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Farming will never be a success unless the farmer
had more voice in the disposal of
his produce—P. Morrel.

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[No. 2

INTERNATIONAL AND IMPERIAL CO-OPERATION IN REGARD TO AGRICULTURAL STATISTICS AND THE COMPILATION AND DISSEMINATION OF SCIENTIFIC AND TECHNICAL INFORMATION*

BY DEWAN BAHADUR SIR T. VIJAYARAGHAVACHARYA, K.B.E.

Vice-Chairman, Imperial Council of Agricultural Research

It is at once a pleasure and a privilege to welcome you to the Agricultural Section at the 18th annual meeting of the Indian Science Congress. I propose to depart somewhat from precedent, for instead of choosing for my address a subject connected with some special branch of agricultural science, I have selected one of a somewhat more general nature which, however, is closely concerned with the successful application of science to the improvement of agricultural practice. Agricultural statistics form the basis of studies in the economics of agriculture, whilst the rapid dissemination of scientific, technical and statistical information is becoming more and more important in these days of specialization. The recent depression in agriculture due to the fall in prices of agricultural produce, clearly brings out two points which bear on the subject of my address. Never was there a greater need for improvement in the *efficiency* of agricultural production than at present since low prices can only be permanently combated by this means. In promoting such an increase in efficiency the rapid dissemination of scientific and technical information is an important factor. The present world crisis in agriculture has also brought out clearly the interdependence

* Presidential address to the Agricultural section of the Indian Science Congress, Nagpur, January 1931.

of different countries on each other and the need for much more accurate statistics of the production and consumption of agricultural commodities than exist at present. The problem is largely an international one and I have recently had an opportunity of visiting the International Institute of Agriculture and of representing India at the biennial meeting of its General Assembly, where these problems were discussed from the international aspect.

As most of you are aware, the International Institute of Agriculture was founded 25 years ago largely through the energy and foresight of an American citizen David Lubin whose eloquence secured the assistance of His Majesty the King of Italy and the foundation of the Institute at Rome. The Institute is supported by subscriptions from most of the Governments of the World and India has been a contributing country since the inception of the Institute. From an early stage in its history, the Institute devoted special attention to international agricultural statistics and for many years published an invaluable international year-book of agricultural statistics and a monthly statistical bulletin. In these publications the Institute's statisticians summarize the world position in regard to the production and consumption of the more important agricultural commodities so far as such information can be obtained. There are many gaps in our knowledge of these matters; the extent to which different countries maintain statistics of agricultural production varies greatly and the systems on which they are maintained vary almost as much, so that the collating of international figures is a task of no small difficulty. The International Institute has recently succeeded in organizing a special census of agricultural production which has been carried out throughout the world, the results of which are now being compiled. The Institute will now work up the relative economic data which the survey has made available and see what general deductions are possible which will be a guide to agricultural problems in the future. The discussions at the recent meeting of the Assembly show that all countries attach great importance to more thorough studies of the production and consumption of agricultural commodities and the trend of future changes. Only as our knowledge of these matters increases, can we hope to so regulate policy that sudden changes as these which have lately disturbed the world, can be avoided.

At the recent General Assembly at Rome while universal appreciation was expressed of the valuable statistical work conducted by the Institute, in some important quarters doubts were thrown on the suitability of its machinery for dissemination and interchange of scientific information relating to the different branches of agriculture. There is no single science of agriculture, on the contrary, the application of scientific methods to the solution of agricultural problems makes demands practically on all branches of science. But if agriculture makes demands on all branches of science, it also has to be recognized that many of the problems involved, lie on the border line of those sciences and in these days of specialization in scientific research, it is becoming more and more difficult for the scientific investigator to keep in touch with progress even in his own and allied subjects. The investigator of agricultural problems feels difficulty the more acutely because the ground to be covered if he attempts to read all the available literature, is so wide both because of the number of sciences involved and because his problems are nearly always border line problems. New advances in pure science are constantly making possible new methods of approach and entirely new technique in applied science;

and the agricultural investigator needs to be kept in touch with such developments. At the Imperial Agricultural Conference of 1927, the need of agricultural investigators throughout the Empire for the systematic supply of scientific information bearing on the work was strongly emphasized. As a result, a scheme of Imperial Agricultural Bureaux was drawn up and arrangements made for it to be financed partly by the British Government and partly by each of the countries of the Empire. Eight Bureaux are now in working order and are controlled by an executive committee on which each country is represented. In order that research workers abroad might obtain the utmost possible assistance and that research institutions in England might be brought into touch with the needs of other portions of the Empire, each Bureau was located at a centre of research in the special subject dealt with. Thus the Imperial Bureau of Soil Science has been placed at the famous Rothamsted experiment station. The Imperial Bureau of Plant Genetics (for crops other than herbage) has been placed at Cambridge and associated with the School of Agriculture, whilst the Imperial Bureau of Plant Genetics for herbage plants has been placed at Aberystwyth where so much valuable work on fodder crops and grasses has already been conducted. The Imperial Bureau of Fruit Production is situated at the East Malling Fruit Research Institute in Kent. The Imperial Bureau of Animal Nutrition is located at the well-known Rowett Institute at Aberdeen, that of Animal Health at the Veterinary Laboratory, Weybridge, that of Animal Genetics in the University of Edinburgh, whilst the Imperial Bureau of Agricultural Parasitology has found a home at St. Albans. It will be observed that these bureaux together with the older institutions—the Imperial Bureau of Mycology at Kew and the Imperial Bureau of Entomology, now the Imperial Institute of Entomology, cover most branches of agricultural science. Their functions are to collect, collate, abstract and distribute to all research workers desiring such assistance, the results of recent research in the subject with which the Bureau deals; already several valuable bibliographies and summaries of current research in several subjects have recently been issued. The work is essentially co-operative. Only in so far as other countries in the Empire provide the Bureaux with copies of published papers and other information can the Bureaux maintain the supply of information to workers in other parts of the Empire. In each country there is an official correspondent for each Bureau. For India the official correspondents are the two Expert Advisers to the Imperial Council of Agricultural Research. I would take this opportunity of asking all research workers in agriculture and the allied sciences to assist the Research Council in supplying the Bureaux with complete sets of Indian publications. The Bureaux have a still more important, if less definite, function than the publication of bibliographies and abstracts, *viz.*, to assist individual research workers to obtain information as to how matters stand in any particular branch of investigation and to put them in touch with specialists in other countries. The Bureaux have skilled translators and are thus able to make available papers which are not easily accessible. One Bureau—the Imperial Bureau of Plant Genetics, Herbage Plants, in particular has established a small loan library of translated papers which can be lent to other research workers in need of such assistance. Though official correspondents have been appointed, it is the essence of the scheme that individual research workers should correspond freely with the Bureaux on matters of scientific interests. I have recently had the privilege of visiting all these Bureaux except that at Aberystwyth and am fully satisfied both that India can make and is making a substantial contribution to the advancement of agricultural science and

that all parts of the Empire stand to gain by the pooling of knowledge now rendered possible. The funds for the maintenance of these Bureaux are supplied mainly by the British Government, the contributions from the Dominions including India being small in proportion, while on the Executive Council, which is the governing body of the Bureaux, the Dominions have an equal voice with Great Britain. Coming nearer home, the Imperial Council of Agricultural Research has recently decided to establish a Bureau of Agricultural Information for India. Not only will this provide a liaison with the Imperial Bureaux already mentioned but it is hoped that it will also assist research workers in India in the various branches of agriculture to keep in touch with each other and with work in progress in other parts of the country. The Imperial Council of Agricultural Research is charged both with promotion of research and the dissemination of information; it is hoped that its latest venture will be successful in the latter direction.

NOTE ON PINE-APPLE CULTIVATION ON THE SLOPES OF THE SIMHACHALAM HILL

By N. RAMADAS, L. Ag.

Agricultural Demonstrator

Pine-apples are cultivated on the slopes of the hill at Simhachalam, which is nearly 1,000 feet above the sea level. The place belongs to the Simhachalam Devasthanam under the management of the Vizianagaram Estate. The Estate gives the hill slopes for the cultivation of the pine-apples on lease generally for a term of ten years at a rental of Rs. 10 per acre per annum with a stipulation that the lessee should plant and grow at least 10 trees per acre of jack, mango, and cashewnut during that period. Generally the land is to be surrendered at the expiry of the ten years' period, as by that time, the soil would have been depleted and the trees would have grown up and shaded the land too much to allow of further successful cultivation of pine-apples. In rare cases the term of lease is extended for a further period of ten years, when fresh planting is made.

Soil.—The soil is a good loam, well mixed with organic matter and very rich.

Preparation of the land.—The jungle is cleared from land freshly taken for the planting of pine-apples, the brushwood burnt *in situ*, and the ashes spread on the land. Land is dug up to a depth of 1 to 2 feet and all stones are removed, and terraces formed. The stones removed are piled up to form a wall at the lower edge of each terrace which is generally 1 to 1½ yards wide. The soil dug up immediately near the wall, is thrown over it and the suckers planted in the depression thus formed. The entire process is done by manual labour with crowbars and *mammoties* and the cost of preparing the land and forming terraces ranges from Rs. 250 to Rs. 400 per acre according to the quantity of stones found. The stone walls with a covering of earth at the bottom on the inner side of the terrace, act as barriers, and prevent the rain water from running down too fast and eroding the surface. On the other hand they make it stand for some time, deposit the earth it carries, and slowly pass down through the crevices between the

stones of the wall. Here and there, footpaths are provided for the workers to move about.

Planting material and planting.—Suckers from an old plantation which is to be abandoned, are used as planting material. The tuft at the top of the fruit, and the whorl of suckers which arise at the top of the fruit stalk and just below the fruit, though useful as planting material, are not used for planting, as they take three years to bear fruit. The sucker coming up from the base of the plant below ground which takes two years to fruit, is also not generally planted. Hence suckers which arise from the axils of the leaves above ground, 50 per cent of which generally fruit in the first year of planting are used for planting. Planting is done in the rainy season, *i.e.*, during the months of *Sravanam* and *Bhadrapadam* (August–September). The planting is done in the depression along the wall, about a foot apart. About 8,000 suckers are required to plant up an acre, the cost of which ranges from Rs. 30 to Rs. 50 according to the distance from which the suckers are to be carried.

After cultivation.—Once the suckers are planted, nothing is done afterwards during the first year except a weeding. From the second year onwards, the plot is hoed with the *mammoty* once a year during the rainy season and the plants earthed up.

Fruiting.—Plants planted in August (*Sravanam*), begin to bear fruit by the following May (*Vaisakham*). During the first year, only 50 per cent of the plants bear fruit. From the second year onwards, all the plants bear, and during the period between the second and the sixth year, the bearing will be at its maximum. It is during this period, that a high outturn is realized from the plantation. The fruit-bearing capacity declines from the seventh year.

The plants begin to bear fruit from *Chaitram* to *Ashadam* (April to July), and of these *Jeshtam* and *Ashadam* (May–June), are said to be the months of maximum production.

Value.—Generally, the fruit is sold at Rs. 6 to Rs. 8 per 100 delivered on the hill. Conveyance charges from the hill to the foot of the hill will be about eight to ten annas per hundred fruit, according to the position of the plantation on the hill.

If there are 8,000 plants to the acre and only about 50 per cent of the plants bear fruit in the first year, there will be about 4,000 fruit, which will fetch Rs. 240 at the rate of Rs. 6 per 100 fruit, in the first year.

From the second to the sixth year, all plants bear fruit as this is the period of maximum production. From the 8,000 fruit obtained Rs. 480 are realized in each year. The value of the 40,000 fruit obtained in the five years (second to sixth year both inclusive) comes to Rs. 2,400.

From the seventh year, the fruit-bearing capacity declines and during this period the average can be taken as 3,200 per year which will fetch Rs. 192 per year or Rs. 768 in the four years (seventh to tenth year—both inclusive).

Thus the value of the produce obtained during the ten years will be Rs. 3,408. Deducting Rs. 408 for bad seasons and unfavourable market,

the produce may safely be valued at Rs. 3,000. Against this the cost of cultivation amounts to Rs. 550 as follows :—

	RS.	A.	P.	
Preparatory cultivation ...	400	0	0	Charges for <i>m a m m o t y</i> hoeings have not been inclu- ded as the ryot personally at- tends to it.
Cost of planting material ...	50	0	0	
Lease amount for 10 years at Rs. 10-0-0 per annum ...	100	0	0	
	550	0	0	

Deducting the cost of cultivation from the gross value of the produce there will be a net income of Rs. 2,450-0-0 over one acre for a period of ten years or nearly Rs. 250-0-0 per annum per acre.

