Madras Agricultural Journal

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

Vol. XX] SEPTEMBER 1932 [No. 9

CONTENTS

A NOTE ON THE ONGOLE BREED OF CATTLE

BY R. W. LITTLEWOOD N. D, A.,

Deputy Director of Agriculture, Livestock, Hosur Cattle Farm.

This breed is regarded as a dual purpose one. The bulls are used for work purposes in most of the districts, north of Madras, as far as Vizagapatam and Kurnool and Bellary Districts and the cow is one of the chief sources of the Madras City milk supply. From enquiries made, it is estimated that about 2500 cows of this breed are imported into Madras City each year from the breeding tract, some are returned to the tract again when dry and others are sold to the butchers. The Ongole cow yields on the average about 2500 lb. milk in a lactation in Madras. The Ongole Cattle Farm was opened in 1918 for the purpose of building up a pure herd of these animals which would calve regularly, produce good bulls for breeding purposes in the District and cows with a good average milk yield. In the beginning, 48 cows were purchased from the breeding tract. Some were disposed of at different periods for various reasons and the number was reduced to 25. During the last ten years, particulars have been worked out regarding the milk yield of the foundation stock and their progeny with the following results :—

I. The average yield of milk of the various classes :—

(a)	Foundation stock	2674·1 lb.	
	Daily average		9·8 lb.
(b)	Cows purchased with dams ...	2731·7 lb,	
	Daily average		9·1 lb
(c)	Farmbred cows with over 2 lactations	3526·4 lb.	
	Daily average		11·5 lb.

Farmbred show an increase of 852 lb. milk in a lactation with a daily average increase of 1·7 lb. per cow.

The average yield of farmbred stock, even including cows with one or two lactations is 3335·8 lb. and a daily average of 11 lb.

II. The average maximum yields is as follows :

(a)	Foundation Stock	3714 lb.	
	Daily average		11·6 lb.
(b)	Cows purchased with dams ...	3526 lb.	
	Daily average		10·5 lb.
(c)	Farmbred cows (over 2 lactations, ...	4047 lb.	
	Daily average		12·6 lb.

Farmbred show an increase of 332 lb. milk with a daily average increase of 1 lb. per cow,

III. The highest individual yield in a lactation is:—

(a)	Foundation cows	5422 lb.	
	Daily average		14·1 lb.
(b)	Cows purchased with dams ...	4504 lb.	
	Daily average		12·5 lb.
(c)	Farmbred cows	*6224·5 lb.	
	Daily average		25·6 lb.

On this station 8 cows have yielded over 5000 lb. milk in a single lactation and 11 cows have yielded between 4000 and 5000 lb. milk in a single lactation,

IV. The best average milk yield in each class:—

Purchased cow	3761 lb.	
Daily average		11·5 lb.
Cow purchased with dam... ...	3313 lb.	
Daily average		10·3 lb.
Farmbred cows	4995 lb.	
	4885 lb.	
	4838 lb.	
Daily averages		15·5 lb.
		16·5 lb.
		16·3 lb.

V. The average dry period omitting abnormal cases:

Foundation cows :	177 days.
Cows purchased with dams. ...	181 days.
Farmbred cows.	147 days.

* This animal is still in milk and averaged 21·3 lb. last month

VI The average age at which a heifer calves is 3 years 3 months ; the average weight of the calves are :—

Bull calves.	...	...	65½ lb.
Heifer calves.	...	...	60 lb.

In April 1932, 38 2 Ongole cows at the Chintaladevi Livestock Research Station averaged 14 lb. milk per day per cow.

VII. The average number of calvings for 15 old cows, 14 to 17 years of age is 8·5. Milk yields in general show an increase from the third lactation onwards; five cows gave their highest yields in their seventh lactation and three in their fifth. On the average a calf is produced every 16 months.

The female stock in the District is much neglected and usually takes the last place as regards feeding and attention. For instance, a ryot devotes his special attention to his work cattle, next to these come his bull calves which he is rearing, next the cows suckling bull calves and lastly his dry cows and heifers.

The rearing of dairy heifers is generally in the hands of the poor class chiefly *Malas* ; these people are usually the field labourers and weavers as well. They select one or two promising heifer calves from the ryots' herds, two to three months after they are weaned, generally at the age of about 12 months. The system of purchasing is usually, the Mala selects a calf and either purchases it outright, or on stipulation such as face value plus a certain amount of the profit when the animal is sold, or the family agrees to do a certain amount of work at the time of the cultivation season for the ryot. The calf is reared carefully and generally attended to by all the members of the family, the number of calves reared vary with the size of the family. The females collect grass in their spare time or obtain fodder from the ryot as part wages whilst returning from work. A sufficient quantity is collected and stored in the harvest season when they assist the ryots in harvesting. This is supplemented with grass which is collected. It is fed in small quantities regularly along with some *Variga Pottu* (Grain husk) and the washings from the kitchen. The heifers come to heat through good and regular attention from the age of 30 months and onwards. Promising animals pass several hands with a little profit to each. As soon as the Mala sells, he goes and purchases another animal with the money. In some cases these people walk many miles in search of a good heifer. When the animals are nearing parturition, they are purchased outright by dealers and when a sufficient number are procured, they are sent to Madras as milch animals. Some of these after they go dry in Madras are sent back to this District again to be maintained until they calve again. The maintenance charges one or two years ago were from Rs. 6 to 8 per month and a turban or cloth was given to the Mala when the animal calved and was taken back.

The Ongole cattle on the whole have poor horns and they have not a characteristic shape like breeds such as the Kangayam and Alambadi. Amongst the work cattle in the tract itself all sorts and sizes of horns are seen. The horn in the bull is short and stumpy and in several instances it is inclined to be slightly loose but is not noticeable until shaken by the hand. Several experts have been consulted regarding this but they were not able to throw any light on the subject; the late Imperial Dairy Expert (Mr. Smith) stated that loose horns are common in the Hariana and Kistna Valley breeds of cattle and these are very similar in type to the Ongole and he concludes that this is due to years of domestication. Loose horn is very common in the Saniwal breed of cattle also. In any case both in his and the writer's opinion, this is a minor fault if the cow is otherwise of the proper type, is a regular breeder and a good average milker. In the West in judging animals, little or no notice is taken of the horn. In the judging scale of points, one mark is allotted for horns out of 100. Records have been kept of matings of animals, bulls with tight horns have been mated to cows with tight horns; in some cases, the progeny have tight horns and in others, loose horns. Bulls with loose horns have been mated to cows with tight horns; some of the progeny have tight horns and others loose horns. Loose horns have been noticed in some of the Ongole heifers at Hosur at the age of 2 years and they have become tight at the age of 3 to 3½ years.

The foundation cows and bulls were purchased before the writer took up his duties in India in 1921. They were purchased by his predecessor from the breeding tract, nothing was known of their ancestry and one had to wait and see the kind of the stock bred to these animals. Weeding out of irregular breeders, poor milkers and poor types continued each year. This is very slow work, it takes four years or more for each generation and faults cannot be rectified all at once. Lime and bonemeal were fed to all the cattle and yet some bulls reared on the farm had slightly loose horns and in some cases split horns. Loose horn is seen amongst cattle in the tract. If this is hereditary, it will take a very long time to breed it out of the stock. A cow which is of a good type, a regular breeder and a good milker cannot in my opinion be discarded simply because one or both of its horns are slightly loose, if shaken by hand.

Even in another part of this Presidency (Tanjore District) which is two or three hundred miles from the Ongole tract, there is a breed of cattle known as the "Southern Breed"; they are similiar to a small type of Kangayam. All the ryots in this tract dehorn their bull calves when they are a few weeks old by branding the horn bases with a red hot iron and this stops the growth of horn. The reason for doing this is that they can control their animals much better if they are hornless and the writer agrees with them. It is thus seen that

opinions regarding horns differ within a distance of two to three hundred miles in this Presidency alone.

The Government Agricultural Chemist suggested the feeding of Sulphur to some young bulls with loose horns but this has had no effect. It is not a question of the growth of the horn itself but of the boney core inside the horn, this does not grow and the horn becomes slightly loose.

A STUDY OF THE WATER OF THE WELLS OF THE CENTRAL FARM, COIMBATORE

By C. RAGHAVENDRACHAR, B. Sc.,

Assistant to the Government Agricultural Chemist.

As an introduction to a detailed study of the variations in the water table and composition of the well waters in the Central Farm, Coimbatore, as influenced by season, the nature and number of underground springs, the composition of the lower strata etc., a preliminary analysis of samples of water taken from 14 wells in the Farm area was made with a view to determine the chemical composition of the total solids dissolved in them. As this has provided interesting information showing the great variation between wells situated in the different parts of the Farm, it has been proposed to present here the analytical data obtained.

Samples of water from the different wells were taken on the 7th October 1931 and numbered from 1 to 14-A. Sample 11 was taken from the well proper (in the cotton station) and 11-A from the bore hole. Similarly Sample No. 14 represents the top spring and 14-A the bottom of the Farm Yard Well. The different samples were taken from the wells as shown below:—

Sample No.	*Place taken from.*	
1.	Well in F. No.	76.
2.	,,	77.
3.	,,	68. (Students' Block)
4.	,,	Brickfield.
5.	in Field No,	59.
6.	,,	57.
7.	,,	50. (Sweepers' Quarters)

8.	„	38.
9.	„	near Insectory.
10.	„	No. 5 (Old Wind Mill.)
11.	„	in Cotton Station.
11-A.	„	„ (Bore Hole).
12.	„	with new Wind Mill.
13.	„	in the Botanic Gardens.
14.	Farm Yard	Top Spring.
14-A.	„	Bottom of the Well.

The samples have been analysed and tabulated. The analytical figures are given in the table below. Considering the total solids, sample 7 (Well No. 50) shows the very high figure of 0·6 per cent. of total solids; perhaps the level of this well and its history regarding baling of water may throw some light on this, or the water bearing strata near this well also might be saline. When there are two springs at different levels feeding the well, as could be seen in sample No. 11, 11-A and 14 and 14-A, the top spring is more saline,

Taking the (percentage) composition of the total solids sample No. 7, which is the most saline has got a low percentage of CaO plus Mgo. This is associated with the high pH of the water which probably precipitates most of the calcium and magnesium salts. The increase in the salinity is due to the sodium salts.

Samples 11 A and 14-A which are both from deep springs have got 20·9 and 18·3 per cent. respectively of CaO plus MgO indicating that deeper springs contain more of Ca and Mg salts which brings about temporary hardness of the water in this area. Samples 1, 2 and 7 show that an increase of pH brings about a lower concentration of CaO and MgO in the total solids.

Grouping the samples from wells adjacently situated to one another, as (a) 1 and 2, (b) 3, 4 and 5, (c) 8, 9, 10 and 11 (d) 12 and 13, it is seen that the amount of CaO and Mgo per cent. in the respective groups are: (a) 8·6 to 8·8 (b) 15·5 to 16·1, (c) 12·9 to 13·8 and (d) 17·1 to 17·3. It would therefore be seen that the sum of CaO plus Mgo per cent, is more or less the same for the wells situated in the same area.

Results of Analyses of the Waters of the Wells in the *Central Farm, Coimbatore.*

(Amounts in Grams per 100 c. c. of Water).

