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EDITORIAL

The Entomological Society of India. We wish to draw the attention of our readers to a communication appearing elsewhere in this issue from Rao Sahib Dr. T. V. Ramakrishna Iyer, late Government Entomologist, Madras regarding the formation of an Entomological Society for India. Considering the importance of the subject we dare say the inauguration of such a body is none too early. We wish the new organisation every success.

Rendition of the Livestock section to the Veterinary Department. From a recent Government notification we find that the Madras Government have decided to transfer the control of the Livestock improvement work from the Director of Agriculture to the Director of Veterinary Science. The question of the control of this section has been a bone of contention between the Agricultural and the Veterinary Departments in most of the provinces for the last many years and it is apparent that the final decision over this long standing controversy has more or less been influenced by the report of Dr. Wright who has, as the Government order says, definitely thrown his whole weight on the side of the Veterinarians. In view, however, of the strong opposition to this change, said to have been put up by some of the Governments including Madras during the last conference of the Animal Husbandry Wing of the Imperial Council of Agricultural Research in Madras last year, the order now issued by the Madras Government comes as a surprise.

It is but too true that the livestock section has received various set-backs in recent years, by the abolition of the Chintaldevi Livestock Research Station and the gradual curtailment of its other activities for want of sufficient funds. If, therefore the section is hereafter to receive more active support from the Government through the influence of the Veterinary Department, nobody will be more glad than we, notwithstanding the fact that we still will regret the rendition. We hope the change will be for the better and that sooner than later a general improvement will be visible in the condition of the Madras Livestock.

The Late Mr. Benson. The late Mr. C. Benson, whose death was cabled from London on the 8th inst. was a familiar figure in Madras in the eighties and nineties of the last century. After a brilliant scholastic career in the

Royal Agricultural College, Cirencester, England, he joined the Madras Department as Assistant Superintendent, Experimental Farm, Saidapet, Madras in 1874. When the Agricultural College, Saidapet, was transferred to the control of the Director of Public Instruction, he continued to serve under the Board of Revenue, but during Mr. W. R. Roberson's absence on leave, he acted as Principal of the college and for some years later he was connected with teaching. In 1885 he went back to the Board of Revenue and became Agricultural Adviser to the Government of Madras in his capacity as the Deputy Director of Agriculture.

While, under the Board, his talents found free scope in the solution of many agricultural problems with which both the Board and the Government were confronted. His varied experience and practical acumen were of immense advantage and his ability found expression in the help he gave the Government by the publication of the "Analysis of the Kurnool District" a unique treatise on the economic condition of the agriculturists of the Kurnool District, by the revision of the Village and Taluk Manuals and by his much appreciated memorandum to the Irrigation Commission (1902). He was the first compiler of the statistical Atlas of the Madras Presidency.

When the Agricultural Department was reorganized during the regime of Lord Curzon, Mr. Benson was chosen as the fittest person to select a site for the Agricultural College and reorganize the Department in Madras. The ideal conditions under which the Agricultural College and Research Institute, at Coimbatore, are now found, speak to the insight of Mr. Benson and his long vision.

His recorded opinion was against the Tungabadra Irrigation Project in the form in which it was pushed in the earlier years, based as it was on his experience that the black soils of the Ceded Districts cannot stand irrigation without being rendered barren, as in the case of irrigated lands in the Punjab and United Provinces. He was an Examiner in Agriculture for several years in the Diploma Examinations of the Saidapet Agricultural College.

He was the right hand man of the late Sir F. A. Nicholson, the sympathetic and beloved friend of the Indian ryot, during the latter's tenure of office as Member of the Board of Revenue and Commissioner of Agriculture.

He served for over 32 years and retired in June 1906 being succeeded by Mr. R. C. Wood. He was loved and respected by his subordinates and was kind and courteous to all. He was a gentleman to the core.

A SIMPLE DEVICE FOR RAPID FILTRATION OF CANE JUICE IN "CREAM JAGGERY" MANUFACTURE

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In the process of manufacture of "cream jaggery," a satisfactory rate of filtration is a *sine qua non* for the practical success of the method. The filtering apparatus as described in bulletin No. 39 of the Department of Agriculture, Madras, is, by no means, a perfect one and leaves much room for improvement.

For the benefit of those who have not had access to the above bulletin, a short description of the method as recommended therein is presented below with a few remarks as to its working.

The apparatus consists of a conical cylinder with a perforated bottom $2\frac{1}{2}'$ high with a diameter of $1\frac{1}{2}'$ at the top and 1' at the bottom. (See Fig. 1 for laboratory model). It contains a layer of coarse washed sand at the bottom 4"—6" deep, and above this is a 6" to 9" layer of activated carbon. The boiled and skimmed juice is poured carefully on to the top of the activated carbon layer.

It will be recalled that the filtration is rapid at first; but slows down considerably after 15 to 20 minutes, due to the deposition of fine particles suspended in the juice on the surface of the carbon layer forming a more or less impervious mat thereon. When this layer is scraped off, the flow of juice is resumed. With the addition of more and more juice, however, the scraping operation has to be done frequently and at each such operation, the fine particles move deeper and deeper down into the filter with the result that the latter becomes choked up after a time, rendering it unsuitable for further use without refilling with fresh activated carbon and sand.

On a consideration of the above, it will be apparent that a reduction of the colloidal and suspended impurities of the juice and prevention of the formation of the mat should result in an increased rate of filtration. With the object of reducing the colloidal content of the juice, 1% of active carbon on the weight of juice was added to the boiling juice after thorough skimming and the boiling continued for 10 to 15 minutes longer. Any scum that collected on the surface in the meanwhile was also carefully removed. This pre-treatment caused a definite, though limited, improvement in the filtration rate, probably due to the partial removal of the colloidal impurity by the activated carbon.

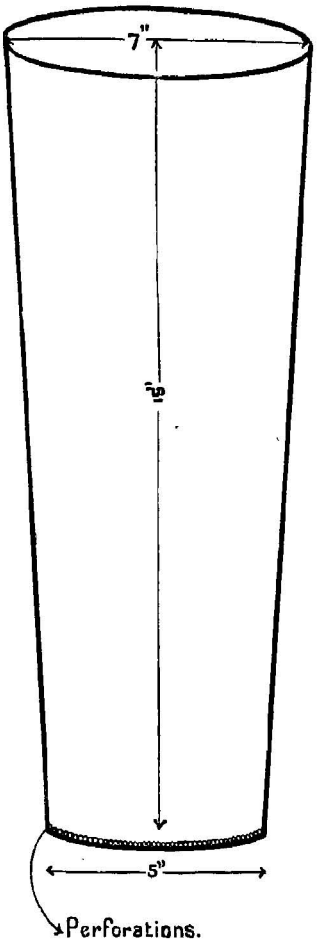
The formation of the impervious layer on the top surface of the activated carbon was sought to be prevented by superposing thereon a bed of some coarse inactive material. Among the materials tried, clean coarse sand, unactivated carbon and washed paddy husk gave a measurable improvement. Of these, paddy husk proved the speediest; it had, however, to be

rejected as the hot juice dissolved out some organic compounds from the husk, rendering the juice acid and imparting to it an undesirable flavour. Unactivated carbon was the next best. By unactivated carbon is meant the first char that has been heated strongly out of contact with air. The carbon so heated, though unable to remove colouring matter from the juice, does not discolour the juice in any way.

In spite of the improvement effected as a result of the modification introduced, the need was still felt for a further advance in the filtration rate. Our object being the development of a simple and cheap process for securing rapid filtration, the application of the principles of vacuum and pressure filters so commonly employed in factories and laboratories is precluded from the investigation in question. On further consideration, the idea suggested itself that the principle underlying the construction of the Soxhlet oil-extraction apparatus may be made applicable to the problem on hand. Those who have worked this apparatus will have noticed that, once the liquid reaches the bend of the syphon, it is drawn down the longer tube of the syphon with some force. It was thought that fixing of a syphon to the filter which will now have no perforations in the bottom, would secure the desired result. Trials with an apparatus provided with a syphon did not, however, prove satisfactory in the first instance. Further trials indicated that to get the apparatus into working condition, the relative position of the bend of the syphon with reference to the level of the carbon within the cylinder had to be adjusted. Again, the arrangement of the filtering media within the cylinder was found to have a great bearing on the rate of filtration. As a result of a series of trials carried out in this connection, the laboratory apparatus shown in Fig. 2, has been found to give a satisfactory rate of filtration when used in the manner described below.

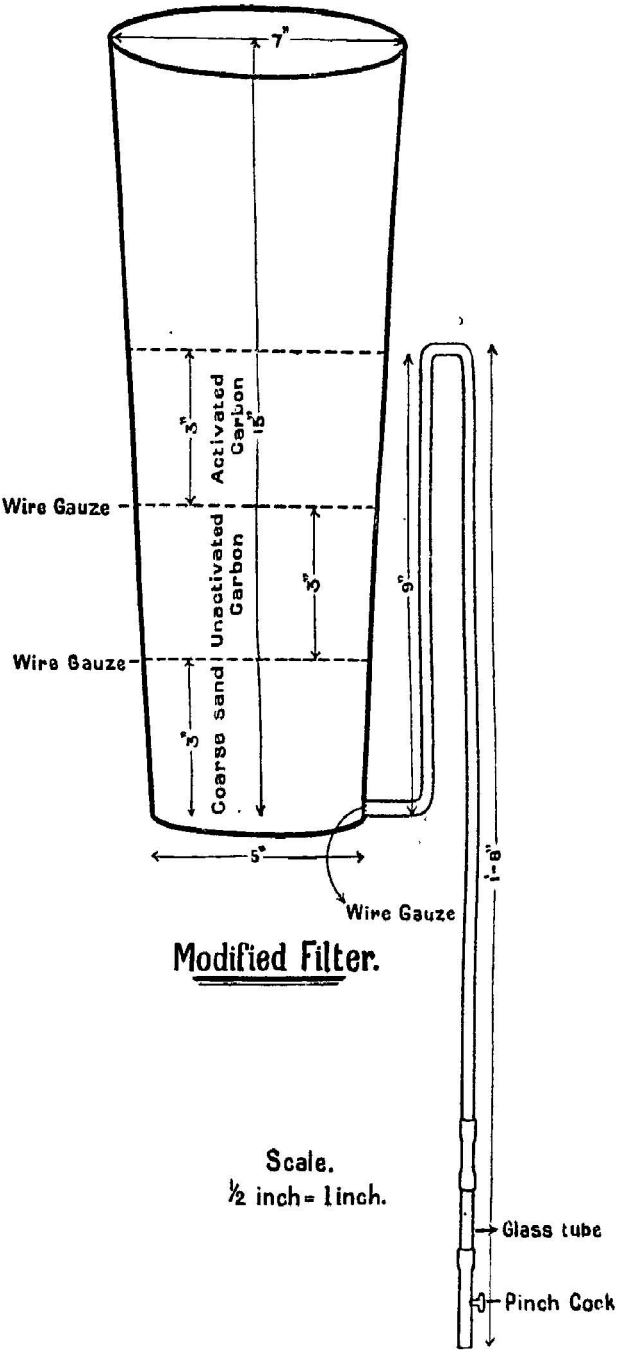
The apparatus consists of a conical cylinder provided with a syphon on one side, of the type and dimensions shown in the sketch. A circular piece of wire gauze of a diameter slightly larger than that of the exit hole in the cylinder is placed against the latter, flush with the side of the cylinder. This is kept in position by coarse sand placed in the cylinder up to a height of about 3 inches from the bottom and a wire gauze is placed above the sand layer. Over the wire gauze are placed in succession a 3 inch layer of unactivated carbon, another wire gauze and a 4 inch layer of activated carbon in the order mentioned. For preparing the filter for use, the following procedure may be adopted. Water is poured into the filter up to the top till a continuous flow of water, uninterrupted by air bubbles, is obtained through the syphon. As soon as the water level in the filter reaches that of the carbon layer, the flow from the syphon tube may be stopped by means of a cork or a rubber tube and pinch cock. The filter is now ready to receive the treated juice. The cork may be removed or the pinch cock may be opened after pouring the juice into the filter. In case the filtration slows down, the surface of the carbon layer may be scraped with the broad blade of the scraper.

FIG I



Old Filter.

FIG II



Modified Filter.

Scale.
½ inch = 1 inch.