HINTS ON PINE-APPLE CULTIVATION

By G. JOGI RAJU, DTP. AGRI.

District Agricultural Officer, Vizagapatam

The only place in the Northern Circars where pine-apples are grown on a fairly large scale is the Simhachalam hill, on the terraced slopes of which they are found to thrive without irrigation though the rainfall does not exceed 40" a year. Elsewhere, only a few plants are to be seen in citrus, mango, and other gardens. The general impression is that they thrive only on moisture-retaining hill slopes.

2. Pine-apples can, however, be successfully grown on ordinary cultivated lands also. The writer got them planted on about 80 cents of his land at Kondevaram in 1928 under what may be termed the 'raised bed' system. The attempt has been quite successful and last season, other ryots in the village copied the system on about four acres of theirs.

3. From the experience so far gained, the following hints may be given for the use of intending growers:—

1. Select a well-drained rich plot for planting.
2. Plough the land well, apply from 30 to 50 cartloads of *Penta* or village heap manure and work it in.
4. Procure suckers from Simhachalam, where they are available in August or September soon after the harvest of previous season's crop. They can be had at about Rs. 10 to 12 per 1,000 delivered at the Railway Station.
5. As far as possible, procure shoots which come up from the axils of the leaves on the stems from which fruit has been harvested. These bear fruit earlier than any other planting material, about 50 per cent bearing in the following season and the rest in the next. These shoots however are difficult to procure at Simhachalam as they are rarely parted with. The next best kind of planting material which is largely available is the suckers which arise from the ground, some of these being usually removed

at the annual weeding and hoeing. These have narrower and longer leaves than the shoots in the axil of leaves, and bear somewhat later, about 30 per cent in the second season after planting, and the rest in the third season. Crowns and slips from above and below the fruit may also be planted but they bear in the latest *i.e.*, only the fourth season. These however may be put down in a nursery for two years and then planted out.

6. Plant the suckers singly in two lines, four feet apart on each bed, and $1\frac{1}{2}$ to 2 feet apart in the lines.

7. Plant *Bontha* plantains on alternate beds quinquennially, 16 ft. apart, so that some income will be derived from these before the pine-apples give a reasonable yield. The partial shade thus provided is also beneficial to the pine-apples. If it is intended to raise a mango or *sapota* garden on the plot, these grafts may also be planted 36 ft. apart, so that, by the time the pine-apple is exhausted and removed they begin to give a decent income.

8. Water the suckers once by hand at the time of planting and once or twice more at intervals of a week if there be no rain. No irrigation will be required till the next summer. After the fruit sets, irrigate once in three or four weeks by filling in the trenches and allowing the beds to absorb moisture. Four or five irrigations may be necessary. To prevent undue evaporation, the trenches may, in summer, be kept filled with plantain trash or other material.

9. Weed the plot as often as necessary to keep it clean. Hoe with *mammoties* once every year after the harvest of the fruit, and again after the rains. In alternate years fresh trenches may be opened along the centre line of the beds and the old trenches covered, filling them with plantain trash or other organic material.

10. Manure the plants individually every year after the first hoeing and work it in around the plant. Ordinary *penta* may be used, at about 30 to 50 carts per acre. The addition of oilcakes or sulphate of ammonia may also be advantageous. Two to three ounces of groundnut cake or half to one ounce of the sulphate, is an economic dose.

11. From each plant leave one sucker (coming up from the ground) to grow every year. Leave shoots growing from the axils of the lower leaves on the stems from which fruit has been harvested, to yield fruit in the season following and thereafter cut away that stem to the ground. By this time the first sucker left to grow will take its place. When plantation comes to full bearing one fruit from the sucker coming up from the ground and at least one from a shoot from the leaf-axil, are expected to be obtained every year from all vigorous stools.

12. During the hot summer the fruit requires protection from the direct sun. This may be given by wrapping up each fruit with some plantain trash. Care should also be taken to prevent the fruit from lodging on the ground as it causes rotting at the place of contact.

STUDIES IN THE COST OF PRODUCTION OF CROPS— SUGARCANE

By GOVINDA KIDAVU, DIP. AGRI.

Deputy Director of Agriculture, IV Circle

Below is given an abstract statement giving the cost of production of jaggery, arrived at from figures elicited by enquiry in typical cane-growing areas in North Arcot, South Arcot and Chittoor Districts, as also from figures taken from the Palur Agricultural Research Station.

Abstract statement showing cost of production of jaggery of the above four areas :—

	Production cost per acre											
	I N. Arcot			II Palur Farm			III S. Arcot			IV Chittoor		
	RS	A	P	RS	A	P	RS	A	P	RS	A	P
A. CANES—												
1. Preparatory cultivation ...	24	0	0	20	10	6	15	0	0	34	10	0
2. Manures and manuring ...	50	0	0	91	6	0	174	0	0	55	10	0
3. Seeds and sowing ...	87	0	0	62	2	0	77	3	0	51	4	0
4. After cultivation ...	20	4	0	58	10	0	12	3	0	90	6	0
5. Irrigation ...	54	0	0	75	13	0	157	8	0	219	0	0
6. Harvesting ...	24	12	0	22	12	0	15	0	0	45	0	0
Total ...	260	0	0	331	5	6	451	3	0	495	14	0
7. Weight of crop in tons ...	22.32			35			33.5			35.7		
8. Cost per ton ...	Rs. 11.6			9.5			13.4			13.6		
B. CONVERSION—												
1. Weight ...	22.32			35			33.5			35.7		
2. Cost of making ...	59	0	0	87½			...			67½		
3. " per ton ...	2.6			2.5			...			1.9		
Weight of raw sugar ...	6,000 lbs. or			4.1			4.6			4.5		
	2.7 tons											
Cost per ton ...	Rs. 118			102			...			125		

The disparity in figures under the items have been explained in the following note with reference to—

- (1) Soil.
- (2) Previous crop.
- (3) Residual effects of manure.
- (4) Availability of cattle pairs.
- (5) Rate per pair.
- (6) Net receipts from Messrs. Nellikuppam factory.
- (7) Average market rates.
- (8) Kind and quality of output.

The figures for Palur (II) were taken from the average of three years of 247 B canes grown on bulk. The figures for South Arcot (III) were got from enquiry from ryots in the villages in the vicinity of the Palur Agricultural Station (viz.) Kuchipalayam and Arungunam. It is a fact that the ryots in the vicinity of Palur manure their canes with very high doses of manure (viz.) at 8 candies per cawnie or 6 candies per acre and they say that only if they manure at this high rate they get good yields from canes without depleting the soil fertility. Moreover it is the practice in these parts to grow canes in alternate years and hence they say that they use very large quantities of manure. The figure of Rupees 174 was obtained from ryots who use such quantities and the figure is correct. The figure represents the cost, when groundnut cake was selling high at Rs. 26 per candy.

In the Palur Agricultural Station, manure at 150 lbs. Nitrogen per acre only is applied as cake and Ammonium sulphate in the proportion of 3:1 and this comes to about 1,400 lbs. of cake or very nearly 3 candies and 182 lbs. of Ammonium sulphate. Hence the cost is less here (viz.) Rs. 91.

The figures given by the ryots (III) are for canes cultivated by the ryots themselves on their own lands (not on lease or varam) keeping their own cattle and sometimes hiring cattle at Rs. 2 per pair per day of 10 hours for mhoting.

Irrigation.—As regards irrigation charges, the charges for the farm are for water lifted by engine. If overhead charges are included another Rs. 15 is to be added to the farm irrigation charges at Rs. 0-8-0 per irrigation. The charges of lifting water by the engine in the East India Distilleries also comes to about Rs. 20 including finding man.

The ryots' figures (South Arcot) are for mhoting with bullocks and the charges were calculated as though the pairs were hired at Rs. 2 per pair per day with man. If the owner maintains his own cattle and feeds them, and has extra work for his animals (which he has in most cases here for the cultivation of other crops) the charge per pair may be put down at Re. 1-4-0 including man. When pairs are maintained for ploughing, mhoting, carting etc. by ryots, and the feeding charges and the number of days worked are taken into consideration, the charges per pair alone per day comes to Rs. 0-14-0 and with man to Rs. 1-4-0 and if this figure is taken the figure will work at Rs. 104 per acre, which is the figure of another ryot of Arungunam. The hired figure was taken as the ryot who gave information was hiring the cattle.

As regards the other points in the analysis the following notes will be of interest :—

1. The soils of both Palur and South Arcot (vicinity of Palur) are sandy loams and are under garden conditions.
2. The previous crop in the case of farm, was garden paddy. One ryot had garden paddy previous to canes and another had pure groundnuts harvested in July–August and then canes.
3. The previous paddy crop in the ryots' lands is manured with green leaves at 5,000 lbs. per acre, and groundnut is manured with 15 cart loads

of village rubbish. These may have some residual effect. In the farm the previous paddy crops were manured with groundnut cake at 3 cwts. and bonemeal at 2 cwts. per acre.

4. Cattle are available but the charges are high.
5. The rate per pair is Rs. 2 per day with man.
6. The net receipts from the factory will be from Rs. 600 to Rs. 650 per acre (i.e.) value of jaggery.
7. The factory was paying till now at Rs. 31 per candy of 500 lbs. jaggery obtained from the juice extracted by the power mill at the factory. The canes are to be simply carted to the factory and they pay for the jaggery obtained after making a test boiling of 15 gallons of the juice.

1. Ryots do not mill and boil but they give as whole canes to the factory.

Below are given details for the four areas cited above.

DETAILED STATEMENTS

I

Sugar-cane—Cost of Production—North Arcot District

Particulars	Per acre			Amount
	Men at 6 as	Women at 3 as.	Pairs at 12 as	
<i>Preparatory Cultivation.—</i>				
				RS. A. P.
Ploughing and digging corners ...	...	...	...	15 0 0
Trenching—contract ...	...	...	...	9 0 0
<i>Manures and Manuring—(applied before planting)</i>				
8 cart loads of cattle manure at Re. 1 per cart load including cartage.	...	...	...	8 0 0
Spreading manure in trenches ..	...	4 to 8	...	1 0 0
10 cart loads of cattlemanure including cartage.	...	...	...	10 0 0
1,000 lbs. <i>pungam</i> poonac ...	...	...	...	27 0 0
Carting the above poonac ...	...	...	...	1 0 0
Spreading the manure ...	3	10	...	3 0 0
<i>Seeds and sowing.—</i>				
15,000 cane setts at Rs. 5 per 1,000.	...	...	...	75 0 0
Cartage at 8 as. per 1,000 setts	...	...	...	7 8 0
Irrigating for planting ...	...	...	3	2 4 0
Distributing the setts ...	...	6	...	1 2 0
Planting the setts ...	3	...	...	1 2 0

Particulars	Per acre			Amount
	Men at 6 as.	Women at 3 as.	Pairs at 12 as.	
<i>After-Cultivation.—</i>				
3 weedings	...	60	...	RS. A. P. 11 4 0
Earthing up canes—contract	...	...	...	4 0 0
Fencing—contract	...	...	...	5 0 0
<i>Irrigation.—</i>				
Irrigating for 9 months at an average of 4 irrigations per month (deducting 2 months for rains received during rainy months) at 2 pairs for irrigation.	...	...	72	54 0 0
<i>Harvesting etc.—</i>				
Cutting, tapping and cleaning the canes, including charges for bringing the staff to the milling area.	24	72	...	22 8 0
Miscellaneous —	...	...	...	2 4 0
Total cost of production of stripped canes at the milling floor per acre.	...	...	...	260 0 0
<i>Milling and jaggery-making.—</i>				
Hire of mill pan etc. for 12 days at Re. 1-4-0 per day.	...	...	...	15 0 0
Construction of the furnace, bricks, labour etc.	...	...	...	4 0 0
Iron grating—cost per acre—assuming it lasts for 60 acres-work-(cost Rs. 3-12-0).	...	...	...	0 1 0
Crushing charges-7 boilings per day at 6 as. per milling of the canes for boiling- contract.	..	...	...	31 8 0
Feeding charges	...	12	...	2 4 0
Jaggery man	12 at 8 as.	...	...	6 0 0
				58 13 0

Yield, 50,000 lbs. of stripped canes.

Therefore cost of producing 82 $\frac{1}{2}$ lbs. of canes ... 0-6-10 or nearly 7 annas.

Yield of jaggery equivalent to 50,000 lbs. canes ... 6,000 lbs.

Cost of conversion of canes into jaggery .. 0-12-11 or nearly 0-13-0

Percentage of jaggery to cane ... 12 approximately.