Heads of Analysis	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	11-A.	12.	13.	14.	14-A.
Total Solids.	0·1103	0·1826	0·1217	0·1273	0·1506	0·2677	0·6194	0·1532	0·1894	0·1456	0·1304	0·0915	00·1398	0·0771	0·1923	0·1665
$CaCO_3$	0·0096	0·0136	0·0204	0·0177	0·0223	0·0373	0·0132	0·0202	0·0246	0·0166	0·0162	0·0202	0·0214	0·0250	0·0243	0·0318
$MgCO_3$	0·0088	0·0155	0·0172	0·0228	0·0226	0·0120	0·0242	0·0199	0·0253	0·0199	0·0184	0·0182	0·0255	0·0218	0·0270	0·0264
$MgSO_4$	...	...	...	...	...	0·0325	0·0586	...	...	...	...	...	...	0·0178	0·0035	...
Na_2CO_3	0·0166	0·0280	...	0·0037	...	...	...	0·0135	...	0·0148	0·0165	0·0063	0·0028	...	...	...
Na_2SO_4	0·0206	0·0367	0·0168	0·0215	0·0265	0·0275	0·1141	0·0236	0·0374	0·0239	0·0173	0·0128	0·0239	0·0065	0·0452	0·0269
NaCl.	0·0604	0·0831	0·0602	0·0597	0·0707	0·1316	0·4010	0·0643	0·0900	0·0597	0·0440	0·0269	0·0636	0·0953	0·0895	0·0726
pH.	8·3	8·4	7·9	8·0	7·6	7·4	8·4	8·0	7·6	8·0	8·2	7·9	8·0	7·8	8·0	7·6

Percentage Composition of the Total Solids.

$CaCo_3$	8·7	7.5	16.8	13·9	14·8	14·0	2·1	13·2	13·0	11·4	12·4	22·0	15·3	14·1	12·7	19·1
$MgCO_3$	8·0	8·5	14·2	17·9	15·0	4·5	3·9	13·0	13·2	13·7	14·1	19·9	18·3	12·3	14·1	15·9
$MgSO_4$	...	...	...	...	...	12·20	9·5	...	...	...	...	...	...	10·0	2·0	...
Na_2CO_3	15·0	15·3	...	2·9	...	...	...	8·8	...	10·2	12·7	6·9	2·0	...	...	...
Na_2SO_4	18·7	20·0	13·8	16·9	17·6	10·30	18·5	15 4	19·7	16·4	13·3	14·0	17·1	3·7	23·5	16·2
NaCl.	55·0	45·5	50·0	47·0	47·0	49·2	65·0	42·0	47·5	41·2	33·7	29·4	45·5	54·0	47·0	43·6
CaO	4·95	4·16	9·4	7·8	8·3	7·82	1·19	7·4	7·3	6·4	7·0	11·8	8·6	7·9	7·1	10·7
MgO	3·65	4·65	6·75	8·55	7·25	6·25	5·20	6·2	6·4	6·5	6·75	9·1	8·7	9·25	7·3	7·56
Total of CaO & MgO	8·6	8·8	16·1	16·3	15·5	14·1	6·4	13·6	13·7	12·9	13·8	20·9	17·3	17·1	14·4	18·3

SUNNHEMP (*CROTALARIA JUNCEA*) FOR GREEN MANURING IN COIMBATORE WET LANDS

BY A. CHIDAMBARAM PILLAI & GULAM AHMED,

Farm Managers, Paddy Breeding Station, Coimbatore.

The wet lands represented by the Paddy Breeding Station, Coimbatore, grow a single crop of paddy of about 5—6 months' duration in the year and it is rotated with either sugarcane or plantains in a 5 to 6 course rotation. The water supply in the channels lasts for about six months, July to December, and as the plantain and sugarcane crops remain on the land for nearly a year, this supply has to be supplemented. It is a common feature of these lands to have a well, one in a block of 5 to 6 acres and water is lifted by mhotes to irrigate these crops in the hot weather. There are four such wells in the Paddy Breeding Station and it was considered an attempt might be made to see if any garden crops could be grown successfully on the lands after the harvest of paddy between February to June. Crops like groundnut, ragi, gingelly, fodder, cholam (sorghum) sunnhemp, *pillipasara* (*Phaseolus trilobus*) and some pulses were raised on a small scale in the hot weather of 1931. This note explains the experiences gained in such an attempt, particularly with the growing of a sunnhemp crop. It may be stated here that none of the other crops tried was an economic success. The cost of lifting water from the wells formed such a big item in the cost of cultivation, that it by itself, covered the value of the produce obtained.

Cultivation. It is always a problem to get the paddy lands to a good tilth for the summer cropping. The usual practice adopted in the neighbourhood of the station is to wait for the lands to dry up completely after the paddy havest, flood the fields once again, and plough them at the right time after a certain stage of drying. This practice has been adopted at the Paddy Breeding Station whenever the land had to be prepared for some summer crop. Sometimes a soaking rain would dispense with the necessity of irrigating the fields before ploughing. An iron plough of the 'Hindoostan' type has been found to do the work quite satisfactorily for the first ploughing. Two or three more ploughings with the ordinary country plough get the land to a good condition to receive the seed.

Sunnhemp. In the land prepared in the above manner sunnhemp seed was sown broadcast at the rate of 50 lb. to the acre, covered lightly by passing the country plough and irrigated. The sowings were done in two batches one on the 4th May (1·18 acres) and the second, one month later on the 6th June (0·32 acres). The germination was good and the land was soon covered with a vigorously growing crop. Later irrigations, three in all were given to supplement the

rainfall which amounted to 5·62 inches for the periods, April to middle of August. In about three months, the crop had grown to a height of nearly five feet and was ready to be cut and used as green manure. Taking both the sets of sowings together the cost of raising the crop per acre amounted to:—

		Rs.	As.	P.
1.	Preparatory cultivation	16	7	0
2.	Cost of seed	3	2	0
3.	Cost of irrigations	16	6	0
4.	Cost of cutting the crop	4	15	6
	Total Rs.	40	14	6

The total produce of green leaves obtained worked out to 39,000 lb. per acre or about 950 lb. of green leaf to every rupee spent on cultivating the crop.

It is usual with the wet-land cultivation of the tract to green manure the paddy crop every year. The ryot usually applies green leaves brought from outside buying it at the rate of 4 annas per bundle of 50 lbs. The usual rate of applying the leaf being 1,500 to 2,000 lbs per acre he spends about 8 to 10 rupees for green leaf. The Coimbatore ryot does not require to be told about the efficacy of applying green leaves to his paddy crop and it is the prohibitive cost of the leaf that makes him limit the dose of application.

Moreover in the case of a three month old sunnhemp crop the leaves and stems are so succulent that they readily decompose in the puddled field unlike the miscellaneous leaves brought as head-loads which more often contain plenty of undecomposable wood than of leaves.

Even if the farm figures obtained in 1930–31 be taken as unusual and extraordinary, an yield of 24,000 lbs. of green leaves from an acre of three months old sunnhemp crop can be easily expected. This quantity of 24,000 lbs. obtained from an acre should be enough to manure 6 acres of land at 4,000 lbs to the acre and this would not cost more than 6 to 7 rupees per acre.

Pillipasara (*Phaseolus trilobus*) is another green manure crop that has been tried in the Paddy Breeding Station recently but under Coimbatore conditions it does not appear to be capable of giving such a heavy tonnage of green leaf as sunnhemp in such a short period as three months. Sowing it in the standing crop of paddy just before it is harvested, a practice in vogue in the Godavari delta, will be tried, so that it will remain sufficiently long in the field to give a bigger tonnage of green leaves.

With the experience obtained in 1930-31, the sunnhemp was raised for green manuring purposes in 1932 summer as well. Unlike the previous year the rains were more timely with the result that there

was no necessity for any irrigation. The cost of cultivation on this account was cansiderably less than that of the previous year namely Rs. 55—13- 4 per acre. The green leaf obtained worked out at 36,436 lbs. per acre in 2½ months' time or 1410 lbs. per rupee spent on cultivation. In this case, the sunnhemp was pulled out instead of being cut and hence the entire plants including the roots were included in the weightage. If the crop had been pulled out in the previous year, the yield might have gone up by one-fifth more and the production per rupee might be 1150 lbs. instead of 950 lbs.

PRACTICAL AGRICULTURAL CO-OPERATION *

By Mr. K. UNNIKRISHNA MENON, Dip. Agri.

Deputy Director of Agriculture, IV Circle, St. Thomas Mount.

As I have been studying co-operation with particular reference to agriculture I am here attempting to place before you some of my views on the subject. My claim as an outsider to speak on co-operation before an audience of co-operators is the fact that that the man in the forest can see only trees, whereas the man outside can see the forest as a whole. Before coming to the point I shall attempt to describe the present position of co-operation in this country in the broadest way possible and contribute my mite by way of suggesting methods for improvement.

In the history of any organization a few definite stages of growth can be noticed. With a number of enthusiasts who do propaganda work in favour of a movement and under their guidance new organisations are started as the first step in their existence. Secondly, there is a period when people are busy forming organizations and their number easily mounts up. Good reports commenting on the encouragingly large number of organisations formed during the period please the public as well as the Government. This is followed by a third period of working difficulties due to practical inaccuracies in the programme of work forecasted for the organisation to follow. The original scheme was probably suited to the conditions which were available at the outset when the propagandist studied the question. There must have been some changes, as a result of which the needs of the country and the population must have undergone considerable change. Later on comes the more difficult and annoying period of stagnation which is marked by inactivity. The next stage is one of fear of the authorities that helped the formation of the organisations as to whether they are any good or can serve any useful purpose, and so forth.

* Paper read before the North Arcot District Co-operative Conference in May 1932, held at Pallikonda.

It will be evident to them that these organisations can do little, and the question of winding them up will then be looming large in their minds.

This is the economic principle on which all organisations in this world have been found to work and I fear that it will be unnecessary for me to explain to you now as to the stage in which we stand with regard to the co-operative societies in this country. Therefore, without commenting upon this aspect of the question, I directly come to consider as to how an organisation can continue to remain useful to the public even though it was instituted scores of years ago. What I would consider necessary for an institution to live long and be useful to the public is that its organisers must study the changing conditions of the country and the needs of the people who are members of the organisation and adopt changes in the scope and work of the organisation. Any organisation which is prepared to expand according to the changing needs of the people for whose benefit it is formed cannot fail to become useful. For this purpose again, we have to consider as to what the members of these organisations want them to do as different from what they have been doing hitherto. Putting these questions side by side with the directions in which the organisations should expand, we shall be able to get at the solution of the difficulties which present themselves in our co-operative movement of the present day. I leave this question more for the kind consideration of the co-operators before me for solution, with special regard to the needs of the particular society or union which has deputed them to this conference. However, I shall make some suggestions of a practical but general character.

Co-operation was worked as a purely credit movement in the rural areas with a fair amount of success at the beginning. Later on, it fell into inactivity. A condition of stalemate was created by the large overdues and the panchayat not being bold enough to take any action. This is a proof to show that it has failed to function as a pure credit movement.

The society with overdues is considered to be a bad society. It has to be reconstructed. We have to look at the causes as to why the overdues accumulated. In general terms the people may easily attribute it to the inefficiency of the managing committee, but the members can easily find out the special reasons which contributed to it in each case and end or mend them as far as possible. The cause of the overdues is generally found to be that the loan was not used for productive purposes so that the borrower might become financially stronger to be able to pay back the loan. Even the worst usurer in the country has been found to help his client with additional loans when he realises that the debtor is a man of character and that by only helping him with additional loans that he can enable him to

pay back the money which is long overdue to him. Taking the cue from the village banker, the societies have to help the members with further loans in order to strengthen the financial position and more particularly see that they utilise the present loan entirely for productive purposes. Therefore, what may be necessary in the case of co-operative societies will be to find further funds for giving cheap credit to the member suffering from overdues, provided that the man has character. Such may be special loans for special purposes given with due regard to the purpose for which one must use the loan. The return of such loans with interest in moities or as a whole in due time must be very vigilantly looked for and effected. If things are arranged by the society to do so, the overdues can be slowly reduced.