It is important that no air be allowed to enter the apparatus during the course of filtration and it may also be emphasised that pre-treatment of the juice, viz., boiling with activated carbon and efficient skimming contributes a good deal towards rapidity of filtration. Below are presented some of the results obtained in the laboratory with the modified filter compared with the ordinary filter of the same dimensions.

Particulars of filtering arrangement.		Amount of juice handled.	Time required for filtration.
Old filter—containing gravel, activated carbon and unactivated carbon.		62 lbs.	22 minutes.
Old filter containing gravel, wire gauze—unactivated carbon—wire gauze—activated carbon.		62 ,,	30 ,,
Old filter containing gravel—wire gauze—activated carbon—wire gauze—unactivated carbon.		62 ,,	30 ,,
Modified filter containing gravel—wire gauze—unactivated carbon—wire gauze—activated carbon.	(1)	65 ,,	13 ,,
	(2)	27 ,,	7 ,,
	(3)	55 ,,	11 ,,
	(4)	55 ,,	11 ,,
Modified filter containing gravel—wire gauze—paddy husk—wire gauze—activated carbon.	(1)	88 ,,	13 ,,
	(2)	68 ,,	15 ,,

It must be admitted that the above results were obtained with an apparatus of a size suitable for laboratory studies. A bigger filter of the modified type has been got ready for large scale trials and will be tested in the coming season. There is, however, no reason to doubt that the modified filter will not work equally well in large scale trials.

It may be pertinent in this connection to record certain observations made regarding the effect of addition of egg-white on the clarification of cane juice. When well-beaten egg-white is added to cold juice and mixed well, subsequent boiling of the juice produces a copious scum. After removal of the scum, addition of carbon to the juice and further boiling and skimming bring about very efficient clarification. On stopping the heating, the impurities settle down to the bottom very readily, leaving a clear, supernatent solution. Filtration of the juice prepared as above even with the old filter has been found to be markedly rapid. The egg-white being alkaline in reaction, there is the further advantage of a reduction in the acidity of the juice by its use for clarification.

Acknowledgement. I wish to express my thanks to Mr. P. V. Ramiah, the Govenment Agricultural Chemist, for the facilities afforded for carrying out the investigation.

A NEW CECIDOMYIAD PEST OF MORINGA

By

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and

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Introduction. A study of the fauna of flower buds of *Moringa pterygosperma* has revealed the presence of a number of insects such as caterpillars, thrips, Braconids, Chalcids and Cecidomyiads. The last named of these was sent to Mr. M. S. Mani of the Indian Museum, Calcutta who has described it as a new species.—*Stictodiplosis moringae* in the Records of the Indian Museum, Vol. XXXVIII. Part II. page 195. The present paper gives a short account of the life history and habits of the pest together with its natural enemies and the results of the trials for its control.

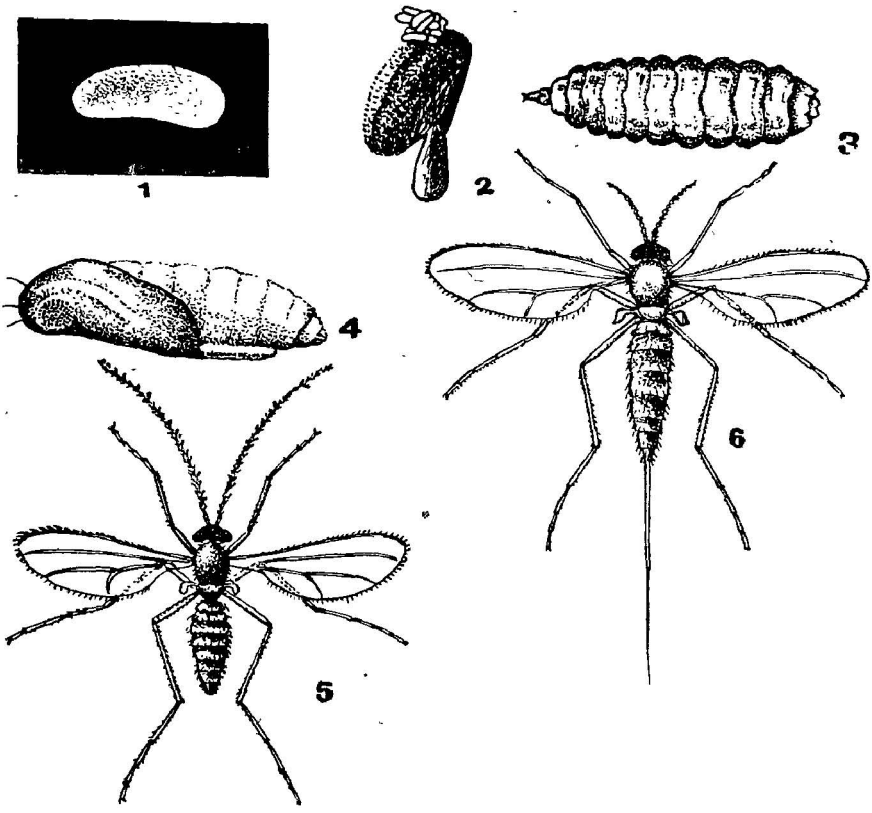
Description of the Fly. The description of the insect given by Mr. Mani is given below :

Female—Length 1·5 m. m ; general color of body brownish black ; mesonotum brown ; scutellum brownish black ; abdomen brownish black, two thirds the length of the body ; Submedian lines densely setose ; head with long setae ; palpi densely setose, terminal segment rather very long ; antennae short, third segment longest, its stem short, stout ; fourth segment fused with third, somewhat shorter, with a very short stem, of a length about one and two thirds the diameter ; fifth segment with a somewhat longer stem ; sixth, seventh and eighth segments, shorter than fifth, their stems more slender and somewhat dilated apically ; claw as long as empodium.

Male—Generally resembling the female ; terminal palpal segment longest ; antennae somewhat longer than body ; stems of third segment half the length of basal and apical enlargements ; fourth segment fused with third, basal stem two thirds the length of basal enlargement, apical stem three-fourths the length of apical enlargement ; stem of fifth segment equal to the enlargements ; basal stem of sixth segment a little shorter than basal enlargement, apical stem equal to apical enlargement. Terminal clasp segment of genitalia slender, bidentate apically ; basal clasp segment apically emarginate on the inner side.

This new species can be readily distinguished from the only known Indian species *S. pulcherrima*, Kieff. by its much smaller size, paler color and other characters.

Life History and Habits of the Pest. The female generally selects buds about 4—10 m-m long for oviposition ; very small and very big buds are avoided. The ovipositor is pushed into the bud through the white corolla and eggs are deposited in clusters (Fig. 1) mostly on the anthers. In some cases these may be found on the inner side of the petals also. It takes about 4—10 minutes for egglaying. The number of eggs in each cluster varies. In one bud as many as 80 eggs were noted in one cluster while the minimum was 5. Seven buds had 8, 10, 15, 20, 30, 40 and 45 eggs respectively in each cluster.



The Moringa Cecidomyiad (*Stictodiplosis moringae*, *M.*)

1. Egg.
2. Cluster of eggs on anther.
3. Maggot.
4. Pupa.
5. Adult—male.
6. Adult—female.

Eggs. The eggs (Fig. 2) measure about 0·18 to 0·23 m. m. in length and about 0·07 to 0 09 m. m. in breadth. It is slightly curved and transparent when freshly laid. Just before hatching it assumes a pale pink color. The egg period varies from 24½ to 31 hours. The following table gives the duration of the egg period.

TABLE I. Table showing the Duration of Egg Period.

No.	Eggs laid on	No. of eggs laid	Eggs hatched on	Egg period
1	9--3--37 9, a. m.	20	10—3—37, 3 p. m.	30 hours.
2	do.	10	do.	30 hours.
3	do.	20	do.	30 hours.
4	12--3—37, 9 a. m.	12	13—3—37, 3-45 p. m.	31 hours.
5	14-3-37, 9-30 a. m	6	15—3—37, 10 a. m.	24½ hours.
6	do.	24	15—3—37, between 1 & 3 p. m.	28½ to 30½ hrs.

Maggots. The newly hatched maggot is about 0·3 m. m. to 0·33 m. m. in length and of pale white color. As soon as it hatches out it moves about inside the bud and feeds on the internal tissues and grows bigger in size. The full grown maggot (Fig. 3) is about 1½ to 3 m. m. long and ½ m m. broad and of light pink color. No galls are produced by the maggots as in some other species. When the buds drop or when the flowers open they come out and make cocoons of sand or soil with a slight lining of silk and pupate inside them. The maggots take about 2-3 days to construct cocoons and pupate inside them. The larval period is about 6-9 days. The following table gives the duration of larval period of a few maggots.

TABLE II Table showing the Duration of Larval Period.

Serial No.	No. of eggs laid	Eggs hatched on	Maggots pupated on	Larval period
1	2	24—1—37	2—2—37	9 days
2	4	24—1—37	1—2—37	8 ,,
3	16	24—1—37	1—2—37	8 ,,
4	25	15—3—37	21—3—37	6 ,,

Pupae. The fresh pupa (Fig. 4) is pale yellow in colour and measures 1-1 5 m. m. long and 0·5 m. m. broad. The color changes gradually and the pupa turns black before the emergence of the adult. The pupal period is 5-9 days. The table given below gives the pupal period.

Table III. Table Showing the Duration of Pupal Period.

Ser. No.	Number of maggots.	Maggots pupated on	Adults emerged on	Duration of pupal period.
1.	15	1—2—37	9—2—37	8 days.
2.	1	1—2—37	8—2—37	7 ,,
3.	5	1—2--37	9—2—37	8 ,,
4.	4	24—1—37	2—2—37	9 ,,
5.	11	11—4--37	17—4—37	6 ,,
6.	4	31—7—37	5—8—37	5 ,,
7.	4	Do.	6—8—37	6 ,,
8.	2	Do.	7—8—37	7 ,,
9.	3	Do.	8—8—37	8 ,,

Duration of Life Cycle. From the observations of the life history records given above it will be seen that the total life cycle of the fly from egg to adult stage is about 12-19.

Longevity of the Adults. The adults (Figs. 5 and 6) are short lived. With or without food, male or female, in no case did the fly live for more than three days. The average longevity is about two days.

Nature and Extent of Damage. As a result of the attack of the maggots the flower bud loses its natural features and color; the corolla becomes pale yellow and shrinks thus giving prominence to the green calyx and ultimately the buds drop down. If the maggots are found in large numbers some appreciable damage is done to the buds. Counts of buds taken from February 1936 to February 1938 show that the maggots are found throughout the year in the Insectary and fields in the Central Farm, Coimbatore, the percentage of infestation differing in different months. The table below gives the necessary information.

TABLE IV. Table showing percentage of infestation of buds.

Month	Percentage of infestation of buds		
	big buds above 10 mm.	Intermediate buds bet. 4 & 10 mm.	small buds below 4 mm.
February 1936	18·0	3·7	Nil.
March ,,	1 9	Nil	,,
April ,,	Nil	0·9	,,
May ,,	0 9	Nil	,,
June ,,	Nil	,,	,,
July ,,	,,	,,	,,
August ,,	5·1	4·4	,,
September ,,	4·1	6·3	,,
October ,,	8·2	6·2	,,
November ,,	31·6	Nil	,,
December ,,	Not examined.	Not examined.	Not examined.
January 1937	21·6	3·0	Nil.
February ,,	13 0	2·8	,,
March ,,	8·9	6·4	,,
April ,,	4·6	0·7	,,
May ,,	5·0	0 9	,,
June ,,	1·0	0·9	,,
July ,,	2 3	5·8	,,
August ,,	14·2	9 6	,,
September ,,	13·1	5·0	,,
October ,,	44·7	24·6	,,
November ,,	48·9	32 0	,,
December ,,	66 2	26·2	,,
January 1938.	31·0	5 9	,,
February ,,	9·3	4·3	,,

Natural Enemies. Mention has been made in the first paragraph that a number of other insects are also found in the buds. Two of these, one a Braconid (*Microbracon, s. p. n.*) and the other, a Chalcid, have been noticed to feed on the maggots. Though the former is seen in large numbers than the latter the incidence of the parasites seems to be low.

Control Methods. An internal feeder is always a difficult insect to tackle. Bordeaux mixture was, however, tried as a repellent but did not show any good effect. One method which can be suggested is to work up the soil underneath the tree so that the pupae may be destroyed.

Acknowledgements The authors take this opportunity of thanking Mr. Mani for describing the fly.