II

Cost of production of sugarcane per acre (Farm figures for bulk crops of 247 B. (J-247) average of three years)

Description of work	Pair	Men	Women	Amount
Preparatory cultivation.—				RS. A. P.
2 ploughings with improved ploughs ...	4	4	...	5 0 0
Working Guntakka twice ...	2	2	...	2 8 0
Trenching with victory ploughs ...	2	3	...	2 13 6
Setting right trenches and digging bottoms to loosen the soil and forming channel for irrigation.	...	30	...	10 5 0
				20 10 6
Manures and manuring.—				
Cost of 1,400 lbs. groundnut cake at Rs. 27 per candy of 530 lbs.	...	...	...	72 0 0
And 182 lbs. Ammonium sulphate (manuring done with 150 lbs. nitrogen per acre, 75 per cent Nitrogen as groundnut cake and 25 per cent nitrogen as ammonium sulphate).	...	...	...	15 0 0
Weighing and distributing manure (3 times during the growth).	...	4	16	4 6 0
				91 6 0
Seeds and sowing.—				
Guiding water and planting setts ...	...	4	4	2 2 0
Cost of 12,000 setts at Rs. 5 per 1,000 ...	...	...	...	60 0 0
				62 2 0
Irrigation.—				
Cost of 36 engine irrigations ...	...	...	...	57 4 0
Charges of man guiding water throughout the period.	...	54	...	18 9 0
				75 13 0
After-cultivation.—				
Weeding 4 times ...	...	...	80	15 0 0
Intercultivating with Junior hoe along the ridges—4 times.	2	4	...	3 3 0
Earthing up after second manuring ...	...	8	...	2 12 0
Tying and untying leaves before and after manuring for second earthing up.	...	...	16	3 0 0
Second earthing up ...	...	20	...	6 14 0
Trashing and removing trash twice in September and November.	...	2	42	9 5 0
Fencing posts and propping with wires twice (high cost due to lifting and propping fallen canes a second time).	...	52	...	17 14 0
Removing propping wires ...	...	2	...	0 11 0
				58 10 0
Harvesting.—				
Yield of canes per acre—35 tons (average).	...	...	...	20 0 0
Harvesting canes 35 tons on contract at 0-4-6 for 50 bundles of 10 canes each or 70 cartloads	...	...	...	
Carrying the produce to the milling floor.	...	8	...	2 12 0
	...	...	...	22 12 0
Total cost of production per acre ...	...	...	...	331 5 6

I. Average cost of production per railway maund stripped cane stalks at the milling floor—variety 247 B.

Average yield of crop ... 35 tons.

Cost of production ... Rs. 331-5-6.

(i.e.) to produce 35 tons of cane the cost is Rs. 331-5-6.

Therefore for 82 $\frac{3}{4}$ lbs. of canes $\frac{576}{7} \times \frac{2651}{8} \times \frac{16 \times 12}{35 \times 2240} = 5 \text{ as. } 6 \frac{3}{4} \text{ ps.}$

II. The cost of conversion into jaggery. (By power mill capable of milling 1,000 lbs. canes per hour).

Weight of canes (247 B) used for milling to give enough quantity of juice for 6 charges per day ... 3,875 lbs.

Average percentage of extraction 62 per cent.

Amount of juice obtained $\frac{3871 \times 62}{100} = 2,403 \text{ lbs. juice.}$

(The average percentage of juice 19 per cent).

No. of boilings taken per day with 400 lbs. of juice in each parr—6.

The cost of producing jaggery for 6 charges as above.

	RS. A. P.
1 expert cooly for boiling the juice ...	1 0 0
1 man to attend to the milling at 6 as. ...	0 6 0
1 man to remove juice and for pouring in pan at 6 as. ...	0 6 0
1 man to feed the furnace at 6 annas ...	0 6 0
1 woman to remove megass etc ...	0 3 0
Running charges of engine for 4 hours at 5 annas per hour ...	1 4 0
Charges for mill and pan ...	0 12 0
Total ...	4 5 0

No charges are included for fuel as megass and trash are used.

For converting 3,875 lbs. of cane the charges come to Rs. 4-5-0.

For 82 $\frac{3}{4}$ lbs. ... $\frac{576}{7} \times \frac{69 \times 12}{3875} \dots 17 \frac{1}{2} \text{ pies or } 1 \text{ anna } 5 \frac{1}{2} \text{ pies.}$

Percentage of brix ... 19 per cent.

Total jaggery obtained for 3,875 lbs. ... $\frac{2403 \times 19}{100} \dots 456 \frac{1}{2} \text{ lbs.}$

Percentage of jaggery to cane ... 11.8 per cent.

The figures are average ones for the bulk crops of 247 B grown in the Farm and Fiji B grown by ryots in the vicinity. As ryots do not mill canes here and as they invariably send them to the factory no cost of conversion of canes into jaggery can be given for ryots' crop. The figures for jaggery conversion given are for Farm canes (247 B) crushed by a power mill which crushes about 1,000 lbs. per hour. The ryots' canes are always Fiji B which gives from 13.5 per cent to 14 per cent jaggery to cane by weight.

III

Ryots' figures in garden land and wet land per acre in the vicinity of the Palur Farm—Variety Fiji B.

Description of the work	Pairs	Men	Women	Amount
				RS. A. P.
Trenching with mamutty in fallow land 3ft. apart—1 foot broad and 1 foot deep.	...	40	...	15 0 0
10 cartloads of village rubbish or compost at Rs. 0-12-0 per cart.	...	...	...	7 8 0
Spreading	...	4	...	1 8 0
Irrigating by mhote and planting ...	2	4	4	5 8 0
Cost of 12,000 setts at Rs. 6 per 1,000 on the average.	...	...	...	72 0 0
Cost of 6 candies of groundnut cake at Rs. 26 per candy.	...	...	...	156 0 0
Powdering cake—6 candies	...	...	...	6 12 0
Applying cake—3 times	...	...	12	2 4 0
Earthing up twice after manuring ...	...	25	...	9 6 0
Tying leaves to facilitate earthing up and untying.	...	...	15	2 13 0
Irrigation charges.—				
Irrigating once in 8 days (or 6 days if severe drought prevails) 36 irrigations throughout the life of 11 months excluding rainy months of October, November and December at Rs. 4-6-0 per irrigation per acre. 2 pairs at Rs. 1-10-0 each and 3 men at 0-6-0 each (per acre).	...	...	...	157 8 0
Harvesting charges for 50 carts at 0-4-0 per cart of 1,000 lbs. or 33½ tons on the average.	...	...	...	15 0 0
Total Rs. ...	...	...	...	451 3 0

According to ryots' figures the total cost of production of one acre of sugarcane (Fiji B) comes to Rs. 451-3-0.

The average yield of canes in tons per acre 33½

Therefore cost of producing 82½ lbs. $\frac{7219 \times 576 \times 2}{7 \times 77 \times 2240} = 6$ annas 10½ pies.

Percentage of jaggery to cane in Fiji B is from 13·5 to 14 per cent,

IV

Sugarcane—cost of production—Chittoor

Particulars	Men at 6 as.	Women at 4 as.	Pairs at 12 as.	Amount
				RS. A. P.
Preparatory cultivation.—				
Irrigating to moisten the field ...	3	...	3 at 1-8-0	5 10 0
1st ploughing with country plough ...	...	...	3 at 1-0-0	3 0 0
Subsequent 9 ploughings ...	...	...	18	18 0 0
Trimming bunds ...	4	...	...	1 8 0
Levelling and ridging the land ...	12	...	2	6 8 0
Manures and manuring.—				
Sheep-penning at 2,500 sheep per acre at Rs. 10.	...	...	...	10 0 0
Cost of 25 cartloads cattle manure at 8 as. each.	...	...	...	12 8 0
Carting 15 cartloads cattle manure and spreading (before ridging).	4	...	2 at 1-8-0	4 8 0
Carrying 10 cartloads cattle manure at the time of planting and spreading it in the trenches (at planting time).	3	2	...	1 10 0
Cost of 2 candies pungam cake at Rs. 12 a candy.	...	...	...	24 0 0
Powdering cake, carrying and manuring the crop in trenches before earthing up.	8	...	...	3 0 0
Seeds and sowing.—				
Cost of 20,000 setts at Rs. 2 per 1,000 ...	...	...	...	40 0 0
Preparing the setts for planting and distributing the same.	2	6	...	2 4 0
Planting the setts ...	9	...	...	3 6 0
Irrigating for planting ...	3	...	3 at 1-8-0	5 10 0
Irrigations on 5th day after planting ...	...	...	2 at 1-8-0	3 0 0
72 irrigations before the crop is cut ...	...	...	144 at 1-8-0	216 0 0
After-cultivation.—				
1st hoeing in young crop ...	...	10	...	2 8 0
2nd weeding and hoeing in the second month.	...	30	...	7 8 0
Earthing up canes after applying cake ...	12	...	...	4 8 0
Weeding the crop before wrapping in the trenches.	...	6	...	1 8 0
1st wrapping to the canes ...	30	...	...	11 4 0
Proportionate cost of 600 standards and 300 bamboo horizontals which keep for three years.	...	...	...	35 0 0
Carrying and fixing the standards, tying the horizontals and wrapping second time.	40	...	...	15 0 0
Third wrapping ...	20	...	...	7 8 0
Fourth wrapping ...	15	...	...	5 10 0

Particulars	Men at 6 as.	Women at 4 as.	Pairs at 12 as.	Amount
<i>Harvesting.—</i>				RS. A. P.
Harvesting, trashing, bundling and transporting the canes to the mill.	120	...	...	45 0 0
Total cost of producing (one acre) of stripped canes at the milling floor.	...	...	...	495 14 0
Milling and preparing jaggery at the usual charges per day, 15 days.	60	...	Pair at 3 as. per charge	67 8 0
				67 8 0

Approximate no. of canes per acre ... 40,000.

„ weight of canes per acre... 80,000 lbs and cost of production—Rs. 495-14-0.

1. Cost of production of one railway maund or 82½ lbs. of canes 0-8-2.

2. Approximate percentage of jaggery to cane—12½, i.e., 10,000 lbs.

3. Cost of conversion of all canes per acre into jaggery Rs. 67-8-0.

Therefore cost of conversion of canes into 82½ lbs. jaggery Rs. 0-8-11 or Rs. 0-9-0.

Agriculture at the Indian Science Congress, Nagpur.

The section of Agriculture of the Indian Science Congress held at Nagpur, in the first week of January this year, had a very interesting and successful session under the presidency of Sir T. Vijayaraghavacharyar, vice-Chairman, Imperial Council of Agricultural Research. Fifty-six papers on the science and practice of agriculture and dealing with such varied subjects as soil science, plant and animal nutrition, plant breeding, genetics and cytology, plant physiology, agricultural economics and statistics, horticulture, plant pathology and on the use of electricity in agriculture, were submitted from the various centres of research in India. The papers are of interest both to the practical agriculturist and to the scientific investigator. Short notes on some of the papers which are of a practical interest to the agriculturist are given below for the benefit of our readers. In a later issue we hope to mention other papers which are of interest to the purely scientific investigator.

Notes on papers of interest to the practical agriculturist.—Mr. M. N. Ghosh of Sabour described the effect of flooding and other soil conditions on the growth and maturity of sugarcane in the cane-growing tract of Saran in North Behar, situated between two big Himalayan rivers. When the rivers

are in high flood the sub-soil water level in the tracts bordering on them rises very high; consequently, with an early cessation of rains in any year or even a long break in the rains, conditions arise in the soil leading to a rise of salts. Of the canes Co. 213, Co. 210, and Co. 205, Co. 213 was the first to succumb under these adverse conditions. The leaves turned yellow, growth stopped, and carbo-hydrate formation was considerably lessened. Even when favourable conditions set in again, although the cane revives its growth, it does not ripen properly. Co. 210 and Co. 205 are more tolerant than Co. 213 but even these do not show short maturity and do not give juice with high sugar content. The concentration of salts at various depths was examined and it would appear that a decrease of lime and an increase of salts together with a relatively dry condition of the soil is the beginning for the cane to get such treatment. Calcium cyanamide in the month of July is suggested but no results are described.

Messrs. V. A. Tamhane and P. G. Krishnan of Sakrand in Sind studied the Nitrogen fixation in the *Kalur* (alkaline) soils of Sind and found that even a very small quantity of sodium carbonate, inactivated the nitrogen fixing organisms, while appreciably large quantities of salts like sodium chloride and sodium sulphate only rendered the organisms slightly inactive. Application of calcium chloride or sulphate stimulated, and calcium oxide (quicklime) depressed the process of Nitrogen fixation.

Mr. Maya Doss of Cawnpore made some interesting observations on the use of electricity in farming. Even at two annas six pies per unit of electricity, he found that electric power was considerably cheaper than that supplied by a petrol paraffin engine for threshing of wheat and chopping of fodder. It is stated that the U.P. Government have a hydro-electric scheme by which electrical power will be available at one anna per unit.