The Townshend Committee found out that the overdues were due to short term loans having been used for long term purposes. This Committee, as well as the Royal Agricultural Commission, were not well satisfied with the kind of supervision exercised on the societies The educative work done in the rural areas was found inadequate and the Provincial Union deputed a number of gentlemen to do propaganda work very recently. When I had occasion to speak to a fairly enlightened co-operator, he was not able to understand that a co-operative loan is money borrowed by a member from his own assets. The full significance of the term unlimited liability was not understood by most members until the liability of a society was actually demanded from the more well to do out of them. Such being the state of affairs one can hardly think that supervision of the work of a society or societies can be very efficient if done by the ordinary run of members of the rural credit society. More educative propaganda of an intensive nature is evidently needed, while the closer examination of the purpose of a loan must yet be done by some uninterested agency. As rural credit is mostly meant to finance cultivation, I mean to emphasise that the supervision must be done by one who has a full knowledge of the life and requirements of a farmer. From our old experience we have to see that the supervision must be more liberal but accurate. This is a difficult one. Unless we are able to carry out this in the best way the economic progress of the villager which is the aim of the co-operator as well as the agriculturist cannot be effected. Without improving the economic position of the villager we cannot expect him to clear the overdues. The chief productive work for which a society may finance a member of the village is agriculture, and in the fitness of things it devolves on the members of the staff of the Agricultural Department to examine the purpose of the loan and give the society and the party who takes the loan sound advice on the economic aspect of it and how best it can be utilised. The Director of Agriculture, Mr. S. V. Ramamurthi I. C. S. aptly puts it as "prevent the co-operative

hen laying infertile eggs by fertilising her with agriculture, when the eggs she lays will lead to chicken and further multiplication of life". I have got a full staff of agricultural graduates who have been studying the economic life of the farmer and I believe that none else can be more competent to do both the educative propaganda work and a close examination of the purpose of such loans. If you, as co-operators are prepared to try the experiment with a few societies in each taluk, I shall be glad to offer the services of my staff for the purpose so that our joint work may bring about more satisfactory results.

It is found difficult to get a gathering or a quorum to hold a general body meeting in a society. This is due to the lack of interest on the part of the members in the affairs of the society, which in other words means that the society is not functioning in such a way as to benefit the members. This is a practical proof of the statement I made at the beginning. Therefore, the society must form the organisation of the village for various other purposes which are now found necessary for the villager as a result of the change in his outlook. Whatever is useful of the new ideas and informations for the progress of the villager must be made available at the society centre, such that the villager must be satisfied by the fact that the society is worked entirely for his benefit. If such a feeling is created in the minds of the members, no co-operative society can become unpopular. The practical working aspect of it may come to mean that the society must be almost a rural reconstruction centre of the village. It may have to function as an agricultural improvement society to work up the economic advance of the villager besides attending to health, education, sanitation, medical aid, etc. of the village. The society may be required to go so far as to take up the question of settling disputes of all kinds in the village. In order to effect the joint purchase of the requirements of the village and the co-operative sale of the produce, the society will have to function as a trading body. The society may have to serve the village even as a news agency, since the villager of the present day is found interested even in such affairs as the Sino-Japanese relations. If there should be a separate institution for each one of the above items of work it will make matters very complicated with sometimes conflicting interest that may paralyse work and progress.

THE ORGANISATION FOR ENTOMOLOGICAL RESEARCH IN THE UNITED STATES OF AMERICA

By M. S. KYLASAM, B.A. (Hons.),

Assistant in Entomology, Agricultural Research Institute, Coimbatore.

In this note an attempt is made to give a picture of how entomological research is being carried on by the Bureau of Entomology in the U. S. A. That the importance of research in this direction has

been sufficiently recognished is well certified by the considerable sums spent in the investigation of special problems in the fight against insects. The annual appropriation for the Bureau of Entomology is about (dollars) 20,55,058 which roughly comes to 60 lakhs of rupees. The Bureau of Entamology grew up into the present huge organisation from a very humble beginning; in 1884 it consisted of one chief entomologist with 4 assistants and the total appropriation for the staff was dollars 2000 for the staff and dollars 5000 for the world. Their chief work then was the study of pests on citrus and other fruit trees. Silkworm rearing also formed a part of their activities. Whenever a pest report was received an assistant was sent to the spot to make observations on the spot. But with the organisation of experimental stations in 1888, special investigations were undertaken in the stations among other items of work. The formation in 1889 of the Association of Economic Entomologists and the installation of a new insectary with the then most approved arrangements formed a great advance in the field of Entomological Research.

The Bureau of Entomology made rapid studies both in the activities and organisation under the guidance of Dr. L. O. Howard, who, as the chief entomologist, was a dominating figure in the field of Economic Entomology for over 33 years. He retired in 1927 and was scceeded by Dr. Marlatt who is now the chief of the bureau.

Activities. Research activities are chiefly directed towards the solution of economic problems in Entomology. It includes the study of insects injurious to crops and crop products and the development of methods for eradication or control of insects affecting the health of man and livestock and insects infesting human habitations or injurious to industries, of beneficial insects that are of direct utility and others that could be utilized in the control of insect pests. The field work of the Bureau is largely carried on with the help of field laboratories of more or less temporary character where the expert worker is in touch with the centres of activity of the injurious species of insects. The investigations cover control methods of insect, control through the ultimate study of the life of the insect in relation to the farming method. Where favourable, the cultural practices are varied to minimise the insect damage. Insect parasites and other natural enemies of imported insect pests are studied, imported, and established and by this means control of a foreign pest is brought about. Technical, mechanical and chemical methods of control are studied and developed including spraying, fumigation of orchards and trapping methods and other means of mechanical destruction. Plant quarantine and control are efficiently carried out to prevent introduction of new and dangerous insects pests.

The Bureau of Entomology has the largest organisation in the world for investigation and research on insect pests. On January

1929 it was actively engaged on 76 major projects, in the investigation of at least 500 insects known to be injurious to agriculture. The entomological activity of the Bureau are classified under the following groups:—Investigation on (1) Deciduous fruit insect. (2) Cereal and forage insect. (3) Insects affecting cotton. (4) Forest and shade tree insect. (5) Truck crop insects. (6) Bee culture. (7) Stored product insects. (8) Tropical, sub-trapical and ornamental plant insects. (9) Insects affecting the health of man and animals. (10) Insects (11) Bioclimatic studies. (12) Insect morphology. (13) Insect morphology studies. (14) The exchange of useful insects and (15) Insect pest survey.

Organisation:—The employees of the Bureau of Entomology are nearly all in the classified civil services; the total classified personnel on March 1930 amounted to 575 in addition to the temporary unclassified field employees. Field stations are established whenever there is a necessity and are changed from time to time. There is usually one entomologist with a few assistants to attend to each unit of work in a field laboratory. Each local station is organised to conduct work on definite, concrete problems. Each division has its own full organisation with its own particular sub-station established where the work is needed, the stations of one division being independent of those of another. There are altogether over 600 fields stations All the administrative and scientific research work of the Bureau is under the direction and supervision of the chief of the Bureau and he is assisted by associate chiefs.

Just to give some idea of the nature of the organisation a list is presented showing the personnel under the Deciduous Fruit insect investigation with their salaries. Each of the 15 divisions more or less carry a similar personnel.

Deciduous fruits insect investigation:—

	No.		*Salary per annum.*
(1) Entomologist in charge	1	dollars	4000
Associate	1	"	3000
(2) *Orchard insecticides section*			
Entomologists	1	"	3600
Asst. Entomologists	2	"	5000
(3) *Orchard insect survey*			
Entomologist	1	"	3200
(4) *Apple insect section*			
I. *Field laboratory*, Bentonville.			
Entomologist	1	"	4000
" Junior	1	"	2000
II *Field laboratory*, *Vincennes*			
Entomologist	1	"	4800
" Asst.	1	"	2600

III. *Field laboratory, Sligo*			
Entomologist	1	,,	4600
Associate	1	,,	3200
IV. *Field laboratory, Urichita*			
Entomologist.	1	,,	3400
V. *Field laboratory, Yakima*			
Entomologist.	1	,,	4600
Assistant	1	,,	3400
(5) *Grape insects section.*			
I. *Field laboratory, Ohio*			
Entomologist.	1	,,	3400
(6) *Nut insect section*			
1. *Field laboratory, Albany*			
Entomologist.	1	,,	3400
II Field laboratory, Georgia	1	,,	2900
III. Field laboratory, French creek	1	,,	3400
(7) *Blue berry magot section*			
I. Field laboratory Cherryfield.	1	,,	2600
(8) *Japanese and Asiatic beetle section.*			
I. Principal Entomologist.	1	,,	5600
II. Insecticides investigating			
Entomologist	1	,,	3700
III. Biological investigating ,,	1	,,	3400
IV. Parasite investigating ,,	1	,,	4600
V. Foreign parasite investigating	1	,,	3600
(9) *Plant disinfection investigation.*			
I. Field laboratory, Moorstown	1	,,	3800
(10) *Peach insect investigation section.*			
Entomologist.	1	,,	4200

I feel it may not be out of place here to mention that the recent postings of Entomology research assistants to circles, to undertake definite problems pertaining to their own tracts, marks a definite advance in the expansion of entomological research. It is hoped that the direction and supervision of administration and scientific research work will be vested in the hands of the Chief Entomologist just as is being done by the Bureau ; the circle officers may not be in a position to give undivided attention to the progress of work, if the direction and supervision are transferred to them.

Acknowledgment—Materials for this paper are chiefly abstracted from Brrokings Institution publication " The Bureau of Entomology, its history, activities and organisation, 1930".

ABSTRACTS

Propagating sorghum by cuttings—H. E. Rea and R. E. Karper (*American Journal of Botany*, 1932, Vol. 19, pp. 464—476). The authors believe that propagation of sorghum by cuttings would prove useful for research workers and plant breeders in increasing rare sorghum selections, importations or hybrids. Experiments carried out with twelve types and varieties of sorghum and one variety of Indian corn show that these could be readily propagated from cuttings (especially from the many-node cuttings heeled in the open green house bed). The broom corn variety appeared to be best adapted to propagation by cuttings. The sorgo group showed considerable variation, while the grain sorghums produced the lowest precentage of satisfactorily rooted cuttings. (C. N.)

A. I. V. Silage:—Communication from the Imperial Bureau of Animal Nutrition, Aberdeen (*The Scottish Journal of Agriculture*, 1932, Vol. 15, pp. 252–261). This paper describes the patented method of Dr. Artturi I. Virtamen of Finland for making silage without any appreciable loss of the nutrients (called the A. I. V. method for silaging). This is based on the fact that when the material to be silaged, is brought immediately to a pH of 5 or lower by the addition of acids (like hydrochloric acid), proteolytic and other enzymic decomposition is prevented and the material is preserved in almost its original condition. The paper gives full details for packing the silage in pit-silos and tower-silos, the amount of A. I. V. liquid to be used (10—12 lbs per ton green weight) and the choice of raw material for ensilage. In order to prevent the formation of mildew in the top layers, 0·001% of allyl mustard oil is added (one third of an ounce for a pit or elevator 16½ feet in diameter). The silage can be used after 2 months and is very much relished by cattle. Analysis of fresh timothy grass and the A. I. V. silage prepared from it showed almost the same composition, both containing about 14·8% crude protein, and 12% true protein on the dry matter (which was about 21% in both) showing very little loss by silage making. Feeding trials with cows gave an increased milk yield of 7% in favour of silage-fed cows, though the latter were fed with 56% less oil cake and 48% less oat meal than in the normal groups. About 90 lbs. A. I. V. fodder (containing about 20% dry matter) formed the daily ration for milk cows of average yield. The health of cows fed on A. I. V. silage was good, and the butter prepared had the rich yellow colour of summer butter. The cost of making the silage was the same, if not less than making hay. (C. N.)

Available plant food in soils:— New Bio-chemical methods of estimation.—A. M. Smith and R. Coull (*The Scottish Journal of Agriculture*, 1932, Vol. 15, No. 3, pp. 262–271). Methods for the determination of the fertilizer requirements of soils are of 3 kinds. (a) methods based on the chemical analysis of the soil (b) methods based on the response of the plant to application of fertilizers including an analysis of the plant and (c) bio-chemical methods involving a measurement of the biological activity in the soil. The authors consider that the first two methods involve special laboratory facilities and apparatus. and hold the third method to be more convenient for routine determinations. They describe a plate count-method for measuring the growth of the nitrogen fixing organism *Azotobacter Chroococum* in the given soil medium and a gravimetric method for measuring the growth of the mould fungus *Aspergillus niger* in the soil medium—the principle in both cases being that the limiting nutrient of the soil for plant growth (potash or phosphorus) is also the limiting factor for the growth of the lower organisms. Comparisons are made in each case between the soil taken as control and samples of soils to which K_2O or P_2O_5 have been added; and from the increased growth of the organisms, the fertiliser requirements of the soil are inferred. The authors find good agreement between the biological methods and other standard methods e. g., Neubauer's. (C. N.)