AGRICULTURE IN ANCIENT ROME

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In an earlier number of this journal, (Vol. XXIV No. 5, May 1936) an account of agriculture in ancient Greece was given. It was shown that the art of Agriculture was fairly well advanced in ancient Greece. The Romans not only improved the art considerably but also spread it in the countries conquered by them. Many of their learned men have written on the subject. The most important of these authors are Cato, Varro, Virgil, Columella, Pliny and Palladius.

Cato was the 'father of the Roman rustic writers'. His *De Re Rustica* is the oldest work on Roman agriculture. Varro had written 500 volumes on different subjects and his *De Re Rustica* is a valuable book on Roman agriculture. Virgil's *Georgics* may be considered as 'a poetical compendium on agriculture'. Columella's *De Re Rustica*, in twelve books, is 'a complete treatise on rural affairs, including field operations, timber trees and garden'. Pliny was a great naturalist and his Natural History, in thirty-seven books, gives much valuable information on Roman agriculture. The *De Re Rustica* of Palladius, a poem in fourteen volumes, is 'little more than a compendium of those works which preceded it on the same subject'.

Based on these works, the Rev. Adam Dickson, a Scotch clergyman published, in 1788, a treatise under the title of *The Husbandry of the Ancients*. The article on the agriculture of the Romans, in Loudon's Encyclopaedia of Agriculture, published about a century ago, was based on all these works. The materials for the following account of agriculture in ancient Rome have been taken from Loudon's Encyclopaedia.

Rome was founded by a company of robbers and runaway slaves under the leadership of Romulus. The chief, having conquered a small portion of Italy divided it among his followers, each getting one or two acres. For the first few centuries, the agricultural holdings were generally small and the lands were occupied and cultivated by the proprietors themselves. These soldier-agriculturists 'ploughed their fields with the same diligence that they pitched their camps, and sowed their corn with the same care that they formed their armies for battle'.

In course of time, when Rome extended her conquests and acquired large territories, rich individuals purchased large estates. These were either

leased out to farmers or were cultivated by the landlord through a bailiff or overseer. In the former case, either the farmer paid rent for the farm or he received a certain proportion of the produce for his labour, the stock of the farm belonging to the landlord. In the latter case, the management of the farm was entrusted to a bailiff. The landlord, however, was perfectly acquainted with every kind of work on the farm and could judge the work done at the farm in his absence. The Roman landlords were very careful and exact in the management of their country affairs.

In the early days, the Roman villas were small and plain but in course of time they became large and magnificent. The position of the villa and the situation of the different parts were very carefully attended to. The villa was divided into three parts, the *Urbana*, the *Rustico*, and the *Fructaria*. The *urbana* contained the apartments of the landlord; the *rustica* contained the kitchen, the houses of the labouring servants, the stables, piggeries, and poultry houses, ponds for water and dunghills. Adjoining it, in the residence of the opulent Romans, were placed the aviary, apiary, a place for dormice, a warren for rabbits and hares, a place for snails, and a large enclosure or park of fifty acres and more for retaining live deer and wild beasts taken in the chase. The *fructaria* contained the oil and wine cellars, the places for the oil and wine presses, the cornyards, barns, granaries, storehouses, repositories for roots and fruits etc.'

The servants employed in Roman agriculture were of two sorts—freemen and slaves. When the proprietor or the farmer lived on the farm and directed the cultivation, these were directly under his management; in other cases, there was a bailiff or overseer to whom all the other servants were subordinate. The bailiff was generally a person who had received some education and could write and keep accounts. 'It was expected that he should be careful, apt to learn and capable to execute his master's orders with a proper attention to situations and circumstances. He ought not to trade on his own account, nor employ his master's money in purchasing cattle or any other goods; for this trading takes off his attention and prevents him from keeping square accounts with his master'.

Regarding the other servants, 'the careful and industrious should be appointed masters of works; these qualities are more necessary for this business than stature or strength of body, for this service requires diligent care and art." "In the ploughman, though a degree of genius is necessary, yet it is not enough; there should be joined to it a harshness of voice and manner, to terrify the cattle; but he should temper strength with clemency; because he ought to be more terrible than cruel, that so the oxen may obey his commands, and continue the longer at their work, not being spent, at the same time, both with the severity of labour and stripes.'

All the servants were maintained and clothed by the farmer or the proprietor. They were given good treatment by the masters. It is said, concerning the bailiff, that 'he should not eat but in the sight of all his servants, nor of any other thing but what was given for the rest.' Three to

five pounds of bread according to the seasons and a daily allowance of a weak wine, on an average of about a pint and a half a day, were given to all the servants. The dress was such as to give protection against wind, cold and rain.

The labouring cattle were chiefly the ox, the ass, and the mule. Horses were very rarely used for agricultural purposes. 'The respect for the ox which existed among the Egyptians, Jews and Greeks was continued among the Romans. The breeding, breaking, feeding and working of the ox are dealt with in detail by the Roman writers on agriculture. 'Bulls should be tall, with huge members, of a middle age, rather young than old, of a stern countenance, small horns, a brawny and vast neck and a confined belly.' The cows most approved of were 'of a tall make, long with very large belly, very broad forehead, eyes black, and open, horns graceful, smooth and black, hairy ears, strait jaws, very large dewlap and tail and moderate hoofs and legs.'.

Labouring oxen were fed with the mast or nuts of the beech or sweet chestnut, grape stones and husks after being pressed, hay, wheat and barley straw, bean vetch and lupine chaff, all parts of corn and pulse, grass, green forage and leaves. The leaves used were those of the helm oak, ivy, elm, the vine, the polar etc.

Oxen were worked in pairs abreast both with the cart and plough and stood in the stables also in pairs. They were carefully matched in order that the stronger might not wear out the weaker. 'Oxen, when in the plough, were not allowed to go a great way without turning; one hundred and twenty feet was the length fixed upon, and further than this, it was thought improper for them to pull hard without stopping. It was thought proper that oxen in ploughing should be allowed to stop a little at the turning and when they stopped, that the ploughman should put the yoke a little forward, so that their necks might cool. Unless their necks are carefully and regularly cooled, they will soon become inflamed and swellings and ulcers will arise. The ploughman, when he has unyoked his oxen, must rub them after they are tied up, press their backs with his hands, pull up their hides, and not suffer them to stick to their bodies; for this is a disease that is very destructive to working cattle. No food must be given them until they have ceased from sweating and high breathing, and then by degrees, in portions as eaten; and afterwards they are to be led to the water and encouraged by whistling'.

Asses were used chiefly for carrying burdens or for the mill, or for ploughing where the land was light. Mules were used for both the road and the plough provided they were not too dear and the stiff land did not require the strength of the ox.

The agricultural implements used by the Romans were many. The most important implement was, no doubt, the plough. 'They had ploughs with mouldboards and without mouldboards; with and without coulters; with and without wheels; with broad and narrow pointed shares; and with shares not

only with sharp sides and points, but also with high-raised cutting tops,' The Romans used suitable implements for the various processes of cultivation.

Ploughing was the most important agricultural operation. The season for ploughing was any time when land was not wet; the furrow was kept equal in length throughout and straight. Deep ploughing was employed even up to a depth of two feet. The plough was generally drawn by one pair of oxen, guided by the ploughman without the aid of a driver. 'In breaking up a stiff land he was expected to plough half an acre, in free land an acre and in light land an acre and a half each day.' Land was ploughed in square plots of 120 feet to each side.

Fallowing was a universal practice. Generally a crop was followed by a year's fallow but when manure was available two or more crops were taken in succession and on rich soils a crop was taken every year. In fallowing, the land was ploughed after the removal of the crop and then cross-ploughed in spring and then before sowing. 'There was no limit to the number of ploughings, the object being, to let the earth feel the cold of winter and the sun of summer, to invert the soil and render it free, light and clear of weeds, so that it can most easily afford nourishment.'

Manuring was held in high esteem by the Romans. All vegetable, animal and mineral sources were tapped. The dung of birds was considered the best, human excreta and cattle dung being next in importance. Dung-hills were placed near the villa their bottoms hollowed out to retain the moisture and their sides and top protected from the sun by twigs and leaves. Dung usually remained in the heap for a year. It was then laid out on the land in spring and autumn, the two sowing seasons. No more was to be spread than could be ploughed in the same day. Frequent and moderate applications of dung are recommended instead of occasional abundant application. The dung of birds was often applied as top-dressing. 'Crops that were sickly were revived by sowing over them the dust of dung, especially that of birds.' Green crops, especially lupines, were sown and before they came into pod ploughed in as manures ; they were also cut and buried at the roots of fruit-trees for the same purpose. Trees, twigs, stubbles etc. were burned for manure. It was believed that lands manured with ashes of trees would not require manure for five years. Lime was used as manure, especially for vines and olives.

Sowing was done by hand and the seeds covered with the plough or with the hoe and rake. Weeding was generally done by pulling the weeds up with the hand and the soil was stirred with the hoe. Horse-hoeing was also practised, the origin of which 'was due to the injuries of war. The Salassi, when they ravaged the lands lying under the Alps, tried likewise to destroy the panic and millet that had just come above ground. Finding that the situation of the crop prevented them from destoying it in the ordinary way, they ploughed the fields ; but the crop at harvest being double what it used to be, taught the farmer to plough amongst the corn.' This operation was performed 'either when the stalk was beginning to appear or when

the plant had put forth two or three leaves. The corn being generally sown in drills, or covered with the plough, so as to come up in rows, readily admitted this practice.'

In reaping corn it was a maxim that it is 'better to reap two days too soon than two days too late'. Reaping was done in one of the following ways:— (a) cutting close to the ground with hooks, a handful at a time, (b) cutting of the ears with a curved stick and a saw attached and (c) cutting the stalks in the middle, leaving the lower part or stubble to be cut afterwards. Reapers were generally divided into two groups and set on the opposite sides of the field and they worked towards the centre. The Romans did not bind their corn into sheaves. When cut, it was sent direct to the threshing floor. If the ears only were cut they were sent in baskets to the barn. The threshing floor was circular and it had a diameter of 40 to 60 ft. It was generally placed in the open air as near the barn as possible in order that when a sudden shower happened, during the threshing, the ears may be carried to the barn quickly. The corn was spread over the area a foot or two in thickness and was threshed or beaten out by the hoofs of cattle or by dragging a machine over it. This machine was made of 'a board, rough with stones or iron, with a driver or great weight placed upon it'. Corn was cleansed by winnowing when there was wind. After being dressed, the corn was laid in the granary and the straw either laid aside for litter or "sprinkled with brine; then, when dried, rolled up in bundles, and so given to the oxen for hay.'

Hay-making was of great importance among the Romans. The meadows were mown when the flowers of the grass plants began to fade; as it dried it was turned with forks; it was then tied up in bundles and carried home to be stored. Hay was also made of leafy twigs of poplar, elm and oak spray.

Watering on a large scale was applied both to arable and grass lands. Draining was also particularly attended to. Fencing was done only to a limited extent, generally by the planting of trees or of briars and thorns, and rarely by walls of stone or bricks. Trees were pruned and felled at different times according to the object in view. Fruits were gathered by hand.

Among the cereals grown by the Romans were wheat, barley and maize on a large scale and rye, millet and oats to some extent. Of legumes they cultivated beans, peas, chick-pea, lupins, vetch, tare, etc. The sesamum was an important crop cultivated for the seed from which an oil was expressed which was used as a substitute for olive oil. The herbage plants were clover, lucerne and the cytisus. Turnip and rape were much esteemed and were carefully cultivated. Flax was a very important crop raised by the Romans. Willows were grown both for basket-making and as ties and poles for olives and vines. Copse-wood was grown for fuel. Among the timbers which were abundant were oak, elm, beech, pine etc. Fruit trees were extensively cultivated. The more important were the vine and olive on an extensive scale and figs, pears, apples etc. Almost all vegetables known

to us with the exception of potato and a few others were grown by the Romans.

The Romans held in high esteem the maxims of farm management handed down from generation to generation and the Roman writers have recorded a number of such maxims derived from the Greeks and from their own traditions and experience. Some of the more important of such maxims only can be noticed within the scope of this article.

There were several maxims cautioning landlords not to be rash in building their villas.

'Men should plant in their youth, and not build till their fields are planted; and even then ought not to be in a hurry, but take time to consider.'

'Build in such a manner that your villa may not be too small for your farm nor your farm too small for your villa.'

'Proportion the expense of the building to the rent or to the profit arising from the farm.'