Messrs. J. Jagannatha Rao and V. Subrahmanyam of Bangalore described a new method of preparing manure from sewage town refuse and waste vegetation. They sprayed raw sewage on refuse and waste vegetation previously treated with minute quantities of insecticides and fungicides like cupric hydroxide or bleaching powder. They stated that the decomposition developed rapidly and produced no offensive odour. Copper salts have been found to be the cheapest and most effective of the elements, not more than 20 grams of copper sulphate being required to treat one ton of refuse.

Mr. V. N. Gokhale of Poona described experiments in which plantain stems were decomposed into manure by treating them with both lime and calcium cyanamide.

Mr. S. A. Rafay of Bangalore described the results of pot experiments in which he compared the growth of *Ragi*, potato, and lucerne in pots, using activated sludge, chemically precipitated sewage sludges, farm yard manure, and nitrate of soda. His results show that activated sludge and farm yard manure are superior to the other two.

In another paper, the same author showed that land treated with sewage soon gets sick and that it could be remedied through opening up of the land, and application of heavy dressings of lime followed by treatment with superphosphate.

Messrs. B. Viswanath and M. Suryanarayana from Coimbatore, mentioned the results of experiments showing the effect of different methods of

manuring the seed beds, on the subsequent growths of seedlings, and the possibilities of cutting down manure bills by growing seedlings in well manured nurseries, and then transplanting the seedlings into plots manured less liberally than usual.

Mr. G. L. Kothur of Dharwar in a paper on the agricultural characteristics of Indian and American cottons, shows that studied under identical field conditions, American cottons are on the whole least vegetative, early, immune to fusarium wilt, but highly susceptible to insect attacks; and in view of the many failures of American cottons, the author recommends the breeding of suitable Indian cottons to replace the present unpromising types.

As the result of a few cultural experiments on rice, Messrs. S. K. Mitra and P. M. Ganguli of Jorhat, Assam, state among other things, (1) that stronger seedlings do not show a material advantage in yield over weaker ones, although they develop physical and mechanical strength to withstand insect attacks and rush of flood, (2) that weeding in proper time gives a greatly increased outturn especially in broadcast paddy and (3) other conditions being equal, *sail* (winter) varieties of paddy yield most when they have about a foot of water at the base during the growing period.

In an elaborate paper on 'Studies in the cost of production of farm produce' Mr. P. C. Patil of Poona, focusses attention on the importance of the subject, and deals with the two methods in vogue—the survey method and the route method—for instituting inquiries; in the former method, information is collected by questionnaires and in the latter by record of information week by week. After detailing the methods existing in America and in England for finding the annual wage or profit earned by the farmer, the author says that these income measures will not be suited to Indian conditions, and proposes instead, two different income measures (a) Family labour income i.e., the annual wages, the whole family makes and (b) Farm business income which means the difference between the value of the gross produce and only the out of pocket expenses. He then details a scheme for crop study and farm studies and shows that information gained by such studies will provide sufficient material for improving farm efficiency.

Mr. J. C. Guleri of Lyallpur, draws attention to the need that has arisen of late for promoting Agricultural Insurance as a means of allaying rural discontent, and reviews the considerable progress that has been made in this direction in other countries and the spasmodic efforts in our country. He is of opinion that to be successful, insurance schemes should be worked out to suit localities, and should be definitely associated with the administration of Land Revenue, Famine Relief, and Taccavai Loans, with the fullest collaboration of the Co-operative, Agriculture, Veterinary, and other beneficent departments concerned.

In a paper on the methods of the grain markets in Northern Central Provinces, Mr. P. D. Nair of Nagpur discusses several important questions connected with the marketing of grain, such as who brings the grain to the market, how the grain arrives, the methods of sale, the part played by the middle men and commission agents, the expenses of marketing, and the weights and measures used in these markets.

A local product, Nagpur oranges have an all-India reputation, and the Nagpur Municipality alone derived during the season 1927-8 an income of Rs. 35,269 from this trade. The total value of the oranges exported annually from the Nagpur district, will amount to several lakhs of rupees. A detailed investigation into the marketing conditions of this fruit was undertaken by the author, Mr. P. D. Nair, who discusses several interesting points in his paper on the 'Marketing of oranges in Nagpur'.

In a preliminary note on 'The effect of manures on the yield and composition of grass lands at the Dacca farm', Messrs. F. L. Gossip and D. Dutta of Dacca, state that the results of the first year's work show that artificial farm yard manure increases the green matter and changes the floristic composition, and that liming of the acid soils of Dacca, has a beneficial effect on the increase of herbage.

The idea of providing salts to grazing animals is a novel one in Western India, and Messrs. L. B. Kulkarni and L. G. Annigeri of Poona say, that rock salt which is available in a compact crystalline mass and is less hygroscopic than other forms of salt is a convenient form to supply to grazing animals which get only slight quantity of salt in the pastures. They also say that animals consume more salts during stall feeding than in open grazing.

In a note on 'The introduced fodder crops at the Dacca farm', Mr. Datta mentions about two American Sorghums and the ensilage corns of the States of America which can profitably replace Juar and Maize the local fodders, as the imported fodders are shorter in duration. Guinea grass another permanent fodder grass is also being slowly displaced by Napier grass, *Pennisetum purpureum*.

In a paper on the bearing of the 'Alphonso' mango in the Konkan, Mr. P. V. Wagle of Ratnagiri mentions that among controllable factors, spacing is important to regulate bearing, which is also dependent on the production or otherwise of vegetative shoots in October. Manuring with sulphate of ammonia and farm yard manure in June, helps the maturity of the October shoots, and thus induces the tree to bear in successive, instead of, in alternate years.

'Cold storage fruits' is an interesting paper by Messrs. D. V. Karmakar and B. N. Benerjee of Bangalore, who have shown that 'Badami' and 'Pyri', best varieties of local mangoes, could be preserved in a cold room at 0° C. for about 40 days in good condition. They have also isolated the micro-organisms responsible for the decay in mangoes, and have studied their characteristics.

Dr. T. V. R. Iyer of Coimbatore in a paper on the *Coccidæ* of the prickly pear in South India refers to the pest condition of the widely-distributed prickly pear in South India, and its destruction by its natural enemies, the coccid bugs. Bionomical notes on the different species of prickly pear coccids are also given, and the recently introduced cochineal insect *Dactylopius tomentosus* L. which has done remarkable work in controlling prickly pear in the southern districts, is discussed in detail.

Notes and Comments

Efficiency in Agricultural Production.—In the opening paragraph of his Presidential address to the Agricultural Section of the Indian Science Congress at Nagpur, Sir T. Vijayaraghavacharya observed 'Never was there a greater need for improvement in the *efficiency* of agricultural production than at present since low prices can only be permanently combated by this means. . . . The present world crisis in agriculture has also brought out clearly the inter-dependence of different countries on each other.' These words are too true in recognition of the fact that production on a profitable basis is a vital factor in the economic condition of the country. The small tenant cultivator will continue to be as helpless as before unless the Zamindars and Landlords recognize this need and make a co-operative effort in reducing the cost of production.

New Year Honours.—We offer our hearty congratulations to Dewan Bahadur C. S. Ratnasabapathi Mudaliar Avargal, Rao Bahadur D. Balakrishnamurti Garu, and Rao Sahib M. V. Vellodi Avargal, on the New Year Honours conferred on them.

Imperial Council of Agricultural Research.—The Advisory Board of the Imperial Council of Agricultural Research met at Delhi in the middle of January and considered a number of research schemes. Important among the schemes were those dealing with the protection of buffaloes and cattle from hæmorrhagic septicæmia by the Bacteriophage method. The causes of contagious diseases among cattle in the central provinces, virus disease of plants, animal nutrition institute at Dehra Dun, establishment of a rice research station in the United Provinces and the establishment of a central institute for education and research in India.

In regard to Veterinary Research the Board accepted a scheme in which investigation officers would be appointed to certain provinces in which Hyderabad, the North-Western Province and Baluchistan were included. Each unit would cost about Rs. 10,000 per annum minus such sum as Hyderabad would be prepared to contribute towards the work within its own territory.

Very little is known about virus diseases of plants in India. The Board decided to make a beginning and accepted a small scheme of investigation. The amount of money to be allotted and the details of the scheme will be worked out separately.

There was considerable discussion on the location of the Animal Nutrition Research Institute at Dehra Dun. While there was unanimity of opinion on the need for an enlarged Animal Nutrition Institute in India, there was a sharp division of opinion in regard to its location. It was finally decided to locate the institute at Dehra Dun but the Board did not commit itself to any money grants for the present.

In considering the subject of a Central Institute for education and research in dairying there was a good deal of pertinent discussion

whether the Institute would conduct research in the indigenous dairy products such as sour milk, ghee and butter. It was rightly urged that there would be no point in carrying out research work on problems like the manufacture of cheese which does not form a part of the normal diet of the Indians. The Board, however, recommended to the Government of India that there is scope for one or two central Institutes for education and research in dairying. With the exception perhaps of what we call professional milk-man or gowlas in the bigger cities, in small towns and villages the sample of milk and milk products is in the hands of the ryots, who keep cattle for work and manure. The sale of milk and products is a secondary affair with no *business involved in it*.

The establishment of a sugarcane seedling testing station in Bengal, a sugarcane research station in the Bombay Deccan and an economic enquiry into the cost of production in sugarcane in the United Provinces, North Bihar, Bombay and the Punjab were approved by the Board.

The Indian Science Congress.—We were glad to see Madras well represented at the Indian Science Congress both in the number of papers presented and in the attendance of members. The contributions by the Department of Agriculture, Madras, were an evening lecture on the 'Study of crops' by Mr. G. N. Rangaswami Ayyangar and,

(1) a paper on 'Inheritance of grain colour in ragi—*Eleusine Coranaca Gaertn* and the relation of the grain colour factors to plant purple pigmentation' by Mr. G. N. Rangaswami Ayyangar and U. Achuta Warriar.

(2) a paper on 'The *Coccidæ* of the prickly pear in South India and their economic importance' by Dr. T. V. Ramakrishna Ayyar.

(3) two papers on 'A note on the occurrence of sterility in rice' and 'Inheritance of plant height and flowering duration in rice' by Mr. K. Ramiah and,

(4) two papers on 'The Intensive use of fertilizers and its effect on the composition of the soil clay' by Rao Bahadur B. Viswanath, S. Kasinathan and G. K. Chidambaram, and 'The liberal use of fertilizers in the seed-bed as a possible means of reducing manure bills' by Rao Bahadur B. Viswanath and M. Suryanarayana.

One morning was devoted to a joint discussion by the sections of Chemistry and Agriculture on the formation of carbohydrates in plants, one morning was devoted for a joint discussion by the sections of Botany and Agriculture on the food and water requirements of crops; an afternoon was devoted for a joint discussion by the sections of Physics, Mathematics and Agriculture, on methods of physical research as applied to agriculture. These joint discussions are of special value as each speaker discussed the problem from the point of view of his own subject.

The International Institute of Agriculture, Rome.—Elsewhere in this issue will be found a short notice on the International Year-Book of Agriculture, which we commend very much to our readers. Compiled and published by that most useful institution, the International Institute of Agriculture, the publication is sure to provide a mine of information on statistical agriculture, thorough and exhaustive in all its components and will be a valuable and necessary volume to all institutions and individuals, who are keen on equipping themselves with sound and up-to-date information on the agriculture of the whole world.

The Madras Health Week Exhibition.—Departmental Exhibitions during festivals and other occasions when crowds gather are always useful and educative, for they provide to the visitors a lot of information on technical subjects, in an easily assimilable manner. At the recent Health Week Exhibition held in Madras during Pongal week, the Madras Agricultural Department participated and had two stalls one to represent the work of the Livestock section, and the other a combined stall of the Chemist, the Entomologist and the Mycologist, showing how public health is intimately linked up with Agriculture. The exhibition was opened on the 13th by H. E. the Governor of Madras and during the week there was a large concourse of holiday crowds, who evinced great interest in the exhibits. It is very gratifying for us to note the Madras Agricultural Department was awarded a gold medal for the best stall on food-stuffs and health.

The Ramasastrulu-Munagala Prize 1931

1. The Prize will be awarded in July 1931.
2. The Prize will be in the form of a Medal and will be awarded to the member of the Union who submits the best account of original research or enquiry, carried out by him on any agricultural subject.
3. The subject matter shall not exceed in length twelve foolscap pages type-written on one side.
4. Intending competitors should notify the Secretary of the Madras Agricultural Students' Union not later than the 15th May the subject of the paper which they propose to submit and the paper should be sent in so as to reach the Secretary, Madras Agricultural Students' Union not later than the 1st June 1931, with a covering letter showing full name and address of the sender. The author's name should not be shown on the paper but should be entered under a *nom de plume*.
5. Four type-written copies of the essay should be sent in.
6. The name of the successful competitor will be announced and the prize awarded at the time of the Conference.
7. Papers submitted will become the property of the Union and the Union reserves to itself the right of publishing all or any of the papers.
8. All references in the paper to published books, reports or papers by other workers must be acknowledged.