Further Experiments in Electro-farming:—S. S. Nehru (*Bulletin No. 61 of the Dept. of Agri. United Provinces*). These experiments are in continuation of those reported previously in Bulletin No. 52 of the Dept. of Agri. United Provinces, and aim at demonstrating the beneficial effects of electro-magnetic currents on plant growth and the practicability of the methods recommended. The author has compared six different methods of applying electrical energy to plant growth viz., (a) high tension spark at 500 volts; (b) planting in radio-magnetic bed with a cradle of wire netting in contact with a long radio aerial with a view to capturing magnetism and transferring it to the bed; (c) enclosing in a magetic collar i. e., a small horse-shoe magnet, with cover; (d) connecting with a wireless aerial by placing the pot in a wireless aerial jacket placed over an insulated stand (e) placing in a radio-magnetic bed; the pots are placed over fhe wire netting on a metal plate. (f) X-ray treatment. The growth of various flower plants, straw-berry, cotton, barley, various hill crops, cereals, tomato and sugarcane as affected by the electrical treatments has been examined. Radio magnetic cradle treatment was found consistently efficient in accelerating growth; and its importance in hastening the growth and improving the yield of paying vegetable crops is emphasised, especially as the method is cheaper in cost of working, than the others. The pamphlet ends with selected criticisms of the method by Sir J. C. Bose, Senator Marconi, Dr. Drane and others. (C. N.)

Inheritance of lint colours in upland cotton—J. O. Ware (*Jour. Am. Soc. Agron* 1932, Vol. 24, pp. 550—562):—The author has crossed against the white-lint variety of upland cotton, four coloured lint varieties e. g., dingy-brown borne by the Algerian Brown lint variety; bright green, borne by the Argentine Green lint variety; yellowish brown, borne by the Nankeen variety; and rust-coloured brown, borne by the Texas Rust variety. It was found that the lint colour F1 generation of each cross was intergrade between that of the respective coloured parent and the white parent showing that the coloured-lint was incompletely dominant over white-lint. In the F2 generation, the crosses segregated in the Mendelian ratio into three classes (a) the coloured parental type, which is homozygous, (b) the white parental type, also homozygous, and (c) an intergrade coloured type, which split up again into 3 classes as did the progeny of the first generation. It is concluded therefore that in upland cotton, each of the four lint colours, rust, dingy-brown, yellowish brown, and green is a clear-cut monohybrid character and when crossed with its white allelomorph produces an intergrade lint colour type in the F1 generation and in the hetrozygous groups of all subsequent generations. It was also noted that fine silky texture of lint appeared to be completely linked with full green lint colour and coarse lint was dominant over fine lint. (C. N.)

Ensilage—(Arthur Amos and H. E. Woodman, *Bulletin No. 37 of the Ministry of Agr. & Fisheries*):—This bulletin intended to explain the chief methods of ensilage and render the process of "ensiling more popular in the British Isles than it is to-day," gives a good account of the different kinds of silage, and the conditions under which they are produced e. g., (1) "Sweet", dark-brown silage, produced when the temperature rises above 113°F, especially in stack-silage, the contributing factors being a comparatively dry crop, capable of producing more heat, intermittent stacking or ensiling, and exposure of the outside of the silage to air, as in stack silage, so that air can blow through the stack. (2) Acid, light brown or yellow-brown silage, generally found in tower-silos when packed with crops containing 25—30% of dry matter. The maximum temperature reached varies from 86° to 104°F. The silage has an acid though pleasant smell, due to the presence of acetic acid. (3) Green fruity silage obtained with crops of medium stage of maturity, the maximum temperature reached being 89°F. The silage has a green olive to olive green colour and a delicious smell, and is greedily

eaten by stock. (4) Sour silage, of a dark brown or olive colour and a pungent and very unpleasant smell due to the presence of butyric acid. It is formed when immature and succulent crops are ensiled which are closely packed, preventing rise of temperature and proper fermentation. (5) Musty silage, full of moulds due to the ensiling of over-mature crops and over-heating. Of these 5 kinds of silage, the authors prefer (2) and (3) and condemn (4) and (5). Experiments with oat and tare crops (with and without peas and beans) containing 26 to 34 % dry matter showed that acid-brown silage and sweet silage can be made in tower-silos with a loss of dry matter no greater than 8% of that contained in the green crop. In the case of "green fruity" silage, the loss is slightly greater, due to use of crop at an earlier stage of maturity containing 23 to 26% dry matter and consequent draining away of some of the juice: the loss in dry matter under favourable conditions amounts to about 9%. About the same degree of loss was also obtained in hay making. Feeding trials showed that well prepared silage had about the same digestibility as green fodder or hay in regard to dry matter, protein and carbohydrate. The oil fraction shows highest digestibility in the case of silage; digestion coefficient of the fibre is almost the same for silage and hay (57 to 58%), while it is lower for green fodder (47·6%). Actual feeding trials show a superiority in favour of silage and 6 lbs. of silage are generally equivalent to about 10 lbs. of root plus some hay. The authors give full details for the making of different kinds of soils like tower silo, clamp silo, stack silo, put silo etc., and of the different crops suitable for ensilage. (C. N.)

The Feeding of Dairy Cows (*Bull No. 42 of the Ministry of Agriculture and Fisheries*, London 1932, Price 9 d. net.):—This is a popular exposition of the important topic of the proper feeding of dairy cows and comes from the pen of Mr. James Mackintosh of the National Institute for Research in Dairying, Reading. The opening paragraphs deal with the principles of animal feeding like the nature of food constituents, digestibility coefficients, nutritive ratio etc. after which follows a brief exposition of feeding standards for maintenance and production of dry, in-calf and milch cows. The importance of mineral and vitamin supplies is stressed. The pamphlet is mainly intended for British farmers and its most valuable portion is contained in the later chapters, wherein the author deals with the suitable selection of rations from among the bulky foods and concentrates commonly used in England, with special reference to the nutritive ratio and the economics of feeding. Several bulky foods like hay, straw, roots, silage, sugar beet tops, potatoes and wet grains, are dealt with in detail and the concentrates are divided into three groups (I). Foods containing over 30% protein like decorticated and cotton cake meal, decorticated and undecorticated groundnut cake and meal, soya been cake and meal, linseed cake, sesame cake, dried yeast and fish meal; (II) Foods containing from 17 to 30% proteins like undecorticated cotton cake, palm kernel cake and meal, cocoanut cake, maize gluten feed, been meal, malt culms etc.; and (III) Foods containing below 17% protein and rich in carbohydrate (over 50%) like oats, barley, wheat, maize rice meal, tapioca meal, treacle etc. A number of selected rations are suggested for dry and in-calf cows and cows in milk. A useful feature is the addition of tables giving the average live weights and maintenance requirements of the different English Dairy breeds, the production standards per 10 lbs. in respect of milk of varying qualities, and the composition of the common bulky and concentrated foods in terms of dry matter, starch equivalents and protein equivalents.

A similar consolidated pamphlet giving details of the maintenance and production requirements of Indian Dairy breeds, and the average composition and digestion coefficients of feeding stuffs and fodders commonly used in India is an urgent desideratum. (C. N.)

Gleanings.

Effect of India's Sugarcane Policy on the Java Trade.— "India's action in directing fresh efforts to the enlargement of its output of white sugar has been interpreted in certain quarters as sounding the death-knell of Java's trade in that quarter. It is not so regarded by the proprietors of the Java Industry, although they appreciate that if the movement carries far enough it will result in a gradual reduction of their British Indian business. For the nearer future they hold, and this seems to be the sounder view, that the erection of modern factories in the interior of India is likely to result in a rapid expansion of local and internal demand for the products of these mills without greatly diminishing the demand in the principal ports for imported sugar. Thus, they anticipate the development of consumption in other parts of the Orient can be made to replace a gradual falling off in demand from British India. Nor do those who have in their charge the management of the Java sugar industry consider themselves eliminated as a factor in European sugar markets. They are content to look upon European business as the safety valve of their industry, an outlet for limited quantities unassimilated by their more important markets in the East, but to this extent they expect to retain their European trade" (*Facts about Sugar.* Vol. 27, No. 7, July 1932).

Bacteria Produce Vegetable Oils.—Bacteria that do the work of powerful pressing machines by liberating oil from Vegetable cells were described before a recent meeting of the American Chemical Society by Dr. John W. Backman. The newly discovered *Bacillus delbrueckia* attacks the tough cells of an oily vegetable, such as coconuts meats and by devouring the cell walls liberates the pure coconut oil which floats to the top of the vat, thus becoming available for industry's manifold uses at a lower cost than that incurred by any process involving mechanical pressing. The bacillus is obtained from brewer's malt. It is said that an infusion of this bacteria will remove all the oil from a vat of dry coconut meat in six days. The colour of the oil is said to be superior to that obtained by the usual pressure methods (A. E. B. *Scientific American*—August 1932).

Rubber Burned in British Grates. Raw rubber now selling for less than kindling wood is being used to light open fires in many British houses. Cut into strips, one pound of rubber costing about five cents (U. S.) will serve to kindle seven or eight ordinary fires. Although not generally realised, crude rubber burns easily without any offensive smell. The British owners of rubber plantation shares are encouraging the use of rubber in starting the coal fires of England in order to dispose off the excess of this material that has depressed the price below the cost of production.—Science Service. (*Scientific American*, August 1932).

Tea Tablets Exported From Java. The Bandoengsche Theefabriek (Bandoen Tea Factory), Bandoeng, Java, is now manufacturing and distributing Tea tablets. Exports of the new product are now being made to several countries, and the concern contemplates introducing them in the United States in the near future. The tablets are manufactured in two styles; sweetened and unsweetened. They are made of pulverized Broken Orange Pekoe. The tablets will remain in good condition for many months when kept in air-tight containers. The company states that one pound contains about 330 pieces, sufficient for the same number of cups. To make a cup of tea, one piece is placed in boiling water, and allowed to brew three to five minutes. The tablet dissolves immediately and the granulated tea settles at the bottom of the cup. The tablets are packed ten in a package in tin-foil with outside printed wrapper. For export, a chest contains 6,000 packages divided into sixty small boxes.—*Planter's Chronicle* August 13, 1932.

Brown Coal as Fertilizer. The use of brown coal (lignite) as a fertilizer has been investigated in practical trials by German chemists who find that the productivity of many plants, such as potatoes, tobacco, and others, can be increased by the addition of controlled quantities in the soil (says a report in the "Scientific American"). By the use of large quantities of lignite, however, growth is reduced because its acid nature restricts the reducing and absorptive power of the plant. This deleterious effect, however, can be lessened by treating the coal with ammonia first. Thermally inferior coals are quite applicable to fertilization. The action depends on the presence of humic acids in the coal which influence the permeability of the plant cells for accepting nutrition: the nitrogen content, however, has no effect. The action of the normal fertilizer is greatly increased by the slight addition of humic compounds. It is believed that the soil exhaustion that accompanies the continued use of artificial fertilizer is due to the reduction in humic compounds within the soil and can be alleviated by replacing them. (*Hindu* August 19, 1932).

How to Store Honey. If honey is stored in a damp place and not thoroughly sealed up it will absorb moisture and if excessive moisture is so taken up the honey is liable to ferment and deteriorate in value. Do not leave the lid off the containers or leave honey exposed for any length of time during the late autumn and winter months. If kept in a dry place in a sound container honey will keep good for years; it may granulate, but that is not a sign of deterioration, and in such cases it may easily be liquified by immersion of the container in hot water. W. A. Goodacre, Senior Apiary Instructor. (*Agricultural Journal of New South Wales*, Vol. XLIII, part 8. August 1932).