'An edifice should be built according to the value of the farm and fortune of the master, which, immoderately undertaken, it is commonly more difficult to support than to build. The largeness of it should be so estimated, that, if anything shall happen to destroy it, it may be rebuilt by one or at most two years' rent or profits of the farm in which it is placed.'

"To sow less and plough better" was a maxim indicating that the extent of the farms ought to be kept in their proper bounds and possibly an advocacy of thin sowings and better cultivation. 'You may admire a large farm, but cultivate a small one.'

The importance of the master's presence in every operation of the farm was emphasised by many maxims.

'Whoever would buy a field ought to sell his house lest he delight more in town than in country.'

'Wherever the eyes of the master most frequently approach, there is the greatest increase'.

'Though every person knows that the presence and attention of the master is of great importance in every business, yet every person does not know, that in no business are they so important as in farming'.

That more can be gained by cultivating a small plot well than a large area indifferently is illustrated by many sayings and stories.

'A vine-dresser had two daughters and a vineyard; when his elder daughter was married, he gave her a third of his vineyard for a portion; notwithstanding which, he had the same quantity of fruit as formerly. When his younger daughter was married he gave her the half of what remained, and still the produce of his vineyard was not diminished.'

'A freedman, who having much larger crops than his neighbours was accused of witchcraft and brought to trial. He produced in the forum a stout daughter, and his excellently constructed iron spades, shears and

other tools, with his oxen and said "These, Romans, are my charms". He was acquitted.'

Industry is considered essential for successful farming. 'The ancients considered him a bad husbandman who buys what his farm can produce to him; a bad master of a family, who does in the day-time what he may do at night, except in the time of a storm; a worse, who does on common days what is lawful on holidays; the worst of all, who on a good day is employed more within doors than in fields.'

Kindness and humanity to servants is strongly recommended. 'Slaves must not be timid nor petulant'. 'They who preside must have some degree of learning and education; they must be frugal and older than the workmen, for the latter are more attentive to the directions of these, than they are to those of younger men. Besides, it must be most eligible that they should preside, who are experienced in agriculture; for they ought not only to give orders but to work, that they may imitate him, and that they may consider that he presides over them with reason, because he is superior in knowledge and experience; nor is he to be suffered to be so imperious to use coercion with stripes rather than words, if this can be done'.

The making of experiments was very strongly recommended to farmers. 'Nature has pointed out to us two paths, which lead to the knowledge of agriculture, viz. experience and imitation. The ancient husbandmen, by making experiments, have established many maxims. Their posterity, for the most part, imitate them; we ought to do both, imitate others and make experiments ourselves not directed by chance but reason'.

The art of agriculture was not only familiar to but held in high estimation by every Roman soldier. It was practised by him in every foreign country in which he was stationed and he taught it to the inhabitants of the country. As Rome extended her conquests, agriculture was introduced into the conquered areas. 'The great agricultural advantage which mankind has derived from the Romans is the diffusion of the art by their almost universal conquests. The Romans spread their arts with their conquests; and their agriculture became that of all Europe at an early period of our era'. As the Empire declined, agriculture also declined and with the fall of the Roman power in Europe agriculture was extremely neglected.

Agricultural Jottings.

(From the Director of Agriculture, Madras).

A SUMMARY OF THE MARKETING SURVEY OF RICE IN THE MADRAS PRESIDENCY

As an average of ten years ending 1936-37, the area under rice in Madras Presidency was 11·3 million acres compared to 73 million acres for the whole of India (excluding Burma). The revenue estimate of yield based on normal yields of the dry and irrigated for each district averaged 5·2 millions of cleaned rice for the Presidency as compared to 27 millions for the whole of India. Notwithstanding the high production, both Madras as well as the rest of India import rice particularly from Burma. There appears therefore some scope for increased production in the Presidency as well as India, but the rice conditions of our country are dependent on a number of world causes, and it is therefore worth while to have a picture of the world rice situation in considering any improvements in our methods of rice marketing.

During the past quinquennium, the acreage under rice in the major growing countries was as follows:— India 73 million acres, Burma 12½ millions, Indo-China 13 3 millions, Siam 7·4 millions and Japan nearly 8 millions. The corresponding production was Burma 4·8 million tons, Indo-China 5·7 millions and Siam 4·7 million tons. Although Madras production is slightly higher than Burma and Siam, and somewhat less than Indo-China, the position of these countries is decidedly advantageous in the matter of export. About 70% of the crop of Madras is irrigated and costs of production are correspondingly high. In addition, Burma with a rice production almost equal to Madras, but a population only one-third of it, has considerable surplus for export. In fact, the exports from Burma amount to about 3 million tons annually or 60% of her production. With such large surplus markets so near and easily accessible by sea, India and particularly Madras, have in spite of their enormous production a great dependence on these markets. World prices, naturally, follow the course of surplus markets and the course of Madras prices in all important rice markets is mainly influenced by the course of Burma rices.

The imports of rice and paddy in terms of rice into Madras Presidency including Cochin from Burma and from foreign countries during the past five years were as follows:—

(000 tons).

Year.	By sea from Burma mainly.	By sea from foreign countries.	Imports by rail from other provinces.	Total.
1931–32	500	23	47	570
1932–33	481	35	43	559
1933–34	588	81	47	716
1934–35	724	335	63	1,122
1935–36	864	146	86	1,096
1936–37	708	51	89	848

The imports from the foreign countries, Indo-China and Siam, rose to formidable proportions during 1934–35, but have considerably decreased after the levy of an import duty of Rs. 0—12—0 per maund since 1935. Imports from Burma, have declined during 1936–37, but still stand at a fairly high level of 700,000 tons. The trend of import shows a pronounced increase from 1930–31 to 1935–36 and a decline thereafter. Our import trade consists of medium, coarse and broken rices from Burma, coarse rices from Central Provinces and Berar, and a small quantity of fine rices from the Punjab and North India.

The export trade of Madras declined considerably from 1931 to 1933, but has slightly recovered during the past few years. The main importing countries are Ceylon by sea and Bombay, Nizam's State and Mysore by rail. The export trade is mainly of finer rices as Sirumani to Ceylon and fine rices of the type of Delhi Bogum, Akkulu and G. E. B. 24 to the other provinces. The total exports during the past five years of rice and paddy in terms of rice were as follows:—

Exports from Madras Presidency.

(000 tons).

Year.	By sea mainly to Ceylon.	By rail to Bombay, Hyderabad, Mysore etc.	Total.
1930–31	104	65	169
1931–32	63	62	125
1932–33	66	30	96
1933–34	76	105	181
1934–35	76	130	206
1935–36	73	139	212
1936–37	84	136	220

The export trade both by rail and sea is becoming stronger in the past few years.

Allowing for imports and exports and the quantities imported and re-exported by the Cochin State, the nett supply of the Madras Province proper and consumption in terms of rice is estimated as below in thousands of tons:

Year.	Production.	Net import.	Net supply for consumption.
1932–33	5,379	220	5,599
1933–34	5,290	283	5,573
1934–35	4,956	579	5,535
1935–36*	4,856	445	5,301
1936 37*	4,771	335	5,106

(* Excludes portions added to Orissa).

The Madras presidency is thus a nett importer, but the above figures show that this import is generally in line with all deficiencies of production. In the international trade of the world, our province does not figure much as an exporter except to Ceylon, although it does so markedly in interprovincial exports. In world trade, the largest consuming markets for rice are China, Ceylon, France, United Kingdom, Netherlands and Germany, but these are supplied by the surplus countries Burma, Indo-China and Siam and Korea in Asia, and Italy and Spain in Europe. Only Burma figures in international markets; but even in this case exports to foreign countries are declining while the export to India is on the increase during the past few years. Some of the finer rices of the province are as good as those in demand in England from Burma, and it is possible to popularise them in western markets, provided care is taken to ensure quality. But in the production of coarse rices our province is markedly in deficit.

A considerable proportion of the produce of holdings ranging from 30 to 60% is retained by the producer in the village for his own consumption for seed, payments to labour etc. The marketable surplus therefore falls short of production, and deficient districts like Salem, Coimbatore and Malabar have to draw freely from imported rices from near ports. While the demand for rice is both rural and urban in the producing districts as the Circars, Tanjore and West Coast, the consumption is mainly urban in the deficient areas as the Central, South and Ceded districts. Broken rice which is mainly a bye-product of the rice industry of Burma and foreign countries, meets the demand of labour populations and of coffee hotels, while it is used in the market measure for adulteration with local rices. The demand for rice is also dependent on the production of other cereals; the *per capita* demand in several districts works out as follows:

Per Capita supply of food grains (cwt).

	Rice.	Other food grains.	Total.
Circars and Agency districts ...	2·72	1·46	4·18
Deccan	0·90	4·11	5·01
East Coast and Central districts	1·93	1·69	3·62
Southern districts	1·09	1·18	3·27
West Coast	3·34	0·06	3·40
Presidency ...	2 21	1·59	3 75

While due to its greater millet production, the demand from the Ceded districts on rice is low, Malabar with a high population and low millet production, has to draw freely on imported rices, in spite of her large acreage under the rice crop.

There are about 3,600 rice mills, small and large, in the province, of which 3,100 are run by oil, 326 by steam and 123 by electricity and the rest by gas. About 4½ million tons of paddy or slightly over 90% of marketable surplus are milled the rest being hand pounded. About a fourth of the production of rice is estimated to be parboiled. Excepting in South Canara, ryots sell mainly as paddy. The assembly of paddy is done by village merchants and commission agents, while larger merchants deal directly with wholesalers. There are also a few organised markets as "Machu Chavadi" in the Circars and "Pettai" in the South where the produce is assembled and marketed, but the village merchants account for so large a share as 70% of the assembly of paddy in the province. Handling charges for paddy vary from one to two annas per railway maund, the costs being less generally in Circars due to large turnover.

The practice of storing paddy for a few months is common with many merchants, landlords and mill-owners, with a view to get the advantage of rise of prices during June to September. Banks advance money on the strength of such stock at moderate interest, but the smaller grower has no facilities for such accommodation. The costs of such storage varies from 0—1—3 to 0—1—6 per railway maund for a period of eight months, besides interest ranging from 6 to 10% on the value of the loan. In the Circars, paddy is stored in cylindrical plastered constructions called "gadelu" or larger wooden erections called "Danyappa kettulu", the costs of storage ranging from Rs. 25 to 30 per 200 railway maunds for a season or about 2½ pies per maund per month. In the Tanjore and Southern districts, storage is done in "Pattarai" or pits or in "Seir" and the costs are practically the same as in the Circars. Costs of milling are however variable depending on whether parboiling is done and on the degree of polish and colouring, varying from 1½ annas per Imperial maund of paddy to four annas, the costs being higher in the Tanjore and Southern districts than in the Circars. Parboiled rice gives a greater outturn of rice to paddy, less broken rice in milling and is admitted to be of more nutritive value. It may be generally noted in passing that there has been an allround decrease after the depression in the costs of preparation for market in such items as handling, milling and storage, but railway rates, except for point to point special rates, remain at the same level.

In the matter of prices of rice, it is noted that world fluctuations as the inflation after the war and depression later have had a pronounced effect on prices in all areas of the presidency. The recorded harvest prices of rice for the past thirty years show that the peak of prices was reached in 1919-20 at nearly Rs. 9 per maund for the presidency, which fell so low as Rs. 4—11—0 in 1930; the lowest prices during the past five years being during 1933-34 at only Rs. 3—3—0 per Imperial Maund. If we consider wholesale prices of paddy, they fell from Rs. 2 per maund in 1930-31 at Cocanada to Rs. 1—7—0 in 1933 and are now at

Rs. 2. At Tanjore wholesale prices fell from Rs. 4—9—0 in 1926 to Rs. 1—12—0 in 1933 and are now over Rs. 2 per Imperial Maund for *Sirumani*. Similarly Cocanada rice prices fell from Rs. 6—2—0 in 1921 to Rs. 2—7—0 in 1933, and are now at Rs. 3—15—0. A comparative study of different varieties of rices at the markets at Ellore, Cocanada, Bezwada, Guntur and Tanjore shows that the year 1933-34 recorded the lowest price in the past five years and there has been a slight recovery in the succeeding years ranging from 8 to 10 annas per maund. Wholesale prices for both rice and paddy have risen markedly in the last few months in nearly all markets. Every year, there is a tendency for paddy and rice prices to fall pronouncedly with the new crop in January of each year, and correspondingly there is a sudden rise in September-October. The course of prices at all wholesale markets is nearly similar, and similar to fluctuations in Rangoon prices.