Any further particulars may be obtained from the Secretary, Madras Agricultural Students' Union, Lawley Road P. O., Coimbatore.

Cleanings

Beetles chew holes in Lead Pipes.—The supposition that metals can be injured by boring and gnawing insects has been confirmed recently by O. Bauer and O. Vollenbruck as a result of systematic experiments in the Kaiser Wilhelm Institute fur Metallforschung and in the National Bureau for the Testing of Materials, says *Industrial and Engineering Chemistry*. The animals that possess this peculiar metallic appetite are certain varieties of beetles and they are especially fond, it seems, of lead. Cases are on record where the insects have ruined water and gas pipes, tanks and cisterns, telephone cables, and lead stereotype plates. No attacks of the beetles on aluminium, zinc, or brass could be verified.—(*Scientific American*, December 1930.)

The Sting of the Honey-Bee.—The sting of the honey-bee is seldom considered to be of much importance, except when an entire swarm attacks a man: when he is likely to suffer greatly from manifestations of his disturbance. When a person is stung by a bee it is customary usually to apply solution of ammonia or of baking soda to the skin. Ordinarily, this is sufficient to modify the local irritation, and little more is thought of the trouble. Some studies recently completed in the Mayo Foundation, indicate that the venom of the honey-bee resembles that of the rattlesnake in several particulars. Both poisons when in contact with the blood break down the red blood cells; both poisons when injected into the arm promptly stop its action. Bee-sting poison is a stimulant of smooth muscle, such as is found in the heart and in the uterus, and is a dangerous poison to the lining of the blood vessels. Obviously, it is a potent substance and if taken into the body in sufficient quantity, can produce death as can the venom of the rattlesnake.—(*Scientific American*, December, 1930.)

Coloration of Insects and Plant Pigments.—Well-known experiments by Poulton, Linden, and others appeared to have proved definitely that green and yellow colours of caterpillars are due to the absorption of plant pigments in the intestines. Later investigations suggested that at least certain insects are able to produce green pigments synthetically. The whole problem has now been very thoroughly revised by P. F. Meyer, who has published an interesting and well-documented account of his experiments (*Zeitschr. vergl. Physiol.* Vol. 11, 1930.) He experimented with caterpillars of various species, which were raised on white bread, with or without the addition of the respective plant pigments, and the hæmolymph was then examined chemically for the pigments. It was found that neither chlorophyll nor any of its products is absorbed in the intestine of insects, and the green pigment in the hæmolymph of insects has no relation to chlorophyll, but represents an oxidation product of a protein. Carotin was found in the hæmolymph, but it was present in the caterpillars bred on food free of carotin as well. The experiments proved also that the absence of chlorophyll and of carotin in the food did not affect the coloration, growth, or reproduction of the insects.—(*Nature*, November 29, 1930.)

The Value of Examinations.—For many years it has been the fashion in certain quarters to decry the value of examinations. It is alleged they

are not fair tests as many candidates owing to nervousness are unable to do themselves justice in an examination room. A candidate who loses his head when faced with an examination paper is not likely to be much less nervous when faced with a true examiner. Another objection is that they lead to cramming. In all education that is worthy of the name there must be a lot of hard slogging work in which memory plays the principal part. No one, for instance, can learn a language thoroughly unless he has mastered its grammar and how can this be done except by memory? It is possible that much of the slipshod method of teaching which we find to-day is due to the popular but fallacious etymology of the word "education". It is derived, we are often told, from the verb 'educere' which means to draw out what is in the child's mind. It is nothing of the sort. The Roman word 'educare' meant to bring up, rear, educate a child, and was used secondarily of animals and plants, meaning to nourish, support, feed with suitable food, manure, etc. Education therefore meant for them supplying the child with food physical and mental, and not drawing it out of them, as if they were spiders who could spin their own webs.—(*Journal of the Royal Society of Arts, October 24, 1930.*)

[We have received the following from the International Institute of Agriculture, for publication in our Journal.—Ed. M. A. J.]

THE INTERNATIONAL YEAR-BOOK OF AGRICULTURAL STATISTICS

The International Institute of Agriculture at Rome has just recently published the 1929—30 edition of the International Year-book of Agricultural Statistics.

This volume of about 800 pages is the result of the most extensive and detailed inquiry made in the domain of international agricultural statistics and constitutes a work of the greatest importance to all those who are interested in questions having a direct or indirect relation to production and commerce of agricultural products.

In the first part of the Year-book are classified the figures for area and population in the years nearest to 1913 and 1929 for 220 countries: the presentation of these figures throws light upon the world situation from the geographical, political and demographical points of view during both the pre-War and post-War periods. The second part is composed of a series of tables comprising for nearly 50 countries the available data concerning the uses for which the total area is employed, the apportionment of cultivated areas between the different crops, agricultural production, numbers of the different kinds of livestock and the products derived from them. In the tables constituting the third part of the volume, have been indicated for nearly 40 agricultural products, the area, production and yield per acre in each country during the last five years of the pre-War period and during each of the years from 1926 to 1929.

For each kind of livestock, all available figures in the different countries have been grouped for the years 1913 and 1925 to 1929. A large part of the volume is devoted to statistics of the commercial movement of 42 vegetable products and 12 products of animal origin. The figures published relate to the imports and exports during the calendar years and for the cereals also during the commercial seasons.

It may be added that the tables of production and commerce not only specify details for each country but also the totals for the different continents and hemispheres and for the whole world, allowing the formation of a general idea of the changes taking place during the periods under consideration in the area under each crop, quantities harvested and the commercial movement in each product.

The part devoted to prices contains the weekly quotations of 25 agricultural products on the principal world markets for the year 1913 and for the period January 1926 to June 1930. In the freights section will be found the quotations for the carriage of wheat, maize and rice on the most important shipping routes, and in the section reserved for fertilizers and chemical products useful in agriculture are published statistics of production, trade and prices for 15 products. In the rates of exchange section are set out the rates on the New York exchange for the most important currencies.

For the first time there have been introduced into the volume special chapters on the importance and distribution of the agricultural population the distribution of agricultural holdings according to their size and mode of tenure and forestry.

The volume has also been enriched by a long introduction and a chapter of explanatory notes.

Correspondence

I

Prickly Pear Cochineal

To

The Editor, Madras Agricultural Journal,

Dear Sir,

I have been introducing cochineal insects in my division to destroy prickly pear. To set at rest the fear expressed by many—mostly educated men—that these insects might attack other crops or even human beings, as soon as the prickly pear becomes extinct, the following statement from Mr. S. Guru Rao Garu, B.A., Retired Revenue Divisional Officer, Madanapalle, and the reply thereto by the Government Entomologist may kindly be published in the pages of our esteemed journal.

Yours sincerely,
R. SWAMI RAO.

Prickly Pear Pest

The pest was observed to spread freely in the prickly pear bushes in Aruppukottai and Kamutti Taluks of Ramnad and to effectively destroy the pear within the course of four to six months. But small tiny insects white in colour were noticed to fly about particularly in the cooler hours of the morning. In the Ramnad Samasthanam travellers' bungalow in which I

camped, I noticed them to settle on the exposed parts of my body and give me a bite. The bite would attract my attention and at the spot I used to notice the insect, a tiny white speck and when I crushed it, a reddish tint used to be left there, resembling in appearance the colour of the prickly pear fruit. I have also noticed the insects settling on water-surfaces. I made casual enquiries regarding the experience of others there and was told that in Tuticorin where prickly pear had become completely exterminated, the insects began to attack sparrows, squirrels, crows and snakes that moved about in the bushes and kill them. I was also told that the nuisance of these insects had become so great at Tuticorin, that some people used to cover up their drinking-water-wells to prevent them settling down there and contaminating the water. It is worth investigating whether these insects adversely affect other crops and animals and human beings after destroying the prickly pear and thereby prove a greater menace to the prosperity of the country than the immediate purpose they serve in effectively destroying prickly pear.

November 20, 1930

S. GURU RAO,

*Retired Revenue Divisional Officer,
Madanapalle.*

Copy of Letter Received from the Government Entomologist, Coimbatore

Dated November 24, 1930.

Dear Mr. Swami Rao,

The tiny insects referred to are the male forms of the Cochineal Insect. It is only the males that have wings and they fly about in search of the female bugs.

At a stage when the prickly pear is almost destroyed and is beginning to die, a preponderance of males is noticeable. These swarm about especially in the mornings. At Tuticorin, it was even reported that these were the cause of an influenza epidemic two years ago.

But I cannot believe that this is founded on fact. They are very innocuous and fragile insects incapable of biting. It is, however, a fact that they occur in enormous abundance and may fall into vessels and wells and it would be necessary to cover them up for the time being.

They are, however, absolutely incapable of attacking, much less killing sparrows, squirrels, snakes etc. nor can they affect any crop. They are quite shortlived.

I do not think they are worth troubling about.

Yours sincerely,

(Sd). Y. RAMACHANDRA RAO.

II

Application of Fertilizers

To

The Editor, Madras Agricultural Journal.

Dear Sir,

1. There is a complaint in some places that application of fertilizers (super-phosphate and ammonium sulphate) hardens the soil and makes it not easily workable. It becomes worse when constant application is made. What are the causes for the same and please let me know whether such hardening is injurious to the soil?

2. Is it a fact that application of fertilizers decreases the available quantity of lime in the soil, and if so what are the methods to stop that or to compensate for the same? Will that be practicable for a ryot, from an economic point of view?

Yours sincerely,

(VELUR) SALEM.

T. P. SUBRAMANYA KANDER.

III

Sugarcane—Manures for and Crushing of,

To

The Editor, Madras Agricultural Journal.

Dear Sir,

I will be obliged if you will let me know through the columns of your valuable monthly,

1. The amount of Groundnut cake and Ammonium Sulphate, the proportion of each to be applied to an acre of cane and the time of application.

2. Which is better for crushing cane, Kirloskar or Chattanoga?

3. We find it difficult to spare our bullocks for cane-crushing continuously for more than a month. How far is it economical to maintain power crushers when there are 70 acres of land under cane?

Yours truly,

AYYAMPALAYAM.
KAVANDAPADI P.O.

(Sd). A. R. NAGGAPPA GOUNDER.

FARMING CALENDAR FOR THE COIMBATORE DISTRICT

March

Weather.—In the month there is a gradual transition from dry to hot weather conditions. The mornings are generally not as cold as in February. The day temperatures show a gradual rise. The maximum temperature for the year, 99°–100°, is reached towards the close of the month. In the second fortnight, definite hot weather conditions set in. A few light thunder showers may be received towards the close of this period.

The average rainfall over the District, ranges from 60 cents to 1 inch.

A change in the direction of winds is definitely noticed from North-East to East, and thence to South-East and South.

Field operations are not much in evidence except in garden-lands.

Manuring and carting tank silt, and preparation of seed-bed, are continued in the garden-land area.

Sowing of summer cholam is taken on hand about the 20th, and is in progress throughout the month. Necessarily, ryots are busy equipping themselves with the outfit for carrying on irrigation for this summer crop. Local leather trade is brisk in the weekly markets; ryots in large numbers buy leather for mhote buckets (*Kavalais*).

Good specimens of cattle which are specially reared in the preceding months, are brought to the weekly fairs for sale. Cultivators very often exchange their old cattle for new ones at this time of the year.

Sugarcane planting referred to as *Masikaranai* in the previous month's calendar, is continued in parts.

Picking of Cambodia cotton is carried on. This crop may receive one irrigation in the beginning of the month.

In dry lands, cotton bursts in abundance, and is gathered in regular succession.

Standing crops like plantains and sugarcane are kept up by copious irrigation, as also plantations like cocoanuts and arecanuts which are found in the river valleys.

In wet-lands, green manure crops like daincha, and sunnhemp shall be sown either with the aid of rainfall or with channel water, with a view to get a good growth of green stuff for being ploughed in later. This practice obtains in the Government Farm lands here, and may be advantageously followed by the farmers.

College News and Notes

Students' Club.—With the examinations fast approaching, the students are busy with their studies and the midnight oil is being consumed in large quantities. Other attractions however exist, for the 'Club Day' is coming on apace and several tournaments in in-door and out-door games are in progress under the able management of Messrs. Tirumal Rao, Lakshmanachar, Krishna Menon, Ayyadurai and C. S. Krishna Iyer. Verily, February is the most active month of the year for the Students' Club, and it is very encouraging to note the enormous amount of interest and enthusiasm evinced by the first-year lads in the Club activities.