A Garget Tip. *Dairy Farmer who is successful with Linseed Oil.* The uses of Linseed oil in correcting gargety conditions of the udder were described by a Cheshire dairy farmer, writes a correspondent. As soon as the inflamed, swollen or hard condition of a quarter is discovered, he gives the cow a quart of linseed oil and continues this for two or three days if required, then gradually decreasing to a pint and so on. Although having previously lost quarters of many cows he has not lost a quarter since adopting this linseed oil tip, the swelling, hardness and inflamation almost invariably disappearing after a day or so.

Curiously enough, although linseed oil in such doses would normally give a pronounced aperient action, it does not have any marked effect in this direction where the udder is inflamed. (*The Farmer and Stock Breeder* Vol. XLVI. No. 2236. August 15, 1932.)

An Effective Rat Trap. One of the best methods of trapping rats is to get a small barrel or a water tight chest and fill it rather more than half full of water. Over the top spread a sack or piece of canvass having a hole large enough to admit a full grown rat in the middle. Fasten it down taut all round. Spread a fairly thick layer of cork or chaff or both on the top of the water and suspend a lump of cheese, meat or a piece of fish from under the sacking or canvass and just to be on the reach of the rats. The stronger the scent of the bait the better. Scatter a handful of loose straw or hay on top of the box or barrel and place a board against it so that the rats may readily find their way to the top. The barrel, it need hardly be said, should stand in a shady corner near where the rats have their burrows or run. See that they are not disturbed by cats. A little bait on the top of the trap vessel will naturally induce them to search for more, and scenting the feast within the vessel they will plunge to their doom one after the other. As many as 38 rats have been trapped this way during a single night. Rats can swim of course but with the surface of the water within the barrel about a foot from the top they are unable to jump out and soon drown. (*Journal of the Jamaica Agricultural Society*, Vol. 36. No. 7 page 351).

Notes and Comments.

1. **Preservation of dry cashew kernels**: Readers might remember our reference to the growing importance of the cashew nut industry in our notes for February and the article on cashew nut cultivation in the June issue. We now understand that one important difficulty experienced in connection with this industry is the proper preservation of the kernels to keep them free from vermin infestation before they reach the overseas consumer. Some insects infecting stored-products are occasionally found doing damage while in transit and the commodity becoming deteriorated f tches a price far below normal rates. Exporters in Mangalore and Rajahmundry are said to be experiencing this difficulty. We could suggest to them to persue the suggestions given in the two bulletins Nos. 12 and 24 issued by the British Empire Marketing Board on Insect infestation of stored cacao and Insect infestation of dried fruit. Remedial and control measures to be effective must begin in the exporting country and the most important of the recommendations are:

(1) The kernels to be shipped should be quite dry, uninfested and free from insect germs; this latter is managed by fumigation and pre packing, sterilisation by steam, other gases, etc., and certain exporters have some patent methods for this purpose;

(2) Cleanliness in warehouses and packing sheds should be insisted on so that infestation may not start there;

(3) The containers in which the kernels are packed should be absolutely insect proof; insect proof packing will also prevent later infestation.

Sandal spike investigations: Very good progress appears to have been made in the investigation of this serious disease of sandal which is causing a loss of over 5 lakhs of rupees every year. The investigations are carried on by a Committee of experts and the different aspects of the investigations are carried out under the joint auspices of the Madras Forest Department, the Indian Institute of Science, Bangalore, and the Forest Research Institute, Dehra Dun. The periodical reports on the progress of the work are being published by the Sandal Spike Working Committee under the editorship of Dr. V. Subrahmanyam of the Institute of Science, Bangalore. The main lines of investigation appear to be to find out the real cause and nature of the causative agent and the methods to control the disease. For this purpose, biochemical, entomological and field experiments are being conducted and the results checked. The theories regarding transmission of the disease and the agents responsible for the same have not however been definitely fixed, though very valuable data seem to have been collected.

Marketing of Groundnuts in S. Arcot: We are gratified to note that a scheme for the satisfactory marketing of the groundnut produce

in S. Arcot has been inaugurated by the Director of Agriculture and the Registrar of Co-operative Societies. The ryots in the district often stand in need of advances for their agricultural needs unless they dispose of their produce for any price they get at the time and at present they are often compelled to sell the stock to money lenders at a very low rate. The scheme provides for advances by a Co-operative Society to cultivators on the security of the produce purely for agricultural purposes and in return the ryots agree to sell their stock to the Co-operative Loan and Sale Society. When the produce is sold only the amount of the loan relating to the groundnut crop is deducted and the balance paid to the ryot. The Central Society has a godown at Cuddalore and an Agricultural Demonstrator specially trained for this work who helps the Central Society in its business. He also sends periodical information to the other demonstrators in the district regarding current prices at Cuddalore. With the increase of such business the Co-operative Department is expected to open sub-depots in more centres in different parts of the tract. This scheme appears to have been approved at a recent informal conference of the ryots in Villupuram when both the Director of Agriculture and the Registrar of Co-operative Societies were present. An arrangement like this for products other than groundnut wherever possible will go a great way in helping small holders in the rural areas to find a good market for their purpose.

Reviews.

I

"Artificial Fertilizers" (By *E. J. Russell, Bull. No. 28 of the Ministry of Agr. & Fisheries*, London, 1932). This monograph written in a popular and readable style, is intended to summarize our present knowledge of the effects of artificial fertilizers on ordinary farm crops. Much of the information is drawn from English experiments, especially those conducted during the last 70 years at the Rothamsted Experimental Station, of which the author is the director. The pamphlet opens with a historical survey of the discovery of artificial fertilizers and their popularisation by Sir John Bennet Lawes of Rothamsted by application to various crops like, wheat, barley etc., and proceeds to deal in detail with different kinds of nitrogenous, phosphatic and potash fertilisers with special reference to their physiological effects on the plant and the optimum proportions to be applied to various crops commonly grown in England. The information relative to the manuring of individual crops is brought together, in a valuable chapter at the end under the caption "Manuring of farm crops". A short note is also appended on compound or mixed patent fertilizers. Though the brochure is mainly intended for British farmers and most of the trials reported are those carried out in Britain or on the continent, still it is written so as to appeal to a wider circle and especially the pages dealing with the physiological effects of the fertilizer ingredients on the plant metabolism will be read with interest, as they summarise recent work on the subject. A great deal of work has been done in the different provinces of India on the response of economic crop plants to application of fertilisers and manures, but the information is not at present available

in a collected form and such a publication undertaken by a central organisation like the Imperial Council of Agricultural Research would undoubtedly prove of great value to the Indian farmers, especially if accompanied by suitable soil maps of the provinces showing the deficiencies of the soil in important mineral constituents.

Though it lies within the province of an author to deal with fractional aspects of a problem, one may venture to suggest that a more comprehensive and satisfactory view of the subject of manuring would have been presented to the farmer, if the results of experiments comparing the relative advantages of natural (organic) and artificial (inorganic) manures, had also been given and a chapter on the natural manures like farm yard manure, green manures etc., been included. As it stands, the pamphlet is likely to leave an one-sided impression in the reader's mind, in favour of artificial fertilizers, whose limitations especially in tropical soils poor in humus, it will be of advantage for him to know.

(C. N).

"Laterite and Laterite Soils" (*Technical Communication No. 24 of the Imperial Bureau of Soil Science*: London 1932 price 2 sh. net) This pamphlet reviews the much confused literature relating to laterites and laterite soils. Though the term laterite was first applied by Buchanan in 1807, to a clay used in India for building purposes which possessed the property of setting to a hard mass on drying the word has been rather loosely extended since to various red soils, iron formations and different kinds of ferruginous deposits occurring in the tropics. The authors believe that much of the confusion is due to overlooking the important role played by weathering processes in the formation of laterite and prefer to restrict the term to the products of rock weathering formed by the leaching of ingneous and metamorphic rocks whereby the bases and much of the silica are removed leaving a residue containing varying amounts of alumina uncombined with silica.

Laterite soils may be formed either *in situ* over the parent rock or from the eroded detrital laterite material. Studies of rock weathering in the tropics show that under conditions of intense leaching, laterisation takes place *in situ*. The rock passes directly into a weathered product in which the alumina in excess of that required to combine chemically with the silica (excluding quartz or secondary silica) is present chiefly in the form of gibbsite. The presence of free alumina is reflected in characteristically low ratios for Mol. SiO_2/Mol. Al_2O_3 (less than 2·0) in the clay fraction. According to Martin and Doyne, soils in which the ratio is 1·33 or less are laterite soils, while ratios between 1·33 and 2·0 indicate laterite soils, and ratios above 2·0 non-laterite soils. Free aluminium and iron oxides, uncombined with silica, may be determined by means of the alizarine adsorption method.

Favourable conditions for laterite formation are:—

(a) Intense rainfall; intermittent rainfall (alternation of wet and dry periods) opposes lateriation through resilication of the hydrated alumina formed through leaching.

(b) A high temperature, which prevents the accumulation of humus and therefore the formation of humic acids capable of bringing iron oxides and alumina into solution. Laterisation or silica leaching may be regarded as the anti-thesis of sesquioxide leaching (podsolisation).

(c) The presence of the more basic minerals in the parent rock. Basic rocks laterise more readily than acidic rocks, the latter tend to weather to kaolin rather than to gibbsite.

Examples are quoted from Harrison's work to illustrate the process of weathering in basic and acidic rocks resulting in laterite formation. In both

cases there was a decrease in the ratio of combined silica to sesquioxides, alumina and combined water respectively, from the parent rock to the weathered material in contact with it—a decrease which was relatively greater in the basic profile. In the basic profile gibbsite was present and kaolin absent in the layer contiguous with the rock; in the acidic profile gibbsite was absent and kaolin present. Resilication caused by capillary rise and changes in the ground-water level appears to affect the basic profiles more than the acidic profiles, tending to make the silica/alumina ratios of the two profiles similar and ultimately to produce similar soils. In laterite soils formed from detrial laterite material, undecomposed mineral fragments may undergo further laterisation and the whole may acquire a charactristic concretionary structure through cementation with iron oxides, A bibliography of 86 references is appended. (C. N).

III

The Waste Products Of Agriculture—their utilisation as humus. by Albert Howard and Yeshwant D. Wad (*Humphrey Milford*. Oxford University Press, London 1931). The essential difference in the organic matter contents of soils of tropical and temperate zones is too apt to be overlooked in the fixing of manuring programmes for tropical soils. The greatly increased yields obtained in the humid soils of the north by application of artificial fertilizers may not be replicated with the drier and hotter soils of the south where humus may prove the limiting factor for the proper utilisation of the applied nutrients and may even render them harmful. The authors of the present volume are none too late in pointing out the fallacy of (artificial) fertilizing campaigns for a country like India, where the imperative need is for an augmentation of the organic matter and incidentally of the nitrogen content of the soil. As the authors point out, the problem cannot be satisfactorily solved by an advocacy of increase in the area under green manure crops, since the growing of green manure crops is limited to areas of good rainfall and water supply and will not be applicable to dry areas, where the green manure crop by removing the available soil water, might effectively destroy all chances of obtaining a succeeding crop.

The authors believe that the only way of improving such areas is to convert all the available organic matter of the farm e. g., cattle urine, dung, litter, straw, stubble, stalks etc., into synthetic farm yard manure outside the field and after the compost has decomposed to the proper stage to apply it to the land. A detailed method is described for the preparation of the manure, which is called the Indore method, and has been successfully tried at the Institute of Plant Industry, Indore. The underlying principle of the method is to start with mixed organic refuse of a carbon-nitrogen ratio of about 33 : 1 and subject the mixture to regulated decomposition by bacteria and fungi (added through urine, dung and manure from old compost heaps) under aerobic conditions, in presence of the optimum water supply (50 to 60 %) the internal temperature falling gradually from about 55° C to 40° C. At the end of 3 months, the compost has crumbled to a fine condition, which is better than that obtained by the use of Adco, and can be intimately incorporated in the soil and made to give good yields with wheat, barley etc.