There is a premium paid for old paddy from two to three annas per maund. Fine rices fetch from 12 annas to two rupees per maund more than coarse varieties in the producing areas, but the margin of difference is declining in the past few years. The margin is more in the consuming markets than in the producing areas. Broken rices sell at almost the same price as millets. The price differences in the different varieties of rice, new and old rice, and broken rice, lead to a considerable degree of adulteration especially in consuming markets, and broken rice is largely used for the purpose. Examination of samples of rice from all markets in the presidency points to a wider prevalence of this practice, and the proportion of broken rice has been found to be so high as 40% in some areas in Nellore rice, as compared to the usual 20% in producing areas. Although rice is sold by varieties in such markets as Coimbatore and Madras, the name is only nominal and all rices are being freely mixed.

Railway movements in paddy and rice amount to only 8% of production and by canal about 2%. Considered in the light of railway trade, the largest despatching districts for rice are Kistna, West Godavari, Tanjore and Madras City with total despatches of 2·95, 2·75, 2·06 and 1·01 million railway maunds annually. For paddy the major despatching districts are Tanjore (3·01 million) and West Godavari (1·19). In the matter of total receipts of rices, Madras easily stands first with 2·19 million maunds, followed by Coimbatore and Vizagapatam districts, while in paddy the largest receiving districts are Coimbatore with 1·99 million maunds, and next Kistna and Vizagapatam. The main movements of Madras rices comprise those of the Circars rices from Kistna, West and East Godavari districts to Madras City, Vizagapatam, Guntur, Ceded districts, Mysore State, Hyderabad and Bombay; of Nellore rice to Madras City, Mysore and Central Districts, and of Tanjore rices to Ceylon mainly, Trichinopoly and South Arcot districts. The trade in imported rice and broken rices is largely from Tuticorin port to the Ramnad, Madura and Trichinopoly districts, from West Coast ports to Malabar, Salem and Coimbatore districts, from Cuddalore to the South Arcot, Salem, Trichinopoly and North Arcot districts, and from Madras City to Ceded districts and North Arcot. Movements of paddy are not so free as in rice, the large bulk of the movements being confined to exports from Tanjore district to Coimbatore and Trichinopoly districts, from West Coast ports to Coimbatore district and from Tuticorin port to the Trichinopoly and Ramnad districts. Movements of imported rices reached a record figure during the year 1935 and have declined since.

On the average the grower gets from 65 to 70% of the consumer's price in the several growing tracts, the rest being absorbed by incidental charges, transport, milling and merchants' margins. In export to Ceylon, the grower gets about 60% of the consumer's price, the import duty accounting for about 13%, export duty

2½% and transport about 9%. Some profits are also made by merchants and mills by adulteration especially in consuming markets.

The evolution and distribution of improved strains of paddy has been a very marked line of improvement in the crop and there are about 12 lakhs of acres now under departmental varieties. There have been evolved strains for practically major growing area and altogether about 25 strains from the research stations at Coimbatore, Maruteru and Aduturai are now largely under cultivation, the most outstanding being G. E. B. 24.

Madras province being an importer of coarser rices, and exporter of fine ones, improvements in marketing should be directed to export as well as import trade. Better prices to the grower can be got by giving greater facilities for storage and stocking of produce, instead of rapid disposal after harvest as at present. The present facilities for loan on the strength of stock which are enjoyed by the trade larger growers, can be rendered available to smaller growers by the organisation and financing of co-operative societies. Due to the efforts of the Marketing Board, the railways have agreed to accord facilities for erection of godowns in their premises for stocking paddy, and producers' organisations can well take advantage of this. It is desirable that such organisations are started in the major growing areas, and arrangements made for direct export to different consuming areas, thereby reducing unnecessary expenses in marketing.

The imports from Burma call for some attention Although the quantity imported varied from 10 to 15% of our production in the past five years, these imports have the effect of depressing the prices at Madras, and delaying the tendencies of any rise of prices in Madras markets even for a long period after harvest. The fixation of a quota system with Burma will tend to improve price levels in Madras. There are certain difficulties also in the distribution of rice in our province which require remedying. Madras rices have sometimes to travel such long distances as 600 miles to meet deficit areas, and distribution costs are high. Imported rices have however easy access to all ports in several directions of the province and a short lead to consuming areas. The districts of Coimbatore, Salem, Malabar, Vizagapatam and Ramnad stand out prominently as importing centres, and a properly regulated system of special rates from producing areas will tend largely to improve distribution. In the matter of imported rices, it is worth while having a system of licensing of wholesale importers, and undue imports in certain months checked by the issue of certificates of authorisation as is now done for cotton under Cotton Transport Act. It is well to remember that the practice of adulteration of imported and broken rices with local ones is common.

Progress has been effected in the dissemination of market intelligence about rice in the province and wholesale prices by varieties in all important markets are being published periodically in the Fort St. George Gazette and local papers. Due to the enormous number of varieties grown, the standardisation of commercial types is attendant with difficulties, but steps should be taken to specify quality in rice in respect of price quotations. A large number of samples of rice from all over India have been analysed by the marketing section with a view to evolve commercial standards of quality for trading in rice. Side by side with this the regulation of weights and measures requires immediate attention. Not only are the measures used now manipulable, but they introduce large uncertainties in market quotations. Even in markets where sale is by weights, the weight per bag is altered to suit conditions of the market.

As contrasted with wheat, there are no associations or organisations of trade in rice to regulate market charges and standardise market practices. Facilities for trading in "rice futures" are also conspicuous by their absence. In view of

the stabilising influence which "futures" have on ready prices, and also in view of our large import and export trade, it is well to establish organised "futures exchanges" in the larger markets in the presidency as Bezwada, Tanjore and West Godavari. Such markets will have a balancing effect on our export trade with Ceylon and other provinces and our import trade with Burma, while they will introduce more stable conditions for the internal distribution of home produce. The control of adulteration in rice and paddy can also be effected through the establishment of organised and regulated markets in the main producing centres. A good beginning in the control of marketing and direction of improvements can be effected by extending the operation of the "Commercial Crops Markets Act" to the paddy crop which is the main crop of our Presidency.

MARKETING SURVEY OF GROUNDNUT IN THE MADRAS PRESIDENCY

The total area under groundnut in the world is about 15·2 million acres. The main countries of production are:—

	1935—Season area in 1,000 acres.
India	5,857
China	3,310
Senegal	1,729
United States	1,724
Netherland Indies ...	482
French Sudan	457
Ivory Coast	333

Other producing countries are South Africa, Tanganyika, North Australia, British Malaya, Spain, Japan. West Indies and South America.

Groundnut was probably introduced into India about the 16th century but the crop remained unimportant till the second half of the 19th century. Between 1850 and 1890 the recorded acreage increased from 4,000 to 275 000 acres of which nearly 185,000 acres were in the district of South Arcot. There was then a decline in the area due to disease. But from 1898 the crop regained its popularity mainly due to the introduction of a new stock from Africa and partly due to increased demand for groundnut from the European countries. About 1914, the area was about 2·1 million acres which steadily increased to 8 1 million acres during 1933-34. In 1936-37, the area under groundnut in India excluding Burma was 6·48 million acres. India is still by far the largest producer of groundnuts in the world. Madras was the first province to cultivate groundnuts in India and it is still the largest producer among the Indian provinces Groundnut is the most important oil seed crop in this presidency and forms 60 to 65% of the total area under all oil seeds and 6 to 10% of the total area under cultivation. The average area under this crop in this presidency during the five years ending 1935-36 has represented 47·7% of the total area in India. Bombay Presidency, the Nizam's State and Burma are the other major groundnut growing tracts in India and represent together with Madras nearly 90 to 95% of the groundnut acreage in India. The area sown with groundnut in this presidency in 1937 is estimated at 4 56 million acres—against 3·43 million acres in the previous year. This is the highest area estimated so far. The main centres of production are (1) the Ceded Districts comprising the districts of Kurnool, Bellary and Anantapur (2) the Central Districts, South and North Arcot, Chittoor, Salem and parts of Coimbatore and Trichinopoly (3) Guntur and Kistna and (4) Vizagapatam. There is practically no cultivation in South Kanara, the Nilgiris and the major portion of Malabar.

There are two main types of groundnut—the 'spreading' type also known commercially as the Coromandel, Mauritius or the Mosambique, and the 'bunch'

or erect type known as Peanut or Khandesh. Nearly 86 per cent. of the total area under groundnut in this presidency is usually under Coromandel, and this forms the bulk (94%) of the exports. Peanuts are grown mainly in the districts of Guntur, Kistna, Kurnool, Cuddapah, North Arcot and Salem and form nearly 10 to 11 per cent. of the groundnut area in the presidency. Red Pollachi or Red Natal, known as "Lalboria" in Bombay, which is only another form of Peanut with red seed coat, is grown mostly in Pollachi and parts of Madura and Trichinopoly over an area of about 70,000 acres.

The yield of groundnut varies considerably depending on variety, soil, treatment and the season. The mauritius variety generally gives a higher yield than the Bunch type, the average yield being 1000 to 1200 lb. unshelled nuts per acre as against 800 to 1000 lb. of the latter. In red loamy soils the yields are 40 to 50% more than in black soils, while the irrigated crop gives even double the yield of the rainfed crop. The production of groundnuts in the current season is estimated at 1,902 300 tons of unshelled nuts as against 1 657,280 tons in the previous year, an increase of about 14·8 per cent. The normal annual output in the presidency is estimated at 1,540,280 tons of unshelled nuts. The groundnut crop in the province is largely rainfed being sown between May and August and harvested between October and January. The irrigated crop comprising about a lakh of acres is sown in February to March and harvested in July to August.

The marketing season for the main or winter crop commences from the end of October with slight variations according to the variety grown and the time of sowing. In Guntur the erect or short duration variety is cultivated most and the crop is harvested and marketed nearly a month in advance of the crop in the Circars which is mainly the spreading type. In the Southern and Central districts, the winter crop comes to market by December—January, and is generally marketed throughout the year but in South Arcot nearly 75% of the produce passes to whosesalers by the end of April—May. In the Ceded Districts, where the groundnut holdings are much bigger, the ryots generally dry and store the produce either selling in small lots according to the price or holding on stocks till the new crop is about to be harvested. The marketing season in Pollachi (Coimbatore District) commences about August and is completed by the end of November, and comprises 40,000 to 50,000 tons of groundnut annually. The harvesting season being usually rainy, most of the crop is disposed of by the cultivators fresh from the field before drying. The irrigated crop which is lifted by July—August is disposed of before the winter crop comes to the market; the normal produce of this season ranging from 50,000 to 60,000 tons.

The general practice of assembling groundnuts in the market is as follows. The wholesale merchants have a number of small dealers or village merchants operating within a radius of 15 to 20 miles for purchase of ryots' groundnuts on a commission basis, which is usually 9 pies to 1 anna per bag of nuts (80 to 90 lb.) paid by the merchant. Some village merchants also buy and sell on their own account, as also a few landlords. In the Ceded districts, the ryot often takes loan from the *bania* and binds himself in writing to sell all his produce for a series of years under security of his mortgaged property. At times the wholesale merchants or owners of oil mills also engage paid clerks to buy groundnuts from villages. Generally ryots sell the produce in the unshelled form either *kacha* or *pucca*, except in South and North Arcots, where hand shelled nuts are taken in the Kacha form to the market. In Masulipatam and in Vellore the ryots bring the produce to a central place for auction by wholesalers and commission agents. In all other places sale by private negotiation is the rule.

On the average, about 48% of the production is exported after it has been decorticated. Shelling is mostly done by decorticators driven by steam, oil or electric mbtor. Hand shelling is common only in parts of South and North

Arcot districts and Ramnad. Machined groundnut fetches a premium of 3 to 6 rupees per candy (531 lb.) over hand shelled, known by the trade as 'Ordinary groundnut'. There are two types of machines, the beater type and Kirloskar Kalyan type. The former being cheaper is more widely used but the latter is an improved type and the breakage of kernel is much reduced. The practice of moistening the nuts before decortication, especially in the hot months from April onwards is common in most centres except in Vizagapatam. This is done to avoid too much breakage of the kernals and to prevent loss in the form of nooks and bits, but watering is generally overdone and the quality of the kernels suffers considerably.