A Send-off—On the 24th, the students of all the classes gave a farewell 'At Home' to Dr. Kamakrishna Ayyar on his appointment to the post of Entomologist, when the members of the staff were also invited.

Athletic Activities.—The *Parnell Cup* matches were rushed through and the II year won the cup after a tough and exciting struggle with the III year. Mention must be made of Messrs. C. K. Ramachandran, D. V. Krishna Rao, C. N. S. Mani of the III year and L. S. Mani of the II year who played a splendid game in the final contest. There was a cricket match on the 11th with the Officers' Club wherein the officers fared rather badly, scoring only 52 all out, whereas the students knocked up 174 runs for the loss of only 9 wickets. The American Sealed Handicap Tennis Tournament is over, Messrs. Vaidyanathan and Devasikamani leading with 139 games to their credit, closely followed by Muddhana Chetty and Patnaik with 136 games. The handicaps are not yet known and it is hoped that these two pairs will get the cup and medal. The Tennis Singles Tournament for the *Cecil Wood Cup* is proceeding.

Radha Kalyanam.—The Radha Kalyanam was celebrated with great eclat as usual on the 11th.

The Officers' Club.—The annual election of office-bearers for the Officers' Club came off on the 26th and the following were elected:—Rao Bahadur T. S. Venkataraman, President; Mr. K. Ramiah, Vice-President; Mr. V. Gomathinayagam Pillai, Secretary; Mr. M. Sundaram, Assistant Secretary, and Messrs. S. Kasinatha Ayyar, S. N. Venkataraman and S. Mayandi Pillai, Members of the Managing Committee.

Visitors.—J. H. Ritchie, M. A., B. Sc., Secretary, Indian Central Cotton Committee, was here on a visit from 30th January to 1st February.

DIGEST OF THE OPERATIONS OF THE DEPARTMENT OF AGRICULTURE, MADRAS, FOR THE QUARTER ENDING 30TH SEPTEMBER 1930

Season and its Effects.—The south-west monsoon was weak during the month of July which retarded agricultural operations throughout the Presidency. However, light showers received during the month enabled the sowings of dry lands, in different places. In the Gōdāvari, Kistna and Cauvery deltas, transplantation of paddy was proceeded with, but in the Tambraparni, water was not received in requisite quantity. Transplantation of paddy was delayed also in the West Coast. Heavy rain in parts of Salem district was responsible for a severe outbreak of hairy-caterpillars which devastated dry crops of groundnut and cumbu.

Conditions were not very different to this in the month of August. Paddy suffered most in the Vizagapatam district owing to scarcity of rain; sugarcane also suffered on the same account. While in Kistna, conditions were better than in Guntūr; Nellore suffered the most in the second circle. The Ceded districts being practically rainless, *Mungari* sowings were delayed. In the Central districts, groundnut and semi-dry paddy sowings were delayed and water in irrigation sources having gone down, it was found difficult to irrigate paddy. On the other hand, the supply of water in channels under the Cauvery was steady and *Kuruvai* transplantation was completed; while water scarcity was continued to be felt under the Tambraparni, there was a sufficiency of water under the Periyar. On the West Coast, water was insufficient for transplanting second crop paddy and even nurseries suffered on that score. Dry-land sowings though later than normal, were completed in the Coimbatore district.

September was a better month than the previous two. Good rains were received in most localities except in parts of the Central districts and Coimbatore. With the amount of rain received, dry-land sowings were completed all over the Presidency. In Tanjore delta, *Samba* planting began.

Paddy in the upland areas of East Gōdāvari and dry crops in parts of Vizagapatam, West Gōdāvari, Kistna, Bellary, Chittoor, South Arcot and Tinnevely were affected by drought.

Fuel and Dung.—The Oriyas of the Ganjām district seem to be notorious consumers of cattle dung as fuel. It is estimated that for a family of four adults and two children, fuel worth Rs. 50 is required per annum. Those who burn cattle dung as fuel, little realize what a loss of wealth there is to the country in so doing. Every one knows that cattle manure is essential for the growth of plants and unless crops are properly manured, they will not yield adequate returns and unless good yields are obtained, there will not be sufficient food for people in the country. Not only this, the quality of grain is also seriously affected. Yet the usual excuse for burning cattle manure is that there is not sufficient fuel. Every endeavour must be

made by all people in towns and villages to conserve cattle manure for manurial purposes and grow trees wherever possible. In the case of Ganjām, palmyra which ought to grow well is scarce; people use paddy straw for thatching purposes. If palmyra trees are grown, they will not only help to give good fuel but also supply the necessary thatching material. In the adjoining district of Vizagapatam, this tree grows very well. The palmyra is easy to grow and although there may be several fatalities if planted thick, a sufficient number will survive. Similarly other districts may grow trees suited to the locality. For example, in sandy tracts, cashewnut would be an excellent tree to grow. In a matter which affects all, it is desirable that villages as a whole, rather than individuals, should settle this important problem.

Grazing Areas.—With frequent failure of rain during the south-west monsoon following a very hot and dry period of three to four months every year, it is difficult to raise sufficient grass for our cattle. The so-called grazing areas are full of shrubs and prickly-pear. Even the famous *beedus* and *kanchas* in the Nellore district are no exception. Large areas, unfenced and uncared for, lying on either side of the road are the property of rich landlords. A good deal of improvement is possible and is necessary, if cattle are to be better fed. In the first instance, the grazing areas should be fenced and the overgrowth of shrubs and prickly-pear removed. On the onset of the monsoon, such enclosures should be lightly ploughed or worked with harrows to conserve moisture and encourage growth of grass. Wherever grass seeds could be procured it is desirable to sow them, so that there will be enough grass for at least six or seven months in the year. If there is an abundance of it at a certain period, the grass can be cut and converted into silage, for use later in the year. During the remaining months these areas will form an exercising ground for them. Forest Panchayats under whose charge large grazing areas exist at present, could do good work, if they turn their attention to this improvement.

Co-operative Agricultural Improvement Society, Bantanahal.—This society consists of 12 registered members who are all cotton-seed farm ryots. Last year, they had 832 acres under seed farm conditions and obtained over 58,000 lb. of lint which was sold jointly for Rs. 21,591 after allowing the usual market deductions. It is understood that the society got the highest price in the whole of the western area and obtained a premium of Rs. 10 *per naga* of 312 lb. The members secured Rs. 2,000 more this year owing to the joint marketing of cotton. The profits are due to higher price paid for the cotton, reduction in unnecessary market deductions, saving in labour charges, concession rates in ginning and proper weighing of cotton. The receipts were utilized by ryots for paying portions of their past debts and interest. Three members purchased 70 acres at Rs. 100 per acre. Some more ryots of the village have applied for membership in the society. This society has been so far fostered by the local Agricultural Demonstrator, but such spoon-feeding cannot go on for ever. The Government are prepared to show the people the way but it is for individuals to stand on their own legs as soon as possible. Now that this society has realized the benefit of co-operative action, it is hoped that members will prosecute their activities with greater vigour in other useful directions. The work of this society ought to stimulate many others who are now handicapped by want of such co-operative action.

Green Manures.—At the Samalkota Agricultural Research Station the following yields per acre were obtained this season from the various green manure crops grown:—

	Lb.
Pillipesara	13,500
Teegapesara	11,200
Dhaincha	10,750
Sunn hemp varieties	7,950

These were sown in summer with the help of irrigation water.

Dhaincha, if sown too early in the season, or if the season becomes too late for its incorporation in the soil at the right time, is liable to become too thick and woody in the stalk when it becomes a very difficult and expensive operation to harvest. To obviate this, when conditions become necessary, if the crop is cut a foot from the bottom and the tops dried for use later and the lower portions allowed to sprout again, within two months the crop will grow to a sufficient height to give a fair yield. In a village near Kollegal, where there were 60 acres under this crop, the ryots cut the top portions and fed them to cattle. Yet another use is being found by ryots for dhaincha.

Pillipesara is an extremely useful crop for fodder as well as green manure. It is very quick-growing and seems to do well in the Guntur district.

Sunn hemp was grown in Porur in the Chingleput District over twenty acres as a green manure crop and it did so well that it was expected to yield at the rate of ten cartloads of green leaf per acre. The same green manure crop was grown at Tindivanam over 90 acres, besides which 50 acres of indigo and 60 acres of *narikaramani* were grown in the same village. It shows that some people are appreciating the usefulness of green manures for paddy land.

Unfortunately, it is not always easy to get fresh supplies of seed every year. It is understood that in Bhimavaram taluk 50 ryots are growing sunn hemp and dhaincha for seed purposes. Again, in parts of Vizagapatam District, several villagers near Bobbili have been encouraged to grow dhaincha for seed purposes. As it is very difficult to get dhaincha seed for ryots of this Presidency, and as we have often to depend on Bengal for our supply, it is extremely desirable that ryots grow their own. It is an easy and inexpensive crop to grow mixed with dry cereals and it should not be difficult to find customers for purchase of seed. Each district ought to be self-supporting in its green manure seed supply.

Garden Crops.—In a village near Pulla in the Ellore taluk, a block of wet land was put under plantains, brinjals, and other vegetables and the ryot is said to have obtained Rs. 400 profit per acre against Rs. 60 to 75 he would have got had he grown only paddy. With low prices for paddy, it seems desirable to turn one's attention to other more paying crops. At the Samalkota Agricultural Research Station, it is found that over Rs. 800 profit per acre was obtained by growing one particular vegetable. This handsome return might have been due to having grown it on a small scale, but there is little doubt that vegetable gardening in the proximity of large towns or railway centres is a paying proposition.

Increase of area under Sugarcane.—Of late, there has been a desire on the part of cultivators of certain districts to increase the area of sugarcane. It is particularly noticeable in Vizagapatam. There may be several causes, but the fall in price of paddy, the irregular yields that it gives and a disease resistant and vigorous growing variety of cane recommended by the department, may be some. But the fact remains that sugarcane cannot be successfully grown wherever paddy is grown and that it should be restricted to high level lands with good drainage facilities. If the area under sugarcane is to be increased, it should not be done by growing it on inferior land.

For instance, by putting sugarcane on ill-drained land, ryots suffered 40 years ago from the devastation of the crop by a serious fungus disease known as 'red rot'. Unless ryots are careful, the same situation will repeat itself. It is, therefore, very important to confine the area under sugarcane to the best land available.

Secondly, there is also the danger of increasing the area at the expense of rotation. Any crop which is grown in the same land year after year is bound to suffer from disease and will not yield after some time as well as it did in the beginning. A change of crop is therefore necessary. If paddy does not form a suitable rotation, there are other crops like plantain, turmeric, etc., which should take its place.

Provided care is taken to avoid the mistakes referred to above, the area under sugarcane can be increased in all localities where good land and water facilities are available. By paying attention to the introduction of efficient methods of cultivation, superior varieties, and reducing the cost of production, greater profits can be realized.

Beetles on Brinjals.—In a village near Mailam, a field of brinjals was attacked by certain insects known as 'epilachna beetles'. With the assistance of the Demonstrator a portion of the crop was sprayed with Lead Arsenate. It was found that on the following day about 50 per cent of the beetles and grubs died and on the third day only 20 per cent of the insect were living. The next day even these were found dead. To derive most benefit, it is necessary that ryots should approach the Demonstrators for help immediately they notice an attack, and not wait till the mischief is done.

Pest Act (a)—Groundnut.—Reference was made in Digest No. 88 to the introduction of Pest Act on groundnut in the South Arcot District. Owing to previous propaganda, ryots in Vriddhachalam taluk were made aware of the life history of this devastating caterpillar. But owing to the late notification in that area, ryots in eight villages did not start hand-picking of the insect till warned. In one village as the ryots did not co-operate, picking was done by village officers, the expenses to be recovered from ryots later. Certain villages which were not included in the Pest Act area were affected very badly and became centres of infection; it therefore becomes very necessary that such villages be included in the Pest Acts area next year. In the Salem District also the pest was very severe. In fact, it is considered the worst ever experienced. In spite of lantern lectures, actual field demonstrations and distribution of leaflets anticipating the trouble that might arise, the people did not pay heed to the advice given, and allowed their crops to suffer.

(b) *Cambodia Cotton*.—This Act refers to the compulsory removal of cambodia cotton from the field before September 1 of each year. In the VIII Circle, the Act was enforced with very little difficulty. In fact, in certain places the cotton plants were removed earlier than last year, as the prolonged drought and poor stand of the crops did not tempt ryots to keep the crops on. Another feature noticed this year was that in certain firkas of Pollachi and Coimbatore taluks, where, due to early rains, early sowings are usually the rule, there was practically no crop at the end of August owing to want of timely rains.