Though the authors have successfully tried the method at Indore during the last four years, with the help of indigenous labour, and have given full and minute details regarding the sizes of pits, quantities of "urine earth" and dung to be applied to the compost for the use of other farmers, it is doubtful whether the method can be copied elsewhere according to the details given, unless each farmer carries out his own experiments and arrives at the proper procedure to be followed under his local conditions. The variable factors are (1) the carbon-nitrogen ratio of the compost (2) moisture and air supply (3) inoculation with suitable fungi, bacteria etc., through urine, dung and previously

decomposed manure. The moisture content is affected by the local rainfall, and where rainfall is heavy, the authors recommend the transfer of the compost to raised heaps. Excessive cold and heavy winds lower the temperature of fermentation and prejudicially affect the rate of decomposition.

The authors rightly lay special emphasis on obtaining a correct carbon-nitrogen ratio of the compost (33:1) to start with, but it is doubtful whether if the author's method be followed the farmer could control on the large scale this factor as effectively as the other factors. This could only be done by ensuring a good supply of leaves and leguminous crops rich in nitrogen, and even at Indore, with the extensive materials available on a big farm of over 300 acres, the authors state that they could ensure a favourable nitrogen proportion only (1) by cutting the cotton stalks soon after picking is over, so as to secure the maximum number of leaves; (2) by growing a large area of sunn-hemp, which contains when withered as much as 2·3% of nitrogen and (3) by securing as much green weeds, groundnut residues and fallen leaves as possible for the mixture Material containing a wrong ratio does not compost properly. The authors' experiments show that composting of "single" material, e.g., cotton stalks alone, is not successful, due to too close compacting and insufficient aeration and probably also to the unsatisfactory carbon-nitrogen ratio. Obviously it will be unwise to ask a farmer of small means to adopt the method as it stands, where he has to rely on any and all available organic matter, irrespective of the carbon-nitrogen ratio existing in them and especially in dry lands where he may not find it possible to supplement the nitrogen by growing leguminous green manure crops like sunn-hemp. In such cases the small farmer may find it more advisable to bring the carbon-nitrogen ratio of the compost material to the optimum, by the addition of nitrates or ammonium salts or by adding the Adco mixture, though the use of this mixture does not seem to meet with the approval of the authors. (C. N.)

College News & Notes.

Students' Club. A meeting was held on 4th August when student Mr. Y. V. Narayaniah of class III intiated a discussion on "The Problems and Progress of the World To-day". Rao Sahib T. V. Rajagopalachariar was in the chair. Mr. Narayaniah in the course of his long and interesting paper discussed the most vital problems, economic and monetary, confronting the world at present. The discussion was well thought out and the lecturer gave a clear picture of the present economic position. Several students took part in the discussion of whom Messers W. Thirumal Rao, N. Srirama Reddy, M. R. Devarajan, Rangasamy Ayyangar and D. C. Hanumantha Rao may be mentioned. The president in his concluding remarks stated that the economic problem was an important one and that social problems like divorces and marriages were also equally important. After dealing in a general way the causes that have led to the present economic depression the chairman opined that in tackling such problems clear thinking and a thorough knowledge of the details were essential.

At a second meeting of the student's club, student Mr. N. Venkat Rao, initiated a discussion on "Temporary closure of the Universities as an immediate measure against unemployment" with Dr. T. R. Seshadri in the chair. Mr. Venkat Rao in the course of his speech observed that the main cause of unemployment in the middle class society was due to the Universities turning out a large

number of graduates every year, men who were unfit to shoulder responsibilities and do any work on their own except in State service. Some of the other remedies that are usually thought of as birth control, emigration etc., were according to Mr. Venkat Rao either impracticable or could not give immediate relief. The only effective remedy for arresting unemployment was to close down the Universities temporarily and restart them later on ideal lines when there could be a demand for knowledge for knowledge's sake. As was expected there was a good deal of opposition to this rather narrow point of view of the opener of the discussion and the motion was turned down by a large majority.

Games—Hockey. There was a trial match between our College and the Coimbatore United Club on 21—7—32 on our grounds. The play was well balanced for the first 20 minutes or so when neither of the teams scored. Just before the interval, however, our players were able to score a goal. The teams crossing over the C. U. C. started their attack vigorously and soon scored a goal. Our players rose to the occasion and with timely rush of the forward line were able to add two more goals to their credit and thus eventually won the match by 3 to 1.

Our College met the C. U. C. again for the second time on 9th August, the C. U. C. team being a definitely stronger one this time. In the first half our college was able to score 2 goals against nil. In the second half, however, the C. U. C. equalised the score within a few minutes of the commencement of the game. Our forward line tried its level best to score again but every time the ball was shot into the goal it was ably defended by the C. U. C. goal keeper, an old boy of our college. The match thus ended in a draw.

On 16th. August our College played a friendly match with the estate boy-scouts' team. The youngsters put up a really good show this time though they eventually lost the match by 4 goals to nil. We are glad to note that some of the estate boys who played in the scout team gave a good exhibition and we are sure that with more practice and experience they should turn out first class hockey players.

On the 30th. August we played a match against the Stanes High School on our ground and won comfortably by 7 goals to 2. Our opponents appeared to be 'off colour' and though the scores do not represent the actual balance of the sides, our boys exhibited a high standard of hockey. Narayanan at Pivot was a great source of strength to the team and was easily the outstanding player on the side. That our great victory on this occasion was not entirely to our superiority was proved on 8th September when playing the Stanes school on their grounds they turned the tables on us and avenged their defeat by scoring 5 goals against 3. This has, however, come as an eye opener to our men, and they may anticipate a keen struggle against this team in the ensuing hockey tournament.

Cricket. On Sunday, 7th August our College played a friendly match with the Forest College on their grounds. The foresters entered first and were all out for 63 runs, Varadarajan bagging 5 wickets for 30 runs and Narasinga Rao 3 wickets for 19 runs. Our team entering later had scored 134 runs for the loss of 5 wickets, Narasinga Rao being the top scorer with 54 runs.

Y. M. C. A. Tournament. The first match of the tournament was played on our grounds on 13th August between our College and the Government College, Coimbatore. The visitors entering first took 63 runs. Our bowling was very effective, Narasinga Rao bagging 7 wickets for 19 runs, Varadarajan 2 wickets for 19 runs and Lakshmanan 1 for 11 runs. Our innings began rather shakily two of the best batsmen going down for 4 runs. Varadarajan, the skipper, entering later stopped the rot and by careful play gathered runs rapidly until the century was put on boards, his individual score being 56 not out. He declared the innings and put

in the Government College team for the second time. Our bowling was still very effective 8 wickets having been bagged for a poor 22 runs. Mahadevan bagged 5 wickets for 6 runs and Narasinga Rao 3 for 16 runs. Since the time was up the Government College was saved from an innings defeat.

The second match of the tournament was played between our College and the C. U. C. on our grounds on the 20th. The visitors entering first had scored 161 runs. Amongst our bowlers Narasinga Rao was responsible for 5 wickets, Thomas for 3 wickets and Narayanan and Lakshmanan for one each. Our team entering later had made 72 runs for the loss of 7 wickets when the stumps were drawn for the day. Amongst our batsmen Thomas and Narasinga Rao played a good game and were responsible for 34 and 32 runs respectively. The match thus ended in a draw.

The third match was played between our College and the Foresters on 3rd September on the Forest College grounds. Our College were all out for 97 runs. Thomas contributed 46, including 4 fours. For the Forest College, Gulvadi took 4 wickets for 31 runs and Fareed 5 for 37 runs. After the lunch interval, the Forest College were all dismissed within an hour for 39 runs, Sarvate alone being not out with 14. Narasinga Rao for our College bagged 6 wickets conceding 25 runs and Thomas 2 for 5 runs. Our College in our second innings scored 81, Narasinga Rao being top-scorer with 30 and Varadarajan coming next with 19. After tea, the Forest College went in and made a fine rally scoring as many as 70 runs in an hour, Krishnamurthi making 40. The Forest College made 83 for loss of 7 wickets when stumps were drawn for the day. Thus our College won on the first innings.

Our College and the C. U. C. having obtained the same number of points another match will have to be played between these two teams and the winners will get the shield.

Health Week Foot-ball Tournament. We won our first match in this tournament by defeating the Municipal School and qualified for the finals. The finals came off on Monday, 5th September between our College and the London Mission High School. The School scored in the first half and we returned the compliment early in the second half, after an evenly contested and exciting game, the school took the lead close on time and the College lost the match by two goals to one.

Officers Club. Mr. P. A. Raghunathasamy Ayyangar, assistant to Govt. Agricultural Chemist, who has retired from service on 1st September was entertained at Tea at the club on 2nd September. Mr. Ayyangar had been connected for over 20 years with several public activities on the estate the chief of them being the college co-operative society, the estate fuel depot, the officers mess, etc. He was one of the founders of the officers' club and was its first president as early as 1910. After the tea some of his friends who have known and moved with him for the longest time, Messrs. C. Tadulingam, K. Krishnamoorthy Rao and B. Viswanath made eulogistic references to the qualities of head and heart of Mr. Ayyangar and wished him on behalf of the club a long life and well earned rest.

The members of the chemistry section gave him another entertainment earlier in the week.

Visitors. Among the visitors to the Research Institute during the month may be mentioned Dr. Van Der Veen from Java, Mr. Donald G. Beaton, Agricultural Engineer, Cooper Engineering Works, Satara, Khan Bahadur D. B. Cooper, Proprietor, Cooper Engineering works, Satara, and Mr. L S. Pinto, Industrial Engineer, Madras.

Sir Archibald Campbell, The Hon'ble Revenue Member to the Madras Government during his stay in Coimbatore, paid a visit one evening to the Paddy Breeding Station and the Central Farm to inspect the duty of water experiments that are being carried on at the two places.

ASSOCIATION OF ECONOMIC BIOLOGISTS

Under the auspices of the Association Dr. Van Der Veen who had been working for some years at the Sugarcane Research Station, Pasurvan, Java, gave an interesting lecture on Sugarcane cultivation in Java. In the course of his lecture he stated: "In Java there are about 180 factories producing on an average 3 million tons of white sugar every year. The sugarcane area of Java is mainly confined to the middle and eastern portions of the island. The western portion is not suitable because of too much of rain and some of the factories that had been started there previously had to be closed down as the crop was subject to too many diseases. Unlike in India, the factories in Java all grow their own canes in lands rented from the villagers. According to the existing regulations no European can buy land in Java which is already under cultivation. The cultivation of cane in Java is all in the hands of people who have had special training in Agriculture in Europe and so is highly scientific. The Java soils are all very rich being of volcanic origin. Even now due to the action of the volcanoes fresh rich clays are being formed in certain parts of the island. All the scientific and research work connected with sugarcane is carried on at Pasurvan in East Java and the station is maintained by the owners of the sugar factories scattered in different parts of the island. The research work of the station is divided into a number of sections with special laboratories and a set of highly trained staff of workers. Of the three main divisions of research work, that dealing with agriculture of the crop is by far the largest and the most important. Under this division come the several branches like soil analysis, plant pathology, entomology, plant physiology, field experiments, selection and cytology. A good deal of work has already been done with regard to selection and manurial trials and the results obtained have in no small measure been responsible for the phenomenal tonnage of sugar per acre obtained in Java. The selection work is carried on under the guidance of Dr. Posthumus who had come to Coimbatore last year. It is from selection that such good types like P. O. J. 2873 and 2883 which are largely grown in the middle part of Java have been obtained. The sub-division dealing with field experiments carry out nearly 2500 experiments every year on lands held by the factories. As an example of one of the important experiments may be mentioned that intended to determine the most profitable amount of ammonium sulphate to be given to the crop. Experiments are also carried out where new selections made in the island or imported from outside are tested against the local ones. Since the results obtained at Pasurvan are not all of universal application throughout the island a new sub-station has been opened in the western portion of the island where the conditions are found to be different."