The wholesale merchants are generally the owners of decorticating factories of which there are about 550 in this presidency, mostly situated near railway stations for despatch of the kernels to the nearest port of shipment. The wholesale merchants sell the kernels to the exporting firms, which have sub-agents at almost all the important producing centres. All sales are, by the wholesalers to the exporters, on written contracts on the basis of standard quality. The exporters allow free, an admixture of 2 per cent. foreign matter. The seller is compensated for refraction less than 2%, when the contract is mutual. Allowances are also made by the buyer for quality as damaged seeds, excess moisture, colour of kernel etc. The system of 'unfixed contracts' is very common in groundnut markets of the province especially in the Ceded districts. By such contracts, the seller after delivering the goods takes an advance up to 80% of the day's price from exporting firms. The price must be fixed in writing by the seller within 60 days from the date of contract on any day he chooses. This is a system of gamble where a few merchants have profited considerably while many have lost heavily.

In this Presidency, the export business with foreign countries is carried on mostly by three firms only. Exports from Madras Presidency from 75 to 85% of the total exports of India, and ranged from 4·6 lakhs of tons in 1930—31 to 6·4 lakhs of tons in 1936—37 Exports were low in 1932—33 and again in 1935—36. The value of exports from the province ranged from 500 lakhs of rupees in 1934—35 to 1060 lakhs of rupees in 1936—37.

Exports of groundnuts from India and Share of Madras.

Year.	Exports from British Indian ports.		Exports from Madras Presidency.		Share of Madras Percentage of quantity.
	Quantity in tons.	Value in lakhs of rupees.	Quantity in tons.	Value in lakhs of rupees.	
1930—31	601,204	966·78	457,204	735 02	76
1931—32	671,973	1013·68	495,911	714·74	74
1932—33	433,012	712·22	349,962	559·68	81
1933—34	546,546	663·11	455 337	544 60	83
1934—35	511,194	592 84	436,350	499·76	85
1935—36	412,567	665·10	332,230	538 89	80
1936—37	739,487	1228·57	638,577	1060·52	86

The exports from this presidency are mostly to France, Germany, Netherlands, Italy, Belgium and the United Kingdom. Nearly one-third of total exports during the last seven years went to France. The exports to the United Kingdom and Italy are on the increase, while Germany and the Netherlands have considerably reduced their demands. The share of United Kingdom rose from 6·4% in 1931-32 to nearly 13% during 1936-37, partly due to the Ottawa agreement and partly to removal of Soyabeans from the United Kingdom free list.

The coastal exports are mainly to Burma, Bengal, Bombay and Sind and averaged annually about 12,600 tons during the last five years. Groundnuts are also being exported by rail to Bombay, Mysore and Bengal to the extent of about 30,000 to 40,000 tons annually. During 1936–37, 52,225 tons of groundnuts were imported from the Nizam's State and Mysore by rail to Madras, as against 15,000 tons in the previous years. Coastal imports are negligible, the annual average being only about 350 tons in the last five years.

As stated above, the exports of groundnuts represent about 48·2 per cent of the total production. The quantity reserved for sowing represent about 10 to 11% of the production. Considerable quantities of groundnuts are crushed in this Presidency by primitive wooden and stone *chekkus* driven by bullocks, by hand presses and modern expellers. There are 66 oil factories in this presidency, situated mostly in the groundnut tracts of Kurnool, Anantapur and Guntur, and crushing annually about 132,000 tons of unshelled nuts or 9 per cent of the average annual production. The consumption by chekkus for crushing is estimated at 310,000 tons unshelled nuts annually or 20·6% of the average yearly production. Hand presses and rotary mills consume about 5.4%, thus making a total of 35% of the average annual production for crushing into oil. Oil is consumed largely for culinary purposes, lighting, soap-making, for adulteration with gingelly oil and for the manufacture of margarine. The Tata Oil Mills at Ernakulam have recently started manufacturing hydrogenated products. There is considerable coastal export of groundnut oil, mostly to Burma (85%) and in a smaller measure to Bengal, Bombay and Sind.

The total coastal exports of oil increased from 366,146 gallons in 1931–32 to 1,613,637 gallons in 1936–37. Exports to foreign countries rose from 20,157 gallons in 1930–31 to 103,246 in 1936–37. The demand for Indian groundnut oil in England increased during the past few years, the share of total imports rising from 1% in the quinquennium ending 1930–31 to 64·8% in five years ending 1936-37. But there were no exports of groundnut oil from this Presidency to the United Kingdom The export trade of groundnut cake from this Presidency has steadily improved from 9,287 tons in 1930–31 to 42,757 tons in 1936–37. United Kingdom is the chief buyer and imports annually 25,000 to 30,000 tons. Other countries receiving supplies from this presidency are Germany, the Netherlands, Ceylon and Belgium. Cocanada and Masulipatam are the chief ports of shipment. Locally groundnut cake is used for manuring sugarcane and paddy crops and as a cattle feed.

As a large share of the produce (groundnut) is exported abroad, the wholesale price entirely depends on the rates offered by the exporting firms, which depend on the price of groundnut oil and cake prevailing in England and the continental ports. Groundnut oil prices vary according to the prices of other vegetable oils and marine oils. The wholesale prices of groundnut kernels of standard quality at all the ports on the Coromandel coast are fairly uniform, any slight variation in the rate quoted by different firms being due to the difference in shipping freights and their commitments for export. The prices in the interior markets depend on the incidental charges, cart hire and railway freight etc., from the nearest railway station to the nearest port. Wholesale price quotations are for a candy of 531 pounds, but the units of sale for unshelled nuts in the villages, vary from place to place. The downward trend in groundnut prices began in 1929 and towards the end of 1930 the decline became substantial and prices of machined Coromandel for port delivery dropped from about Rs. 53 per candy to nearly Rs. 24. Prices improved slightly in 1932, but dropped again during 1934 to Rs. 17 per candy. Since then, prices improved and recovery was substantial after January 1935, and touched about Rs. 45 a candy. Prices dropped again and machined coromandel is now selling at Rs. 27 to 28 a candy. The present low price is due partly to the heavy crop and the world conditions. The rate for

'peanut' is invariably 8 annas to one rupee less per candy (531 lb.) than that for coromandel.

Being an export crop, the improvement in the marketing of groundnuts, depends largely on world conditions. Although nearly half the crop is retained in the country, Indian prices appear to be governed entirely by export prices in the shape of exporters' buying limits. The organisation of internal trade has not kept pace with the expansion of internal demand. Although Madras is the biggest producing province, there is no 'future' trading in Madras, and the stabilising effect of it on ready prices is lost; the only such market being at Bombay. The system of 'unfixed' contracts, which is a feature of Madras trade also requires control. The practice of damping the seed which affects the quality is a defect which should be remedied. Indian groundnuts exported to England have a bad reputation and contain free fatty acid which increases from about 3% in the beginning of the season to nearly 8% at the end. Damping the seed, and improper and long storage at ports are the causes of free fatty acid increase. In regard to quality of nuts, there are no much defined specifications for different grades and contract terms are not equally fair to buyer and seller, e. g., the allowance for moisture depends entirely on buyers' judgment. Also clay is added by the trade if the refraction is less than that allowed. Sales for shipment to different ports are made on a different refraction basis varying from pure to 4%. London contracts are on pure basis, whereas the shipments to Marseilles are on 4% impurities basis. The exporters in Madras buy on the basis of 2% impurities.

To improve the above defects, the first requisite is an organised market. The application of the Commercial Crops Markets Act to important groundnut areas appears justified from all points of view. Such markets can well take up the work of standardising weights, licensing middlemen, controlling malpractices and realising better conditions for the grower. They can also improve conditions of contract terms. Side by side, co-operative associations of growers can be started, with the ultimate object of themselves decorticating the nuts and having direct touch with exporters and regulated markets. The sale of Kachi. produce by the growers should be discouraged. Advances may be given to the growers for cultivation expenses.

In regard to fixing of grade standards, a conference of members of the trade and marketing officers was held recently at Bombay and lines drawn up for working up a specific system of grades according to refraction and quality. With the operation of regulated markets, such a step is likely to expand. Within our own country, the future prospects of groundnut will depend on the increased use of oil for edible purposes and for industrial purposes as soap making and hydrogenated oils. There is considerable scope for the increased use of groundnut for edible purposes. Groundnut cake for manure and cattle feeding should be used much more than at present. The cultivation of improved types of groundnut like AH.25 evolved by the department should be taken up on a larger scale as they yield 10 to 20% more than the Mauritius variety.

EXTRACTS.

Intensive Cane Production. Some four years ago an experiment was started at the Bundaberg experiment station to see what could be done in the way of producing large yields if the cane were supplied to the limit with fertilizer and water. The variety planted was P. O. J. 2878.

To date, three crops have been harvested. The combined yield of the three crops was 233 tons of cane, with 28 tons of sugar, or 77·6 tons of cane and 9·33 tons of sugar per crop. These yields are far in excess of the Queensland average, and demonstrate the extreme value of irrigation and fertilizers as factors in cane

production, particularly where deep, fertile soil are available in regions of scant rainfall. It is a fact that many growers are now attempting to make full use of available water resources.

In view of the fact that sugar production in Australia is limited and strictly prorated by law, the question might be raised as to the advisability of increasing yields by intensive farming on limited areas. But as the author points out, "fears of serious over-production of cane, due to the adoption of intensive production methods, need have no foundation; growers could reduce their cane acreages proportionately to their tonnage-per-acre increases, and devote the land thus liberated to the production of alternative crops, the growth of which under irrigation could also be made worth while. Care in the choice of the supplementary crop selected would also assure the production of those commodities for which a ready market exists." (*Facts about Sugar*, January 1938).

Honey as An External Remedy. Years ago I applied to bad, dirty wounds which had no tendency of healing and would not cease to suppurate, sugar in the form of finest powder. I scattered the sugar directly on to the bruise in a rather thick layer, and I had good success with this method. I knew that a strong solution of sugar was an antiseptic and attributed the good effect to this circumstance. In different German papers Dr. Raiss in Heilgenkreuzsteinach dascribed how he cures wounds with pure honey with excellent results. In popular medicine, honey has been used in the form of ointments, mixed with meal or fat or other substances. Dr. Zaiss who had heard of these honey-ointments made many experiments with pure honey without any admixture and he had excellent results. He employed honey especially for contused bad irregular slashed and dirty wounds which are always exceedingly difficult to cure. He put the honey directly into the holes and on the whole surface of the wound and bandaged it. He observed, as a rule, that after 24 hours the latter had cleaned itself and got a proper red aspect. The honey is to be renewed all 24 hours after a good warm bath of the injured part. If the skin is only scratched without deeper injuries he daubs the place with honey in a thin layer, often without making a bandage. The honey dries up and forms a cover like a varnish and in a short time the hurt is repaired. Dr. Zaiss recommends the use of honey especially for burns of all degrees and says this method is better than all others. Honey seems to be very good for those disagreeable furuncles in the canal of the ear, and on the nose. For wounds or infections in the cavity of the mouth he lets turn in the mouth a little clump of candied honey. Dr. Zaiss gives some instances of his practice. (*Gleaning in Bee Culture*, November, 1937)

Vitamin C in the Potato. Before the potato was introduced into the Netherlands, scurvy was a very common ailment; to-day the potato is the chief source of vitamin C in the dietary of the Dutch people. In the few determinations of the vitamin C content of potatoes that have been published, no regard has been paid to the possible differences between varieties or to the possible influence of the conditions under which they are grown. These points have recently been investigated by J. B. H. Ijdo, of the Hygiene Laboratory of the University of Utrecht, and his results are recorded in the *Landbouwkundigs Tigdschrift* of August–September 1937. He has found that the vitamin C content of thirteen varieties of potato grown in the same conditions varied from 25 to 63 per cent., whereas samples of the same variety showed an average difference of only 10 per cent. Locality of growth was also found to influence the content of vitamin C in potatoes of the same variety; the greatest difference observed was 40 per cent. for the variety 'Iris'. Practically no difference was found between the contents of small and large tubers, or between samples taken from the centre and the periphery of the same potato. The absolute amount of vitamin C was found to

vary from about 10 mgm. to 20 mgm. per 100 gm. of fresh material, a result which is in keeping with those previously published by other investigators.

(*Nature*, December 4, 1937).