In the Madura Circle where cambodia cotton is grown extensively under dry conditions, ryots finding it difficult for want of rains to pull the plants, only cut them which begin to sprout on receipt of rains in September. Although it might have been a difficult operation to pull the plants outright when the soil was hard, if the ryots understood the spirit of the Act correctly—the reason why the plants should be uprooted—they would have taken the trouble to pass a harrow or a plough through the field when there was moisture later and uprooted the plants. The object of the Act is frustrated by acts like these and ryots themselves will suffer, as such plants will harbour insects inimical to the proper production of their newly-sown cotton.

Cochineal insect and prickly-pear.—Cochineal is a small insect which has been introduced into this Presidency for destroying prickly-pear. In spite of the advantages of the prickly-pear as a good fence, it has many disadvantages. It has taken such a strong hold in the country that it has become a positive nuisance, occupying as it does, large tracts of cultivable land and tank beds. Ryots often bitterly complain that water in the tanks is often held up from free flow by the overgrowth of prickly-pear. This cochineal insect sucks the juice of the prickly-pear and eventually kills it. Ryots anxiously collect the dried up portions for fuel. This insect was introduced some two or three years ago in Tuticorin and it is now found in different parts of the country like Tinnevely, Coimbatore, Kistna, Guntur and Salem districts. Ryots can obtain this insect by writing to the nearest Agricultural Officers. When once introduced, it needs very little attention.

Example is better than precept.—At the suggestion of the Agricultural Demonstrator, a leading ryot at Punjeri in Chingleput District, dug a manure pit 20' x 20' x 3'. Following his example, four more pits were dug by other ryots who are now preserving in them dung which they formerly used to burn as fuel. The same ryot ploughed 9 acres of his dry-land with an iron plough and raised 2 acres of it under ragi which gave a better yield than the crop planted in a field ploughed shallow. This is an instance how leading ryots can set an example to their poorer brethren. They have responsibilities and privileges which, if rightly exercised, would go a long way in improving the agricultural condition of the poorer ryots. That is the reason why the Agricultural Demonstrators invariably first approach influential ryots of the village because on them do the poorer folk look for the lead. An ounce of example is better than a ton of loud promises.

Centres of work.—On pp. 92-99 of Digest No. 88, will be found the jurisdictions of the Agricultural Demonstrators and their centres of work. It will be noticed that each Demonstrator is in charge of a taluk and has his

headquarters almost always at the headquarters of the taluk. There are three to five villages under his charge in which he does intensive propaganda.

The Demonstrators are expected to visit these centres frequently and stay for a number of days at each centre and persuade ryots to take to improved methods in agriculture. Hitherto, Agricultural Demonstrators used to tour in one or two taluks and attempted to visit a number of villages with the result, that no concentration of work was possible. On the other hand, by the new method, ryots of a few villages will have an opportunity of meeting Demonstrators frequently and it is hoped that ryots will take the fullest advantage of their presence and follow their advice. Villages in the neighbourhood of these centres will also be visited by them after a certain amount of work has been done in the centres so that they could persuade ryots of other villages to come and see what ryots are doing there.

To give an idea of what is already being done at some centres, a few examples are given below:—

1. At Brahmanaperi Agraharam in the Erode taluk, the following items of work were being demonstrated in the month of August:—Preparation of compost with sugarcane trash started four months ago; the manure is said to have decomposed well and fit for use; trenching and planting cane in trenches and manuring with sunnhemp green manure grown between rows of sugarcane; ploughing paddy land with an iron plough compared with country plough; manuring paddy with dhaincha raised *in situ* compared with the local practice of bringing wild indigo leaves from outside; planting Co. 1, and Co. 3 varieties of paddy in comparison with the local variety.

2. At Oonjatur, another centre, conservation of cattle manure in pits under cover; compost with sugarcane and turmeric leaves; introduction of J. 247, and Fiji B. sugarcane; planting them in trenches; manuring with sunnhemp grown between rows of cane; growing paddy demonstrating the advantages of green manuring; ploughing with iron ploughs and reducing seed rate by about half of the local rate, are being demonstrated compared with local methods.

3. In Tinnevely District at Maharajapuram and Karivalamvandanallur, two centres of work, dhaincha is being grown for the first time in 75 and 100 acres respectively.

The Demonstrators can recommend ryots to follow several improvements and would be very glad if people are forthcoming to carry out demonstrations at these centres, for their own benefit as well as for that of others in those and neighbouring villages.

Reduction of freight charges on oil-cakes.—The Agent of the Madras and Southern Mahratta Railway has agreed to a reduction of freight charges of manures. In future the consignments of oil-cake both in local booking over their railway and through booking with foreign railways, will be charged at 1/10th pie per maund per mile and that the new rate will take effect immediately.

The condition that the consignments of oil-cake if they are to be booked at this rate should be accompanied by a certificate that the oil-cake is intended for inland use, has also been withdrawn.

Exhibition Motor Vans.—During the quarter, the first unit toured in the Gōdāvari and Vizagapatam districts of the I Circle, and visited various

centres of work. Lantern lectures were delivered. Health Inspectors co-operated in the propaganda.

The second unit toured in the VI Circle, and visited Srivilliputtur, Sankaranayinarkoyil, Tenkasi, Ambasamudram, Tinnevely and Srivaikuntam taluks of the Tinnevely District. In each taluk, important villages were visited and lantern and other lectures delivered.

Exhibitions and Lectures.—In different parts of the Presidency, twenty exhibitions were held and 82 open air lectures and 17 with lanterns were delivered during the quarter.

PUBLICATIONS DURING THE QUARTER.

List of publications.

NUMBER.	NAME.	LANGUAGES.
64	Broad hints for everyday use.	English, Malayalam, Kanarese, Tamil and Telugu.
65	Potatoes	English, Tamil, Telugu, Kanarese and Malayalam.
66	How to Control Jasmine Bug.	English, Telugu, Tamil and Kanarese.
67	Note on Turmeric	English, Telugu, Tamil, Kanarese and Malayalam.
68	School garden	Do.
69	Water-rate or faslijast for certain crops, concession made by Government to ryots in aid of cultivation.	English, Tamil, Kanarese and Telugu.
70	Broad hints for everyday use—III. Feed your cow.	English, Tamil, Telugu, Kanarese and Malayalam.
71	How to send specimens ...	Do.
72	Water Hyacinth	Do.

LOANS TO RYOTS.

The following important rules framed under the Land Improvement Loans Act of 1883 and the Agriculturists' Loans Act, 1884, are herein published for the benefit of ryots who may be unaware that such facilities exist:—

RULES.

I. Loans may be granted to owners and also to *occupiers* of land.

(A) *The Land Improvement Loans Act.*—For (i) the construction of or repair of wells or tanks, (ii) the reclamation of waste or any other work which would permanently increase the letting value of lands.

(B) *The Agriculturists' Loans Act.*—For the purchase of (a) seed, (b) grain, (c) working cattle, (d) breeding bulls, (e) for the re-building of houses by cultivators in tracts newly occupied and cultivated, (f) for the

construction of cattle sheds and of houses destroyed by fire or flood and (g) for other agricultural objects as purchase of fodder including cotton seeds both for domestic and agricultural cattle, and (h) of manure, (i) erection of sugarcane mills or furnaces, (j) of contrivances for raising water, and (k) for the relief of distress (when recognized by Government), to enable owners and occupiers of land to subsist until the next harvest.

II. All Revenue Officers of and above the grade of Deputy Tahsildars are competent to sanction above loans.

III. The rate of interest shall be charged at 6½ per cent per annum (or 1 pie per rupee for each month), except on loans granted for the relief of distress which shall be charged interest at 3 per cent, the Collector having the discretion to remit the charges in case of borrowers who are known to be poor. The Local Government reserves the power to grant loans in special cases at special rates of interest or without interest.

If the work started with the aid of the loans fails from causes beyond the borrowers' control, Revenue Divisional Officers, District Collectors and the Board have the power to remit the whole or any portion of the unpaid balance.

The Collector may advance as loans to the members of the village community or to a group of cultivators on their joint personal security an amount not exceeding five times the annual assessment of the lands registered in the names of the applicants for the purpose of improving tanks or embankments and such like in which they would be jointly interested.

With a view to provide great facilities to borrowers, Collectors, Deputy Collectors and independent Deputy Tahsildars have been authorized to make disbursement on the spot in villages during their tour.

2. Loans may also be granted by the Director of Agriculture for the purchase of implements as ploughs, tractors, guntakas, seed drills, sugarcane mills, etc.

3. Similarly the Director of Industries may grant loans for the purchase of oil engines and pumps. For detailed rules *vide* Takkavi Manual.

4. There is no objection to an individual to obtain several loans either simultaneously or at different times provided they are for distinct purposes and covered by separate and independent security. There should be a separate application and a separate loan order in each case.

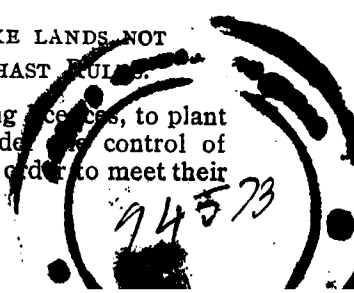
5. Owners and occupiers of land in need of above loans should apply to the nearest Agricultural Officer who will forward them to the officers concerned with a brief note explaining the *bona fides* of the applicants as well as the need and urgency of the loan.

STANDING ORDER, BOARD OF REVENUE, LAND REVENUE AND SETTLEMENT.

19-B PLANTING OF TREES BY RYOTS ON PORAMBOKE LANDS NOT AVAILABLE FOR ASSIGNMENT UNDER THE DARKHAST RULES.

1. Ryots will be permitted, subject to their obtaining licences, to plant trees on poramboke lands, not being lands placed under the control of village panchayats established under Act XV of 1920, in order to meet their

Jan 21, 1931



requirements in regard to timber, fuel, and leaf-manure. These licences will be subject to the following conditions:—

(i) Planting will not be allowed on lands already containing valuable Government trees, as it might, in such circumstances, become difficult in the course of time to distinguish the trees belonging to Government from those planted by ryots.

(ii) The previous permission of the Tahsildar or Deputy Tahsildar should be obtained before trees are planted. In the case of porambores in charge of the Public Works Department, however, such permission should not be granted without the previous consent of that department, which may impose such additional restrictions as it may consider necessary.

(iii) The boundaries of the land and the number and kind of trees to be planted should be specified in the licence.

(iv) The grant will confer no rights over the land.

(v) No fence shall be raised by the licensee, except for the separate protection of each young plant. In special cases, Collectors may allow the raising of a continuous fence for a definitely limited time. Prickly-pear should not be allowed to be used as fencing.

(vi) The Government will have the right to remove the trees, when necessary, without liability to grant any compensation; in this case, however, the trees will be sold in public auction and the proceeds paid to the licensee; or the timber will be made over to the licensee if he desires it.

(vii) The licence will be subject to cancellation if the trees are not planted within a reasonable time or if they are not looked after properly.

(viii) The licensee will enjoy the usufruct of the trees and the timber free of charge, except that licensees will have to take tree pattas for fruit-bearing trees of the kind usually taxed, as soon as they begin to bear fruit.

(ix) The previous permission of the Tahsildar or Deputy Tahsildar will be required before cutting a tree, but such permission will ordinarily be granted.

(x) These rules will be subject to suitable modification in each case on application from village panchayats.

2. A form of licence will be found in Appendix XII-A of Standing Order, Board of Revenue, Land Revenue and Settlement.

3. Please apply to the nearest Agricultural Officer. Permission will be obtained by him on behalf of agriculturists who are willing to avail of the above concession.

FODDER CONCESSION.

The South Indian Railway authorities have agreed to allow the transport of fodder (hay and straw) pressed into bales from and to the stations in Coimbatore, Salem, Trichinopoly and Tanjore district at a concessional rate of 0.3 pie per maund per mile.

Ryots who are willing to avail of this concession should apply to the nearest Agricultural Officer. Those who are willing to apply direct may do so to the Chief Commercial Superintendent, Trichinopoly—
Digest No. 89, Department of Agriculture, Madras.

