
„ G. K. Subramania Ayyar	Asst. A. D. Arni	A. D. Cheyyar
„ M. Krishnaswami Ayyangar	A. A. D. Dharmavaram	A. A. D. Chittoor Dt.
„ D. Achutarama Raju	Agri. Marketing Asst. under the Grain Purchase Officer, Tadepalligudem	A. D. Guntur Dt.
„ B. Hanumantha Rao	A. D. under training, Rayachoti	Agri. Marketing Asst. Tadepalligudem
„ P. Y. Chintamani	A. D. under training	A. D. Anakapalle
„ B. G. Narayana Menon	F. M. A. R. S. Pilicode	Nursery F. M. Govt. Botanic Gardens, Ootacamund
„ N. Narayana Iyer	Asst. A. D. Arkonam	Asst. A. D. Chingleput Dt. for special duty for vegetable cultivation in Raghavan's lands
„ K. Kuppamuthu	Secretary, South Arcot Market Committee, Cuddalore	A. D. Tanjore Dt.

The following 7 Demonstrators have been selected for the scheme of purchase and distribution of manures and seeds. The first three demonstrators to work under the Asst. Marketing Officer, Bezwada and the rest to work under the Asst. Marketing Officer, Guntakal:—

Names of the Demonstrators	Place to which posted
Sri K. V. Reddi Naidu, A. D. Bhimilipatam	Vizianagaram
,, G. Venkataratnam, A. D. Chodavaram	Vizagapatam
,, G. L. Narasimha Rao, A. D. Repalle	Guntur
,, S. V. Nayudu, A. D. (on leave)	Kurnool
,, V. Kumaraswami, A. D. Kandukur	Adoni
,, M. Rami Reddi, Agri. Marketing Asst., Chidambaram	Nandyal.

The following candidates are appointed to officiate as Upper subordinates in the III Grade;—

Sri Rajaramanathan, Fieldman, Entomology Section to be Asst. in Entomology, Coimbatore.

Sri S. Vaidyanathan, Fieldman, Pattukottai to be Agricultural Demonstrator for training, Tanjore District.

Sri T. K. Sankarasubramanyan, Fieldman, Livestock Research Station, Hosur to be Agricultural Demonstrator for training, Ramnad District.

Sri D. V. Ramana Rao, Temporary Fieldman (Tokra Scheme) to be Agricultural Demonstrator for training, Guntur District.

Leave

Names of officers	Period of leave
Sri S. R. Srinivasa Ayyangar, A. D. *Special duty*,	L. a. p. for 1 month from 3—1—44.
,, S. Muthuswami Ayyar, A. D. Madurantakam,	L. a. p. for 1 month from 14—12—43.
,, D. Bapayya, F. M. A. R. S. Guntur,	L. a. p. on m. c. for 4 months from 4—11—43.
,, V. Achyutam, A. D. Tiruvur (on leave),	Extension of l. a. p. on m. c. for 1 month from 1—12—43.
,, T. R. Naganatha Ayyar, Sub Asst. College Orchards, Coimbatore,	L. a. p. for 4 months from 9—12—43.
,, C. Vadamalai, A. D. Vayalpad,	Earned leave on full pay for 30 days from 15—1—44.
,, P. S. Venkatasubramaniam, A. D. Gingee,	L. a. p. for 1 month from 11—1—44.
,, V. M. Ramunni Kidavu A. D. (on leave),	Extension of l. a. p. on m. c. for 2 months from 6—12—43.
,, P. N. Krishnaswami Rao, Asst, to the Cotton Specialist (on leave),	Extension of l. a. p. on m. c. for 1 month from 10—1—44.
,, M. Sanyasi Raju, Asst. in Bacteriology, Coimbatore	L a. p. for 1 month from 15—1—44.

OBITUARY

Late Sri M. SURYANARAYANA, M. Sc., Assistant Agricultural Chemist.

Sri Mantha Suryanarayana was born on 12th February 1901 in Dimili in Vizagapatam District. After receiving his early education in the Maharaja's College, Vizianagaram, he proceeded to Calcutta for higher studies and obtained the degree of B. Sc. (Hons) in 1921. On graduation he joined the staff of the Maharajah's College, Vizianagaram as Assistant Lecturer, which post he relinquished on being appointed as an Assistant in Chemistry in 1922. He was mainly engaged in research work which included investigation of various problems, particularly work on malt foods. He was also actively associated with the compilation of the manurial Experiments in this presidency upto 1930. His work on the biochemistry of the development of cotton lint formed the subject matter of his thesis for the M. Sc. degree, awarded to him in 1933. He had wide and varied interests and took a keen and abiding delight in training students in enacting Telugu dramas during the Annual College Days and Conference. The latent literary and his histrionic talents thereby gradually developed and encouraged him to compete for the prize instituted by the Government of Madras for the best drama in Telugu for popularising the activities of the Department of Agriculture. He wrote a drama entitled "Krishivalavijayam" which was adjudged to be the best and for which he was awarded a gold medal in 1934. His pleasant and suave manners and genial disposition earned him a wide circle of friends and well-wishers who were much grieved to hear news of his premature demise at the early hours of the 22nd December 1943.

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TP. 1.

HURRICANE "TANK BUSTER" PLAYED HOVOC WITH ENEMY ARMOUR DURING VICTORIOUS AFRICAN CAMPAIGN

One of the little surprises in store for the Afrika Korps when the Allied forces opened their victorious campaign in Africa was the Hurricane "tank buster"—known to the airmen who flew it as a "tin-opener" because that precisely describes the effect it has on enemy armour. From Alamein to the battlefields of Tunisia the "tank buster" ripped open enemy tanks with its deadly cannon and machine gun fire.

Picture shows: Gro[illegible]ew servicing Hurricane "tank-busters". T[illegible] 2 mm. cannon can [illegible]