Magnesium Sulphate as an Insect Poison. Many of the well-known and widely used insecticides contain arsenic in some form and therefore suffer from the great drawback of being extremely poisonous to man, domestic animals, and birds. Preliminary tests have recently shown that poison baits containing 20–25 per cent. magnesium sulphate, 60–65 per cent. bran, 15 per cent. molasses, and enough water to moisten, are as effective against grasshoppers as similar baits with 5 per cent. arsenic ("Magnesium Sulphate A New Insecticide," by H. W. Frings and M. S. Frings, *Science*, 1937, 85, 428). Such baits are, of course, harmless to vertebrate animals and are also cheaper than the arsenic baits. It is suggested by the authors that magnesium sulphate may be an insecticide of value in solution as a spray, as it appears to be fatal to mandibulate insects, while its ready solubility in water would render it easily removable from fruits and vegetables, an additional advantage over arsenic compounds. (*Bulletin of the Imperial Institute*, October—December 1937).

The margin between producers' and consumers' prices of certain foodstuffs. This report, undertaken in connection with the International Institute of Agriculture's work for the League of Nations Nutritions Commission, is designed to collect, summarize and interpret data relating to the costs of distribution of foodstuffs. It contains information relating to twelve countries, some of which is original and the remainder only being available in scattered and not easily accessible documents.

The main problems which the report discusses are the size, composition and movement of the distributive margin, the degree to which, and the reasons wherefor, the margin may be excessive, and the possibility and methods for reducing them, and thereby the cost of foodstuffs to the consumer. It will thus be of interest not only to producers and distributors but also to consumers and their organisations whose interest in the reduction of the prices of foodstuffs is becoming increasingly marked in view of the rising tendency of the costs of living in most countries of the world. The importance of the questions is shown by the statistics, amply provided in the report, which show that in some countries the cost of distribution in all the processes involved in the passage of a given commodity from farmer to consumer, averages from 40 to 60 per cent of the consumer's price. Further the report shows that for a whole series of seasons, the long term trend is towards a continual increase in the size of the margin.

The division of the work into two parts, one containing separately the information relating to each country and the other presenting the conclusions which a collective study of such information reveals, makes possible the separation of problems of a general interest from those of the more limited national character, and will facilitate its use for reference purposes.

The report concludes that, there are sufficient possibilities of reduction of distributive costs to justify the belief which underlay the proposal of the League Committee on Nutrition to the Institute to collect material on the distributive margin—the belief, namely, that research in this field, continued with appropriate action, could contribute to lowering prices of necessary goods to the consumer, and to the improvement of nutrition standards.—*International Institute of Agriculture, Rome, Press Service.*

Farm Accountancy Statistics for 1932-33 and 1933-34. The International Institute of Agriculture at Rome is about to publish the sixth volume of the "Farm Accountancy Statistics". This publication contains tables bringing together the chief agricultural statistics for about twenty European countries

and for the United States of America. It makes available in a form which facilitates comparisons as much as possible a series of international statistics. This publication is all the more important as it throws light upon a large number of the most difficult problems of rural economy, of agricultural policy and also upon the trends in farming under the influence of variable market conditions.—*International Institute of Agriculture, Rome, Press Service.*

Live Stock Insurance in Germany. In the Bulletin of Agricultural Economics and Sociology the International Institute of Agriculture has published a study of live stock insurance in Germany. In the first part, devoted to private insurance, are discussed the principal branches of this type of insurance, that is to say insurance against the death of live stock, and insurance of slaughter animals. The articles discuss not only the origin and development of these forms of insurance, giving two complete statistical tables, but also that which concerns the insurance contract, the regulation of societies and legislation against live stock diseases.

The second part is devoted firstly, to public insurance of live stock, practised in Germany—in Bavaria and Thuringia and by two Prussian public fire insurance companies—and then to reinsurance of small local societies which has taken on various forms in Germany and which exists at the present time in Baden, Bavaria, the Free State of Saxony, and finally in Berlin under the form of a share company created recently by the agricultural corporation which owns the total capital of this society which has replaced several re-assurance organisations existing in several states.—*International Institute of Agriculture, Rome, Press Service.*

Review.

Fruit Industry of Italy and Sicily Island—Part III. By S. S. Lal Singh, B. Sc. (Hons.), M. Sc. (Calif.).*

This report, the third of a series, gives a brief account of the author's impressions of his visit to Italy and of the present improved status of its fruit industry brought about by the co-operative efforts of the people and the Government of Mussolini. They devised and successfully worked out a national and thoroughly comprehensive scheme involving free supply of reliable fruit plants of commercial importance, land revenue concessions and subsidies in addition to advertisement, propaganda, legislation and free inspection service on up-to-date lines of commercial orcharding and organised marketing, providing funds for co-operative organisations and facilities for cold storage, packing houses, safe and cheap transport, preservation of surplus fruits and vegetables, and preparation of their bye-products.

While the area and population of Italy exceed those of the Punjab by about 20% and 70% respectively, the area under fruit per capita in Italy works out to 0·41 acre in contrast to the negligible area of 0 03 acre in the Punjab. The author clearly points out that if small Italy could claim 1·72 crores of acres under fruits and has over 850 factories for preservation of fruits and vegetables involving capital of about 300 million rupees and labour of 1,30,000 persons, the immense potentialities of fruit industry in the Punjab are obvious with its extensive areas of congenial climate, soil and water suitable for cultivation of a wide range of fruits.

The above series consist of four parts. Each part is priced 8 annas, and complete set, Re. 1—12—0. We commend the publication to the notice of those interested in this particular line of farming. (S. M. R.).

* Published by the Punjab Provincial Co-operative Fruit Development Board, Lyallpur. Price: Annas eight.

Correspondence.

Entomological Society of India.

Rao Sahib Dr. T. V. Ramakrishna Ayyar, "Hrishikesh", R. S. Puram, Coimbatore, writes:—

During the Silver Jubilee Session of the Indian Science Congress held at Calcutta those interested in the formation of an Entomological Society for India met on the 7th January '38, under the presidentship of Mr. M. Afzal Husain. The Entomological Society of India was then formally inaugurated and most of the entomologists present agreed to become its foundation members. A set of rules framed by a committee, appointed at the previous Science Congress Session at Hyderabad, was then read, amended and passed. A committee consisting of the following gentlemen was elected at the meeting to carry on the preliminary work of the Society, including publicity, enrolment of members, collection of subscriptions etc., till such time as an Executive Council, as provided in the Rules, is elected:—

1. Mr. Afzal Husain (Lyallpur).
2. Dr. Hem Singh Pruthi (New Delhi).
3. Rao Sahib Dr. T. V. Ramakrishna Ayyar (Coimbatore).
4. Rao Bahadur Y. Ramachandra Rao (Karachi).
5. Mr. N. C. Chatterjee (Dehra Dun).
6. Dr. D R. Mehta (Kasauli).
7. Dr. D. D. Mukherjee (Calcutta).

As desired by the members of the meeting held at Calcutta the undersigned is giving publicity about the matter to those interested in the subject especially in S. India. He will also be very glad to hear from all those interested in this new Society who may wish to become members or offer suggestions and he will also supply information wanted on the subject.

The first annual meeting of the Society is expected to be held in Lahore next January.

An offer for Agricultural Graduates.

Messrs. A. V. Thomas & Co., Ltd., Alleppey have written to the Principal, Agricultural College, the following letter which has been forwarded to us for publication.

Dear Sir,

We shall be glad to hear whether you could recommend any young men who would be prepared to work on our tea and rubber estates. Our idea is to take on a batch of young-men who have had training in the Agricultural College and place them on our estates to have practical training under our Superintendents. In course of time these people, if they are found satisfactory, would be posted as Superintendents in our Estates. Men willing to do hard work and those who are not afraid of work in malarial districts are preferred.

Thanking you for any help you can give us in this matter,

Yours faithfully,

(Sd.) A. V. Thomas & Co., Ltd.

Crop and Trade Reports.

Cotton—Fourth Forecast Report. The average of the areas under cotton in the Madras Presidency during the five years ending 1935-36 has represented 9·5 per cent. of the total area under cotton in India.

The area under cotton up to the 25th January 1938 is estimated at 2,512,000 acres. When compared with the area of 2,461,400 acres estimated for the corresponding period of last year, it reveals an increase of 2·1 per cent.

393,400 acres have been reported as sown since the last December forecast was issued. This extent is made up of 203,500 acres under Tinnevellies, 103,300 acres under Cambodia, 45,000 acres under Northerns and Westerns, 29,900 acres under Salems and 11,700 acres under Cocanadas. The area sown in December and January falls short of that sown in the corresponding period of the previous year by 85,900 acres or by 17 9 per cent.

The decrease in area in the current year as compared with the area in 1936-37 occurs in the Circars, Kurnool, South Arcot, Trichinopoly, Tanjore, Tinnevelly and Malabar. In the Cocanadas tract, the area fell from 150,200 acres to 129,400 acres, i. e., by 13·8 per cent. and the reduction in area was due mainly to the cultivation of chillies, tobacco and groundnut in some places in preference to cotton.

The area under irrigated cotton mainly Cambodia is estimated at 271,700 acres as against 247,600 acres for the corresponding period of the previous year, an increase of about 9·7 per cent.

Pickings of the *mungari* or early sown cotton crop in the Deccan have concluded. The yield was appreciably below normal.

Yields below normal are reported from all the important cotton-growing districts except Coimbatore where irrigated cotton is expected to give a normal yield. The estimated yield is lowest in Bellary (50 per cent.). Anantapur comes next with 60 per cent.

The seasonal factor for the Presidency works out to 80 per cent. of the average as against 96 per cent. for the corresponding period of the previous year. On this basis, the total yield is estimated at 488,600 bales of 400 lb lint as against 533,100 bales for the corresponding period of the previous year. It is, however, too early to estimate the yield with accuracy as the harvest has not yet commenced in the major portion of the area and much will depend upon the future weather conditions and the toll taken by insect pests.

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

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

Variety.	Area from 1st April to 25th January.		Corresponding yield.	
	1937-38.	1936-37.	1937-38.	1936-37
	Acs.	Acs.	Bales.	Bales
(1)	(2)	(3)	(4)	(5)
Irrigated Cambodia	259,7	235,2	158,6	145,5
Dry Cambodia	306,2	276,5	62,7	59,4
Total, Cambodia ...	565,9	511,7	221,3	204.9
Karunganni in Coimbatore ...	137,0	128.4	29,7	29,3
Uppam in the Central districts ...	32,0	35,6	4,9	5,5
Nadam and Bourbon	25 2	17,7	1,2	9
Total Salems ...	194,2	181,7	35,8	35,7
Tinnevellies *	529,5	564 4	123,9	145,4
Northerns and Westerns	1,086,0	1 048,5	84,1	119,9
Cocanadas	129,4	145,9	22,6	26,0
Others	7,0	9,2	9	1,2

* Includes Uppam, Karunganni and mixed country cotton in the South.

The average wholesale price of cotton lint per imperial maund of 82⅔ lb. as reported from important markets on 7th February 1938 was Rs. 16—7—0 per

Cocanadas, Rs. 17—6—0 for white Northerns, Rs. 16—7—0 for red Northerns, Rs. 13—5—0 for Westerns (early crop), Rs. 16—4—0 for Westerns (Jawari crop), Rs. 21—14—0 for Cambodia, Rs. 24—13—0 for Coimbatore Karunganni Rs. 19—7—0 for Tinnevelly Karunganni, Rs. 18—13—0 for Tinnevellies, and Rs. 18—10—0 for Nadam cotton. When compared with the prices published in the last report, i.e., those which prevailed on 3rd January 1938, these prices reveal a fall of about 1 per cent. in the case of Westerns (early crop) and a rise of about 5 per cent. in the case of Tinnevellies, 3 per cent. in the case of Westerns (Jawari crop) and Coimbatore Karunganni and 1 per cent. in the case of Cambodia, the prices of Cocanadas, white Northerns, red Northerns, Tinnevelly Karunganni and Nadam cotton remaining stationary. (*From the Director of Industries, Madras*).

Cotton Raw in the Madras Presidency. The receipts of loose cotton at presses and spinning mills in the Madras Presidency from 1st February 1938 to 18th March 1938 amounted to 39,222 bales of 400 lb. lint as against an estimate of 488,600 bales of the total crop of 1937-38. The receipts in the corresponding period of the previous year were 33,681 bales. 48,648 bales mainly of pressed cotton were received at spinning mills and 4,943 bales were exported by sea while 16,923 bales were imported by sea mainly from Karachi and Bombay, (*From the Director of Agriculture, Madras*).

College News and Notes.