Dr. Veen who had observed the work of the Cane Breeding Station, Coimbatore, stated that selection work carried on at Coimbatore was of a high standard and several types had already been evolved to suit the different conditions of soil and climate in India He considered that from the factory point of view the cultivation of cane in India being in the hands of the ryot who does not readily take to scientific methods was a drawback.,

(K. R.)

Weather Review (AUGUST—1932)

RAINFALL DATA

Division	Station	Actual for month	Departure from normal	Total since January 1st	Division	Station	Actual for month	Departure from normal	Total since January 1st
Circars	Gopalpore	5·6	−1·7	13·0	South	Negapatam	3·5	...	12·8
	Berhampore *	6·7	−2·5	19·0		Aduthurai *	2·8	−0·4	13·8
	Calingapatam	2·3	−4·6	14·0		Madura	4·4	+0·1	13·0
	Vizagapatam	1·3	−3·2	11·5		Pamban	0·2	−0·5	4·4
	Anakapalli *	2·0	−1·6	19·2		Koilpatti *	11·7	+9·8	20·8
	Samalkota *	3·5	−0·2	18·2		Palamkottah	6·7	+6·2	12·8
	Cocanada	5·2	−0·9	18·7					
	Maruteru *	6·8	+1·9	24·9					
	Masulipatam	5·3	−1·4	19·9					
	Guntur *	...	...	...	West Coast	Trivandrum	15·5	+10·1	50·4
Ceded Dists.	Kurnool	4·2	...	11·9		Cochin	14·9	+2·6	80·1
	Nandyal *	5·7	+1·9	14·1		Pattambi *	10·5	−8·5	79·2
	Hagari *	6·4	+4·9	11·3		Calicut	16·5	+1·2	107·3
	Bellary	6·9	+4·7	10·6		Taliparamba *	13·4	−20·4	114·1
	Cuddapah	4·5	−1·2	8·8		Kasargode *	13·6	−12·1	88·3
Carnatic	Nellore	3·3	−2·5	11·5		Nileshwar *	10·1	−11·7	121·4
	Madras	4·5	−2·5	5·8		Mangalore	10·9	−12·3	81·7
	Cuddalore	1·7	−3·7	7·9	Mysore and Coorg				
	Palur *	4·5	+3·0	11·8		Bangalore	5·8	+0·5	21·0
	Palakuppam *	4·2	−0·3	13·0		Mercara	18·8	−6·9	100·9
Central	Vellore	3·1	−2·7	13·3		Mysore	5·1	+1·9	20·0
	Hosur Cattle Farm *	4·6	+4·3	22·0	Hills.	Kodaikanal	12·7	+6·1	34·4
	Salem	5·1	−1·2	23·1		Coonoor	12·0	+8·2	25·0
	Coimbatore Town	3·3	+2·3	16·0		Ootacamund *	7·4	+1·3	28·7
	Coimbatore Res. Inst. *	2·8	+1·6	16·3		Nanjanad *	7·2	+0·1	36·4
	Trichinopoly	8·5	+4·6	21·9		Kallar *	10·1	+7·8	27·7

* Meteorological Stations of the Agricultural Department.

Summary of general weather conditions: The monsoon was active in the north of the peninsula at the beginning of the month when the trough of low pressure was active over upper India. On the 9th a shallow "low" passed inland from the Bay into Orissa, and thereafter the monsoon weakened over the whole area. From that date till the end of the month the pressure distribution was of an abnormal type resembling that usual at the transition period in September and October, with the pressure relatively high over the north of the peninsula and low over the south of the Bay. Winds were in consequence variable, and air movement feeble owing to shallow pressure gradients over the peninsula. Towards the end of the month a "Low" developed over the south of the presidency and occasionally extended into the south-west of the Bay. These abnormal conditions gave rise to numerous thunderstorms over the peninsula almost throughout the month. At the end of the month the moonsoon began to revive on the west coast with rough seas and squally weather and conditions became favourable for the formation of a depression over the north of the Bay.

Rainfall was in slight to morderate defect in the Circars, Coromandel coast; Kanara coast and Coorg; in large excess in west Deccan, parts of the Central districts, and Travancore and in slight to moderate excess elsewhere. Some locally heavy falls of rain were reported the chief of them being: Bellary 3.5" (18th) Anantapur 4.3" (19th), Trichinopoly 3.5" (29th) Trivandrum 4.0" (29th) and Calicut 5.4" (30th).

Temperature was generally above normal over Mysore and the Deccan for the greater part of the month.

Weather Report for the Research Institute Observatory:

Report No. 8/32.

Absolute Maximum in shade	92·8°
Absolute Minimun in shade	69·1°
Mean Maximum in shade	83 8°
Mean Minimum in shade	72·0°
Total Rainfall	2·82"
Mean rainfall for month	1·27"
Departure from normal	+ 1·55"
Number of Rainy days	8
Mean daily wind velocity	2·5 M. P. H.
Mean 8 hrs wind velocity	2·4 M. P. H.
Mean Humidity at 8 hrs	80·0%
Total hours of bright sunshine	200·7
Mean daily hours of bright sunshine	6·5

Summary of weather conditions:

The weather was unsettled for the greater part of the month in consequence of the abnormal pressure distribution over the peninsula and the Bay. Air movement was feeble as is usual during periods of weak monsoon and conditions were favourable for the formation of thunderstorms. During the second half of the month the upper air currents were from some point in the N. E. quadrant and numerous thunderstorms occured in the vicinity of the Observatory, though they were of small magnitude and extent.

Pressure fluctuations were irregular, and the day and night temperatures were generally high. The rainfall totalled 2·82 inches and was 1·55 inches in excess of the normal. The skies were mostly heavily clouded and humidity high.

P. V. R. & T. S. L.

Departmental Notifications.

I Circle. V. Tirumala Rao, Asst. Anakapalle permitted to avail a month's leave already granted to him from 18—8—1932. M. V. Kondala Row, A. A. I. Vizagapatam, l. a. p. on M. C. for 3 months in continuation of leave already granted. **II Circle.** S. Sithapathi Rao, A. A. D. Nellore extension of l. a. p. for 10 days from 25—8—32. M. V. Narasimha Sastri A. A. D. extension of l, a. p. for 15 days in continuation of leave already granted. M. P. Narasimha Rao, A. D. Kaikalur, l. a. p. for 10 days from date of availing. **III Circle.** N. Kesava Iyengar, Cotton Asst. Hagari, extension of 1. a. p. on M. C. for one month from 7—8—32. **IV Circle.** K. B. Vydeswara Iyer, F. M. Palur, extension of 1. a. p. on M. C. for 3 months from 8—8—32. M. A. Balakrishna Ayyar, A. D. Wallajah, 1. a. p. for one month

from 1—9—32. C. S. Krishnaswamy Iyer, F. M. Palur, 1. a. p. for one month from 26—8—32. S. Rama Rao, A. D. Chittoor, 1. a. p. for one month from 25—8—32. **V Circle.** T. G. Muthuswamy Iyer, A. D. Tiruturaipundi extension of 1. a. p. on M. C. for 2 months from 18—8—32. **VI Circle.** Anantapadhmanaba Pillai, A. D. posted to Tirupathoor, Ramnad district. L. Sankarakumar Pillai, A. D. Tinnevelly, 1. a. p. for 2 months and 29 days and half average pay for 5 months and one day from 7—9—32. A. M. Muthia Nattar, A. D. Dindigul 1. a. p. for 15 days from 2—9—32. **VII Circle.** E. K. Govindan Nambiar, A. D. Tellicherry, 1. a. p. for 10 days from 10—8—32. K. Govindan Nambiar, A. D. Badagara, 1. a. p. for 20 days from 22—8—32. **D. D. L. S.** H. Narahari Rao, F. M. 1. a. p. for 2 months from 3—8—32. **Millets Section.** V. Gomathinayagam Pillai, Asstt. 1. a. p. for one month from 22—8—32. **D. A's Office orders:** P. A. Raghunathaswami Ayyangar, Chemistry Asst. 1. a. p. for 14 days from 18—8—32 preparatory to retirement. Muhamad Abbas, probationer, will continue to officiate in the vacancy caused by P. A. Raghunathaswami Ayyangar. M. Narasimham, Asstt. in cotton transferred to the Paddy section in the post declared temporary with reference to G. O. No. 810, Public (Services) dated 5—8—32. and will continue to work at Maruter. K. Hanumantha Rao, Asst, Paddy Section, on probation declared temporary with reference to G. O. No. 810 Public (Services) dated 5—8—32 and will continue in the same section. N. K. Thomas, offg. Asst. in paddy section, holding a temporary post transferred to the Agrl. Section as F. M. C. B. S. Coimbatore. K. Veerabhadra Rao, probationer, Chemistry section to continue as offg asst. K. L. Ramakrishna Rao, transferred to Science Section, Cotton Breeding Station, Coimbatore. M. Venkoba Rao, Offg. Cotton Asst. Hagari to continue at Hagari vice V. K. Subramania Mudaliar. M. B. Venkatanarasinga Rao and K. B. Viswanathan permanent assistants Paddy Section, will be in the grade of Rs. 120—10—170 from the respective dates of their joining duty at the Rice Research Station, Ganjam. K. Govindan Nayar, Chemistry Asst. 1. a. p. for 2 months and 16 days from date of relief. P. Kunhiraman Menon is appointed to officiate in the vacancy caused by K. Govindan Nayar. M. C. Krishnaswami Sarma A. A. D. Attur transferred to Central Farm Coimbatore. N. Narayana Ayyar, A. F. M. Central Farm, to VIII Circle, Coimbatore, P. K Palaniswamy, Probationer, Agricultural Section completed his period of probation on 31—8—32. As he has not passed his account test, his services will be dispensed with immediately. K. T. Bhandari, A. D. III Circle to VII Circle. M. Damodhara Prabhu. F. M. Taliparamba to VIII Circle, to work under the Business Manager, Tirupur. A. Chinnathambi Pillai, Offg. A. D. A. Cuddalore, 1. a. p. from the date of his reversion to subordinate service up to and inclusive of 22—12—32 with permission to suffix the Xmas and New Year holidays.

ADDITIONS TO THE LIBRARY DURING THE MONTH OF JUNE 1932.

A. Books.

(1) *Artificial Fertilisers.* E. J. Russell. (1931) (2) *Tree planting on the Farm.* R. H. Anderson. (1931) (3) *Fruit Packing Equipment.* W. Ie. Gay Brerton. (1931). (4) *Vegetable of the Dutch East Indies. (English Edition)* J. J. Ochse. (1931). (5) *Fruits and Fruit culture in the Dutch East Indies,* (English Edition.) J. J. Ochse. (1931). (6) *Handbook of Some South Indian Weeds.* C. Tadulingam & G. V. Narayana (1932). (7) *A Short course in Elementary Metcology,* W. H. Pick (1930). (8) *Coleoptera—Lamellicornia Part III—Coprinae.* (The Fauna of British India Series) G. A. Arrow. (9) *The Indian Year Book.* (1932). (10) *The Asylum Press Almanac, and Directory of Madras and South India.* (1932).

B. Reports.

(1) Agricultural Statistics of Bihar and Orissa. 1930—31. (2) First Report of the Agricultural Machinery Testing Committee. *Eng. Min. Agri. & Fish. Pub.* (3) Agricultural Marketing Act 1931. *Eng. Min. Agri. & Fish. Pub.* (4) "Coffee". *Eng. Imp. Econ. Com. Report.* (5) Reports and Proceedings of Conference of Colonial Directors of Agriculture. 1931. *Eng. Colonial Office Publication.* (6) Annual Report of Alabama Agricultural Experiment Station. 1930. (7) 1931. (8) Annual Report of Massachusetts A. E. S. 1931. (9) Annual Report of Missouri A. E. S. (Progress in Agri. Research). 1930.