Weather Review

DECEMBER 1930

Rainfall data

Division	Station	Actual	Departure from normal	Total from 1st January
Circars	Gopalpore	...	— 0.7	50.3
	Vizagapatam	...	— 1.3	46.9
	Cocanada	...	?	56.4
	Masulipatam	...	+ 0.4	59.8
Ceded Dists.	Kurnool	...	— 0.3	24.5
	Bellary	...	+ 0.2	26.3
	Anantapur	...	+ 0.6	28.8
	Cuddapah	...	+ 0.3	41.0
Carnatic	Nellore	...	+ 4.3	55.7
	Madras	...	— 1.6	77.5
	Cuddalore	...	?	68.2
	Vellore	...	?	65.6
Central	Salem	...	...	41.7
	Coimbatore Town	5.0	+ 3.9	41.2
	Coimbatore Re-			
	search Inst.	...	+ 3.5	39.8
South	Trichinopoly	...	+ 1.0	48.9
	Negapatam	...	— 1.2	83.4
	Madura	...	+ 2.2	47.5
	Pamban	...	— 7.0	32.1
West Coast	Palamcottah	...	— 5.1	23.8
	Trivandrum	...	— 1.6	69.1
	Cochin	...	+ 4.6	121.9
	Calicut	...	— 1.0	119.0
Mysore and	Mangalore	...	— 0.3	137.3
	Bangalore	...	+ 0.4	38.7
	Coorg	...	— 0.3	110.2
	Hills	...	— 1.0	74.1
	Coonoor	...	— 0.7	68.4

General summary of weather conditions.—

The Bay storm which crossed the coast at the end of November weakened rapidly and on the 1st and 2nd was traversing the south of the Peninsula, and passed out to sea off the Malabar coast. It caused some

heavy rain in the south before it moved away northwards and ceased to affect the weather in the Presidency. Thereafter weather was fine with cooler days than usual till the 20th when a depression formed in the area south of the Andamans. This second depression moved out into the Bay but failed to develop and disappeared on the 24th after causing some sporadic rain on the coast between Nellore and Negapatam. After this the weather was generally fine.

Rainfall was in excess locally on the Madras coast and in the south. No rain fell in the two northernmost districts and in the north Malabar coast. During the passage of the depression some heavy falls of rain occurred on and near the Hills, Coimbatore reporting 4.3 inches on the 2nd.

Temperature was below normal over the whole of the area about the middle of the month.

Weather Report for the Research Institute Observatory.—

Absolute Maximum in shade	...	...	89.0
Absolute Minimum in shade	...	...	58.0
Mean Maximum in shade	...	...	83.9
Mean Minimum in shade	...	...	65.5
Total rainfall in month	...	...	5.14 inches
Mean rainfall for December	...	...	1.57 "
Departure from normal	...	...	+3.57
Heaviest fall in 24 hours	...	...	4.23
No. of rainy days in month	...	...	2
Mean daily wind velocity	...	...	1.3 M.P.H.
Mean 8.00 A.M. wind velocity	...	...	0.8 M.P.H.
Total hours of bright sunshine	...	...	248.5
Mean daily hours of bright sunshine...	...	...	8.0

Summary of weather conditions.—

The residual of the Bay storm was passing nearest to this observatory on the 1st and very heavy rain fell on the night of that day. Wind velocity was however low, though the barometer reached its minimum on that day. Weather improved rapidly and was fine till the end of the month.

Rainfall was 5.14 inches and 3.57 above the mean. The heaviest fall was 4.23 inches in 24 hours, this being the heaviest fall recorded for 25 years at this observatory the peculiar feature being that the greater part of the fall occurred between 19.30 and 20.30 hours, and was accompanied with severe thunder.

Weather was generally fine and cool.

P.V.R.
B.S.N.

JANUARY 1931

Rainfall Data

Division	Station	Actual for January	Departure from normal
Circars	Gopalpore	...	-0.2
	Vizagapatam	...	-0.4
	Cocanada	...	-0.2
	Masulipatam	...	-0.2
Ceded Dists.	Kurnool	...	-0.2
	Bellary	...	-0.1
	Anantapur	...	-0.1
	Cuddapah	...	-0.4
Carnatic	Nellore	...	-1.7
	Madras	...	-1.3
	Cuddalore	...	1.3
	Vellore	...	-1.5
Central	Salem	...	-0.3
	Coimbatore Town	...	-0.6
	Coimbatore Research Institute	...	-0.7
	Trichinopoly	...	-0.2
South	Negapatam	...	...
	Madura	...	-0.1
	Pamban	...	4.7
	Palamcottah	...	-0.2
West Coast	Trivandrum	...	-0.2
	Cochin	...	-0.4
	Calicut	...	-0.4
	Mangalore	...	0.1
Mysore and Coorg	Bangalore	...	-0.3
	Mercara	...	-0.1
Hills	Kodaikanal	...	-1.0
	Coonoor	...	...

General summary of weather conditions.

Weather was fine for the first four days of the month with clear skies and low night temperatures over the whole of the reporting area. On the 5th, a revival of the monsoon took place on the Coromandel coast and a few falls of rain occurred between that day and the 8th, and again between the 12th and the 17th, thereafter weather was fine till the end of the month. The weather was typical of the cold weather with low night temperatures over the greater part of the Presidency.

Rainfall occurred only in the south and was above the average only at Pamban and Cuddalore. Western disturbances traversing the north of India failed to affect weather in the north of the area and no rainfall occurred there.

C. MEMOIRS, BULLETINS AND PUBLICATIONS.

20. Progress in Empire Marketing, 1929-30	...	Empire Marketing Board	
21. Ox Warble Fly	...	Publication	No. 28
22. The Tobacco Industry during 1927-28	...	Worcestershire County Council Publication	
23. Poultry House Construction...	...	Union of S. Africa	Bulletin No. 89
24. Overseas Tests of the Milling and baking qualities of Garnet Wheat.	...	Canada Agricultural Department Bulletin	No. 132
25. Insect Pests of Sweet Potato and of Cassava	...	Jamaica Agricultural Department Ent.	No. 134
26. The Making and Feeding of Silage	...	U.S. Farm Bulletin	Bulletin No. 5
27. Breeds of Light Horses	...		No. 578
28. Diseases of apples in Storage	...		952
29. Arbor Day	...		1160
30. Standard Breeds and Varieties of Chickens	...		1492
31. Sugar Beet Culture	...		1507
32. Fall Sown Oat Production	...		1637
33. Chestnut Blight	...		1640
34. Fur laws for the season 1930-31	...		1641
35. The Bacterial Diseases of the Bean	...		1648
36. Studies on Fungicides	...	Cornell Agricultural Experimental Station	Memoir No. 127
37. Genetical and Cytological Studies of mendelian—a synopsis in Zeamays.	...		128
38. Study of Meadow Crop Diseases in New York	...	Cornell University Experimental Station	129
39. Some Cold Storage and Freezing Studies on the Fruit of the Vinefer Grape.	...		Memoir No. 130
40. A Comparison of aging periods for Ice Cream Mixes.	...		131
41. Social Relationship in Tompkins Country	...		Technical Bulletin No. 161
42. An Economic Study of Food Consumed by Farm and Village Families in Central New York	...		Bulletin No. 501
43. The Molting Factor in Judging Fowls for Egg Production.	...		502
44. Partial Sociological Study of Dryden, New York.	...		503
45. Some factors affecting the cost of operation of Retail food Stores in New York State.	...		504
46. An Economic Study of Tractors on New York Farms.	...		505
47. Lead-arsenate—Experiments on the germination of weed seeds.	...		506
48. Results of Sweet-Corn Suckering Experiments on Long Island.	...		508
49. Sour Cherry Fruiting	...		509
50. Success with Sandy Soils	...	Wisconsin Agricultural Experiment Station	Bulletin No. 415
51. The European Corn Borer and its environment	...		416
52. Studies on Porcine infections Abortion...	...	Ohio	429
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54. Use of Honey in Ice-Cream	...		344
55. Fertilizing 25 kinds of vegetables	...		345
56. Crop Yields from Illinois Experiment Fields in 1929.	...		346
57. Effect of certain Hydrocarbon oils on Respiration of foliage and dormant Twigs of the apple.	...		347
58. The Fruiting Habits and Pruning of the Campbell Early Grape.	...	Michigan Technical Bulletin	No. 106

59. Cantaloupe Production in Michigan	...	Michigan Special Bulletin	No. 196
60. Combine Harvester Threshers in Michigan	...		198
61. Studies in Swine Feeding	...		199
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63. The Influence of Sugar and Butter fat on Quality of Ice-Cream.	...		201
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65. Spraying Materials and the control of Apple Scab.	...		203
66. Wood boring Insects which attack Furniture and Buildings.	...	Circular Bulletin	No. 134
67. The Seasonal Life History of the Oriental Fruit Moth in New Jersey during 1924, 1925 and 1926.	...	New Jersey Agricultural Experimental Station	Bulletin, No. 405
68. The Growth Status of the Tomato as correlated with Organic Nitrogen and Carbohydrates in Roots, Stems and leaves.	...		461
69. Studies of Combined Sprays for destroying the overwintering eggs of the European Red mite and apple aphids at the delayed dormant period of the apple Tree.	...		469
70. Studies of Arsenical Injuries and Correctives.	...		468
71. Woodpeckers of New Jersey	...		470
72. Some Phases of Nitrogen Metabolism in <i>Polyanthus Narcissus</i> .	...		472
73. Spring grains in New Jersey	...		473
74. Effect of alkaline substances on sewage sludge digestion.	...		474
75. A Standard for Estimating the Twig growth of one-year old Peach Trees.	...		475
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78. Analyses of Commercial Fertilisers, Fertiliser supplies and Home mixtures for 1928.	...		479
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80. Analyses of Commercial Fertilisers and Ground bone, analyses of agricultural Lime, 1928.	...		481
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88. Studies on Raritan River Pollution, 1927-28	...		489
89. The Permanent Pattern in dress	...	New Jersey Agricultural Extension Bulletin	No. 69
90. Cloth Covered Cold Frames	...		70
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97. The Feeding rate of the Australian, Lady beetle (<i>Rodolia Cardinalis</i>).	...	Reprint from J.A.R. Vol.	41—No. 3—K. 211
98. Parasites of the Oriental Peach Moth in North America.	...	Reprint from J.A.R. Vol.	41—No. 5. K. 213
99. The Absorption of the Anions of acid dyes by soil colloids.	...		H. 18

D. MISCELLANEOUS PUBLICATIONS, LEAFLETS, CIRCULARS, Etc.

100. Breeding and Rearing of Cattle and Buffaloes	...	Madras Agricultural Department Leaf No. 31	
101. Index to the Literature of Food Investigation	...	England Scientific and Industrial Research Department Publication.	
102. Castor-oil bean in Linseed cake	...	England Royal Agricultural Society occasional notes.	
103. Farm Yard Manure and other general Manures	...	Cyprus Gazette No. 2092	
104. Cotton Boll Worms	...	Agricultural Supplement No. 28	
105. Principal Varieties of Garden Vegetables approved for Registration.	...	Cyprus Gazette No. 2098, Agricultural Supplement No. 29	
106. The Improvement of Burnout lands in South Saskatchewan.	...	Canada Agricultural Department Pamph. No. 111	
107. The Care of Milk in the Home	...	" " 114	
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(a) The Increased Significance of Fire-hazard on the Farm to-day.	...	Ottawa Agricultural Department Eastern and B.C. Edition No. 49	
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(e) Fertiliser formulæ in a three years' rotation of Potatoes, Oats, and Hay.	...		
(f) A new Storage rot of Potatoes	...	" Publication " 49	
(g) Storing of fruits, vegetables, and tender plants.	...		
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112. Horticultural Exhibitions	...	U.S.A. Agricultural Department Publication No. 85	
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115. Directory of Officials and Organizations Concerned with the protection of birds and game, 1930	...	" " 92	
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117. Methods and Procedure of soil analysis	...	U.S.A. Agricultural Department Circular	
118. Raising the Dairy Heifer	...	No. 139	
119. Small Trees Wasteful to cut for saw timber	...	" Leaf 14	
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123. Cockroach Destruction in Buildings	...	Wisconsin Agricultural Department Circular No. 238	
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126. A Device for determining the texture of Peach fruits for Shipping and Marketing.	New Jersey Circular No. 212	
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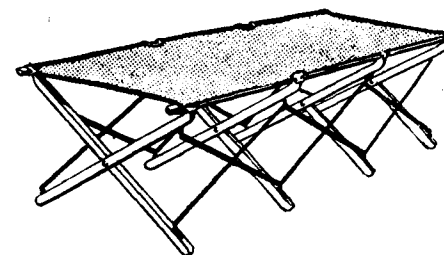
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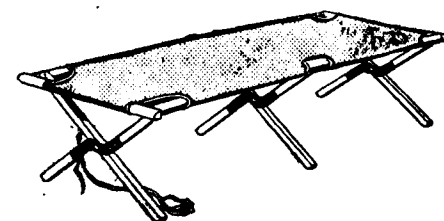
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