Reorganization. Agricultural Department: The Government have issued orders reducing the number of administrative Circles in the Department from eight to four.

Livestock section. Orders have been issued by the Government directing the transfer of the Livestock section to the Veterinary Department with effect from 1 April 1938.

Students' Corner. Farewell tea: A 'Social' to bid farewell to the outgoing students of the third year was arranged on 16—3—38 by the first and second year students in the Freeman Hall. The tea at 4·30 p. m being over, speeches on behalf of the tutors, coaches and lecturers were made. After this, the representatives of the First and Second year students spoke in high terms of the help and advice given them by the third year students. The third year representative made a suitable reply. The principal, Mr. R. C. Broadfoot, spoke a few words of advice to the outgoing students, wishing them all success and prosperity.

Students' Club Day. The students' Club Day was celebrated on the 26th of February 1938. Sports and tournaments connected with it were conducted previous to the Club Day. This year it was celebrated with greater zeal and pomp than in the previous years. The function began with a light tea at 4 p. m. The fancy dress competition evoked the greatest amusement and it was a pleasant evening to be in the midst of a galaxy of competitors dressed in their different "motleys" chosen for the occasion. After tea, the guests and students adjourned to the well-decorated Freeman Hall where a meeting was held with Dewan Bahadur M. Venkatarama Iyer, Retired Deputy Commissioner of Excise, in the chair. The club secretary and the games' secretary then read their respective reports for the year which was followed by the prize distribution by the president. This was followed by a variety of entertainments with music, magic, gymnastic feats, and a Tamil farce by the students. The "College Rag" read on the occasion was amusing to one and all. The happy occasion terminated with the presidential address followed by a vote of thanks by the Vice-President of the Club, Mr. H. Shiva Rao.

The following is the list of the prize winners in the sports and tournaments held in connection with the Club day celebrations :—

Indoor Games *Table Tennis.* Narayana Rao, Winner. P. Thotadri, Runner up, *Carrom Singles.* Varadarajan, Winner. Narayana Rao, Runner up. *Carrom Doubles.* Varadarajan & Syed Ibrahim, Winners. Santhanam & George, Runners up. *Chess.* P. Lakshmana Babu, Winner. Narayana Rao, Runner up. *Blow Ball.* Joseph Doss's Team, Winners.

Sports. *Three legged Race.* Balakrishnan and Partner 1. Rajasekara Shetty and Partner 2. *Sack Melee.* K. K. R. Menon's Team, Winners. *Kicking the Foot ball.* M. Mukundan 1. K. K. R. Menon 2. *Slow Cycle Race* Mohan Punja 1. Azariah 2. *Musical chairs on cycles.* Shaik Hussain 1. George Chellappa 2. *Blind fold chatti race.* T. Marthappa Kini 1. Kesava Reddy 2. *Consolation prizes.* Pandiaraj and Nataraj. *Scouping the Hockey Ball.* B. K. Mohan Rao 1. Shaik Hussan 2. *Ringing the stumps.* M. K. Adeni 1. Kesava Reddy 2. *Bowling at the stumps.* Kothandaraman 1. Santhanam 2. *Ring Tennis.* Anantharaman and Partner 1. Subba Rao and Partner 2. *Volley Ball.* Sivaswami's Team, Winners. *Inter-Mess Tug of War.* Non-vegetarian Mess. *Badminton Doubles.* Veeraraghavan and T. M. Kini 1. Shetty and George 2. *Badminton Fives.* Mohan Punjas' Team, Winners. *Cecilwood Cup Singles Tournament.* Veeraraghavan, Winner, V. Ramanna, Runner up. *Handicap Doubles Tennis Tournament.* C. M. Seshadri and Veeraraghavan, Winners. D. Narayana Rao and R. Anantharaman, Runners up. *Essay Competition.* K. V. Srinivasan 1. Satyanarayana Reddy 2. Mahabala Shetty 3. *Elocution Competition.* K. S Sankaran 1. Upadyayalu 2. K. M. Shetty 3. *Fancy Dress Competition.* Gas mask (Nedungadi) 1. Fakir (Syed Ibrahim) 2. Nurse (G. V. Chellappa) 3. *Consolation.* Milkman (D. Ramanujam), Priest (Pandia Raj) and Charcoal seller (Subba Rao)

College colours were awarded this year to the following officers and students:- *Cricket.* 1. C. Ramaswami. 2. Kothandaraman. 3. M. Mukundan. 4. K. K. R. Menon. 5. K. M. Shetty. *Hockey.* 1. K. K. R. Menon. 2. M. Mukundan. *Football.* 1. P. K S. Mani. 2. K. M. Shetty. 3. S. V. J. Doss. *Tennis.* 1. C. Ramaswami. 2. V. Ramanna. 3. Veeraraghavan. *Athletics.* 1. M. Mukundan. 2. T. M. Kini.

Rao Bahadur C. Tadulingam Cricket Cup. Dr. J. S. Patel's Wards.

R. Krishnamurthi Rao Memorial Hockey Cup. Dr. J. S. Patel's Wards.

Rao Saheb V. Muthuswami Iyer's Football Shield. Dr. J. S. Patel's Wards.

Victory Cup. B. Sc. Ag. Class II.

Parnell Cup. „ „ III.

Parlakimedi Aggregate Cup. M. Mukundan.

In this connection it is worth mentioning that M. Mukundan is the holder of 4 colours, three being awarded this year and one last year. It is really creditable to win four colours.

Officers' Club. At a general body meeting of the Agricultural College Officers' Club held on 3rd March 1938 the following office bearers were elected for the year 1938. *President*—M. U. Vellodi ; *Vice-President*—K. M. Thomas ; *Secretary*—K. S. Subba Rao ; *Assistant Secretary and Treasurer*—C. V. Nagarajan.

Weather Review—FEBRUARY 1938.

RAINFALL DATA

Division	Station	Actual for month	Departure from normal @	Total since January 1st	Division	Station	Actual for month	Departure from normal @	Total since January 1s
Circars	Gopalpore	1·1	+0·4	1·1	South	Negapatam	10·0	+9·4	10·2
	Calingapatam	1·3	+0·8	1·3		Aduthurai *	3·1	+2·8	3·2
	Vizagapatam	2·1	+1·2	2·1		Madura	0·4	0·0	0·4
	Anakapalli *	1·4	...	1·4		Pamban	3·5	+2·8	4·7
	Samalkota*	...	...	0·0		Koilpatti*	1·5	+0·7	1·6
	Maruteru*	...	−0·1	0·0		Palamkottah	6·6	+5·8	6·6
	Cocanada	0·4	+0·1	0·4					
	Masulipatam	...	−0·4	0·0					
	Guntur*	...	−0·1	0 0	West Coast	Trivandrum	4·9	+4·3	4·9
						Cochin	1·1	+0·3	1·1
Ceded Dists.	Kurnool	0·3	+0·1	0·3		Calicut	...	−0·2	0·0
	Nandyal*	0·1	+0·3	0·1		Pattambi *	0·3	+0·3	0 0
	Hagari *	0·4	...	0·4		Taliparamba *	...	...	...
	Bellary	0·3	+0·1	0·3		Kasargode *	...	−0·4	0·0
	Anantapur	0·0	−0·3	0·0		Nileshwar*	...	−0·2	0 0
	Rentachintala	0·5	...	0·5		Mangalore	0·0	−0·1	0·0
	Cuddapah	0·0	−0·1	0·0					
	Anantharaju-pet *	0·0	...	0·0	Mysore and Coorg	Chitaldrug	0·0	0·0	0·0
						Bangalore	0·1	0·0	0·1
Carnatic	Nellore	0·0	−0·1	0·0		Mysore	0·0	−0·5	0·0
	Madras	0·5	+0·2	0·5		Mercara	1·3	+1·1	1·3
	Palur *	...	...	...					
	Tindivanam *	3·1	+2·3	3·3					
	Cuddalore	1·3	+0·4	1·3	Hills	Kodaikanal	2·9	+1·5	2·9
						Coonoor	7·6	...	7·6
Central	Vellore	0·4	+0·1	0·4		Ootacamund *	0·1	−0·5	0·1
	Salem	0·4	+0·1	0·4		Nanjanad *	0·2	−0·2	0·2
	Hosur*	...	...	...					
	Coimbatore	0·3	0·0	0·3					
	Coimbatore A. C. & R. I.*	0·1	−0·3	0·1					
	Trichinopoly	0·4	−0·1	0·4					

* Meteorological Stations of the Madras Agricultural Department.

@ From average rainfall for the month calculated upto 1935 published in Fort St. George Gazette.

The North East Monsoon continued to be active from the first week to the middle of the second week and caused local and light showers in parts of North Madras, Malabar, and South East Madras.

Local and scattered thundershowers occurred in parts of North Madras coast, Madras, Deccan, Hyderabad, Mysore, and South east Madras.

Rainfall was in moderate excess in southeast Madras while defective in a few stations of the Circars, Ceded Districts and hills.

Chief falls reported:— Negapatam 4·9″ on 7th.

Weather Report for Research Institute, A. C. R. I.

Report No. 2/38.

Absolute maximum	94·5°F. on 16-2-38.
Absolute minimum	60·5°F. on 26-2-38.
Mean maximum	90 9°F.
Departure from normal	+0·3°F.
Mean minimum	69·0°F.
Departure from normal	+1·3°F.

Total rainfall	0 09″
Departure from normal	-0·31″
Heaviest fall in 24 hours	0 08″ on 7-2-38.
Total number of rainy days	1 day.
Mean daily wind velocity	0 7 M. P. H
Mean Humidity at 8 hours	73 9%
Departure from normal	2·4%

Summary. Dry weather prevailed except for a light shower on 7th. The mean maximum was almost normal while the mean minimum was above normal by 1·3°F. Rainfall was defective and the mean humidity was excess by 2 4%. The skies were heavily clouded during the first two weeks of the month and less clouded in the third and the last week. P. V. R. & P. G.

Departmental Notifications.

Retirement.

Mr. M. P. Kannappa Pillai, Assistant Farm Manager, Taliparamba retired on invalid pension with effect from 19th January 1938.

Transfers.

Name of officers.	From	To
Mr. A. Muhammad Ali	F. M. A. R. S., Palur	A. D. Puttur.
,, G. Venkatakrishna Ayyar	A. D., Nilakottai	A. R. S., Koduru.
,, M. Alagiriswami	A. D., Vellore	A. D., Wallajah.
,, P. P. Syed Muhammad	Asst. Chemistry Section	A. D., Tirupur.
,, P. V. Hanumantha Rao	A. D., Palladam	A. D , Ramnad.
,, K. Balaji Rao	A. D., Hospet	A. D., Siruguppa.
,, M. Srinivasa Rao	A. D., Sirugappa	A. D., Hospet.
,, S. M. Kalyanarama Ayyar	Asst. in Cotton, Adoni	Asst. in Cotton, Coimbatore.
,, P. R. Subramania Ayyar	F. Supdt. Agri. Middle School, Usilampatti	A. D., Koilpatti.
,, M. Kalimuthu	A. D., Koilpatti	A. D., Tinnevelly.

Leave.

Name of officers.	Period of leave.
Mr. S. M. Kalyanarama Ayyar, Asst. in Cotton, Adoni.	L. a. p. for 2 months from 14—3—'38
,, J. S. C. Antony, A. A. D., Ramnad.	L a. p. for 2 months from 21—2—'38.
,, K. Govindan Nambiar, F. M. (on leave).	Extension of l. a. p. for 1 month from 3—3—'38.
,, N. Srinivasa Rao, A. D., Hosur.	Extension of l. a. p. for 2 months from 1—3—'38.
,, N. S. Rajagopalan, F. R. S., Koduru.	L. a. p. for 2 months from the date of relief.
,, P. N. Muthuswami, F. M. A. R. S., Sirugappa.	L. a. p for 20 days from 1—3—'38.
,, L. Narasimha Acharya, A. D., Ponneri.	L. a. p. for 2 months and 3 days from 10—2—'38.
,, K. K. Ragavan, A. D , Cuddalore.	L. a. p. for 3 months from 15—1—'38.
,, T. Krishna Reddy, A. D., Koilkuntla.	L. a p. for 1 month from the date of relief.
,, A. P. Balakrishna Nayar, A. D., Harur.	L. a. p. for 24 days from 1—3—38.
,, M. P. Narasimha Rao, Asst. in Paddy, A. R. S., Maruteru.	L. a. p. for 2 months from 11—2—'38.