C. Bulletins.

(10) Insect Affecting the Cotton Plant in South India. *Mad. Agri. Dept. Bull. 28.* (11) The Pressure of Population—Its effect on Rural Economy in Gorakpur District. Allahabad Bull 50. (12) Over-Population in Jaunpur. *Empire Marketing Board 59.* (13) Fruit Supplies in 1931. *Empire Board. 49.* (14) The Demand for Honey. *Empire Board 50.* (15) Account of the Research in Progress in the British Empire. *Imp. Bur. Plan Genetics. Pub.* (16) Interspecific and Intergeneric Hybridization in relation to Plant Breeding. *Imp. Bur. Plant Genetics. Pub.* (17) Further Contributions on the Technique Employed in the Breeding of Herbage and Forage Plants. *Imp. Bur. Plant Genetics. Pub. Bull. 7.* (18) Bibliography of Helminthology. for the year 1930. *Imp. Bur. Agri. Parasitology Pub.* (19) No. 31 *Ministry of Agricultnre & Fisheries Bulletins.* Studies concerning the Handling of Milk. (20) No. 32 Pig Keeping. (21) No. 35 The use of Lime in Agriculture. (22) No. 36 Manures and Manuring. (23) No. 37 Ensilage. (24) No. 42 The Feeding of Dairy Cows. *Dept. of Sc. Ind. Res. Sp. Rep.* (25) No. 20 The Problems of Apple Transport Overseas. (26) No. 26 The Storage of Eggs. (27) No. 30 Gas Storage of Fruit. (28) No. 38 Wastage in Improved Fruit, Its Nature, Extent and Prevention, (29) No 39 The Prevention of Wastage in New Zealand Apples. *Dept. of Sc. Ind. Res. Sp. Rep. 39* (30) The Cost of Living Index Number. Method of Compilation. *Min. Labour Pub.* (31) Economic Advisory Council Committee on the Mineral Content of Natural Pastures. *Seventh Report.* (32) Instructions to Observers at Normal Climatological Stations. *Air Ministry M. O. 191/3.* (33) Instructions to Observers at Climatological Stations & Health Resorts. *Air Ministry M. O. 191/4.* (34) Investigations on Coconuts and Coconut Products. *Dept. Agri. F. M. S. Gen. Ser. No. 8.* (35) Soy Bean in the Union. *Union of South Africa. Bull No. 107.* (36) No. 253. *South Austria Bulletins.* Influence of the Season of Planting on the Rooting of Grape Vine cuttings. (37) No. 254. Citrus Experiments at the State Experimental Orchard. Berri. (38) No. 255. Uses of Hessian in the Home. (39) 256. Fruit Trees, Vines and Vegetables. Proved Remedies for Common Diseases. (40) No. 257. Feeding for Production. (41) No. 258. Field Experiments with Manganese Deficiency Disease of Barley. (42) No. 259. Harvest Damage of Barley. (43) No. 260. Modern Housing of Poultry. (44) No. 261. The Seeding of Permanent Pastures. *U. S. A. Technical Bulletins.* (45) 241. Analyses and Composition of California Lemon and Orange Oils. (46) No. 286. Decay and Other Losses in Douglas Fir in Western Oregon and Washington. (47) No. 291. Effect of Air Drying on the H-ion, Concentration of the Coils of the U. S. A. and Canada. (48) No. 295. Susceptibility of Barley to Leaf Rust and to Powdery Mildew. (49) 296 Feeding Punctures of Mirids and Other Plant Sucking Insects and their Effect on Cotton. (50) No. 297. Factors affecting the Price of Rice. *Miscellaneous Publications.* (51) No. 98. Market Diseases of Fruits and Vegetables. Potatoes. (52) No. 121. Market Diseases of Fruits and Vegetables. Tomatoes, Peppers, Eggplants. (53) No. 138. Refrigeration in the Handling, Processing and Storing of Milk and Milk Products. *Farmer's Bulletins. (U. S. A.)* (54) No. 1670. Hydrocyanic Acid Gas as a Fumigant for Destroying

Household Insects. (55) No. 1589. Grape Districts and Varieties in U. S. A. (56) No. 1691. How to control Grasshoppers in cereal and Forage Crops. *Iowa Research Bulletins.* (57) No. 119. Factors influencing Egg Production. The influence of Maturity upon Egg Production in S. G. White Leghorn. (58) No. 120 The Vitamin B Content of Vegetables. (59) No. 121. The Inheritance of Germless Seeds in Maize. (60) No. 122. International Trade in Pork and Pork Products. (61) No. 123. Proteolysis by Streptococcus Lactis with Special Reference to Butter Cultures and Butter. (62) No. 124. Infection studies of Diplodia Zeae (Schw) Lev. and Control of Seedling Blights of Corn. (63) No. 125. The Biology of the Four lined Borer. (64) No. 126. The Production of Artificial Farm Manures. (65) 127. Effects of Artificial Farm Manures on Soils and Crops. (66) No. 128. Factors Influencing Egg Production. II. The influence of the Date of First Egg upon Maturity and Egg Production. (67) No. 129. Long Term Loans of Iowa Banks. (68) 130. Effect of Delayed Harvest upon yield of Grain. (69) No. 131. Acidity changes Associated with the Keeping Quality of Apples under various storage conditions. (70) No. 132. Microbiological Studies of Some Typical Iowa Soil Profiles. (71) No. 133. The Inheritance of Color and Horns in Blue Gray Cattle—II. (72) No. 135. Nitrate Assimilation in Soils. (73) No. 136. Supplements to a Milk Diet for Dairy Calf. (74) No. 138. A Gene Influencing the Composition of the Culm in Maize. (75) No. 139. The Measurement of the Degree of Saturation of Soils with Bases. (76) No. 140. Secular Movement of Corn Prices. (77) No. 141. Bacteriology of Butter. III. A Method for Studying the Contamination from churns. (78) No. 142. Genetic Test for Linkage Between Row Number Genes and certain qualitative genes in Maizes. (79) No. 143. The Biology of the borer. (80) No. 144. Chemistry of Butter and Butter making. (81) No. 145. Bacteriology of Butter. IV. Bacteriological Studies on Surface Taint Butter. (82) No. 146. Studies on the Development of Butter Cultures from Mixtures of Organisms. (83) No. 147. Methods of Determining Carbon Dioxide Production in Soils. (84) No. 148. Some Chemical and Bacteriological effects of various kinds and amounts of lime on certain southern Iowa Soils. (85) No. 150. Length and Floor Construction of Dairy Stalls. *Iowa Bulletins.* (86) No. 256. The Management of Peat and Alkali Soils in Iowa. (87) No. 267. Creamery Organisation and Construction. (88) No. 268. Cropping Systems in Iowa Past and Present. (89) No. 269. Field Experiments with Fertilisers on Some Iowa Soils. (90) No. 270. The Livestock System in Iowa County. (91) No 271. Relative Efficiency of Calves, Yearlings, and Two year old Steers for the Producer. (92) No. 271 (abridged) Shall I feed Calves, Yearlings or Two-year-olds ? (93) No. 272. Influence of Animal's age upon the quality and Palatability of Beef. (94) No. 273. Soft ear Corn Silage for Swine. (95) No. 273 (abridged) Feeding Ensiled Versus Dried Soft ear corn to Swine. (96) No. 274. Harvesting Corn Stalks for Industrial Uses. (97) No. 275. The Population of Iowa—Its Composition and Changes. (98) No. 276. A Soil Management Program for Carrington Loam. (99) No. 277. Swine Performance Record—Litter Comparisons. (100) No. 278. Dried Buttermilk for growing and fattening Pigs. (101) No. 279. The Effect of Various Containers on the Growth of Vegetable Plants. (102) No. 280. A Soil Management Program for Grundy Silt Loam. (103) No. 281. Value of Family Living on Iowa Farms. (104) No. 282. Soybean and Alfalfa Hays for Wintering Pregnant Ewes. (105) No, 283. Retail Credit in Iowa Farmers' Elevators. (106) No. 284, The Trend of Corn Prices. (107) No. 285. Observations on the counting of Bacteria in Ice Cream by the Plate Method. (108) No. 286. The Pasturization efficiencies Secured with Milk from Individual Farms. (109) No, 287, The Effect of processing, Handling and of Testing Procedures on the Fat content of Ice Cream. *Ithaca bulletins.* (110) No, 526. Potato Storage on 259 Farms in New York. (111) No. 527. Supply Side of the New York Milk Market. (112) No, 528,

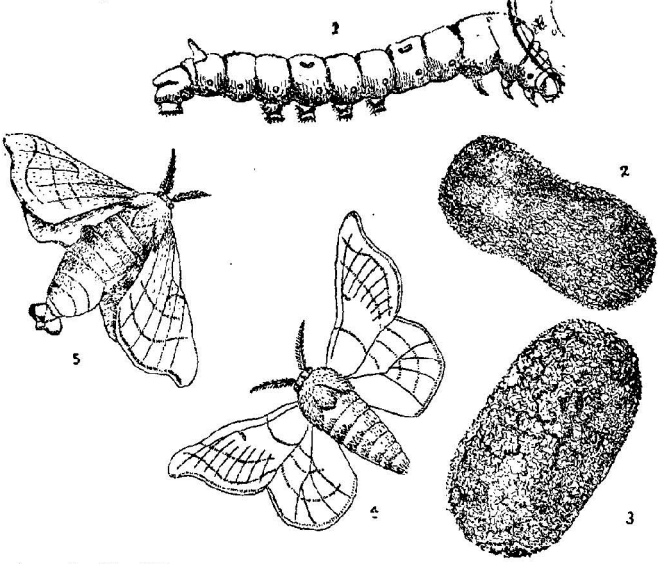
Fermentation and Crystalization of Honey. (113) No, 531. Relative Effectiveness of Limestone Particles of Different Sizes. (114). No. 424, *Texas bulletins.* Grain Sorghum-Date of Planting and Spacing Experiments. (115) No. 426, Determination of Soil Moisture by the Method of Multiple Electrodes. *Ohio bulletins.* (116) No. 456. The Cost of Developing an Apple Orchard. (117) No. 459 Taxation as Related to the Property and Income of Ohio Farmers. (118) No. 460. Ohio Agricultural Statistics for 1929. (119) No. 462. Rate of Planting Potatoes with Some Referenee to Sprouting Habit and Size of Plants. (111 A) No. 463. Molasses in Ration for Fattening Calves. (120) No. 471. Lodging in Oats and Wheat. (121) No. 475. Manual of Ohio Weeds, (122) No. 477. Studies on the Nutritive Value of Milk. 1. The Deficiencies of an Exclusive Milk Diet and How to Overcome them. (123) No. 479. Nitrate Fertilization and keeping Quality of Apple Fruits. (124) No. 483. Factors Affecting Fruit Setting I. Stayman Winesap. (125) No. 491. The Combined Harvester-Thresher in Ohio. *Nebraska Research Bulletins.* (126) No. 46. Economic Aspects of Contagious Abortion in a Dairy Herd. (127) No, 47. The Symptoms of Spindle Tuber and Unmottled Curly Dwarf of the Potato. (128) No. 48. A Study of Kerosine Cook Stoves. (129) No 49 The Incidence of Avian Tuberculosis in Mammals other than Swine. (130) No. 50. Food Habits of the Ring-necked Pheasant in Central Nebraska. (131) No. 51 Breeding Winter Wheat for Resistance to Stinking Smut. (132) No, 52 Relative Susceptibility of Alfalfas to Wilt and Cold. (133) No. 53 Infection Experiments with Spindle Tuber and unmottled curly dwarf of Potato. (134) No. 54 The Vitamin A Content of the Milk of Holstein, Ayrshire, Jersey and Guernsey Cows. (135) No. 55 Utilisation of Proteins by the Growing Chick. (136) No. 56 A Study of Washing Machines. (137) No. 57 Effect of Maturity and the Ethylene Chlorhydrin Seed Treatment on the Dormancy of Triumph Potatoes, (138) No. 58 Studies of Rickets in Swine. (139) No. 59 Influence of Number of Daily Milkings on the Production of Dairy Cows. *Nebraska bulletins* (140) No. 238. The Routine and Seasonal Work of Nebraska Farm Women. (141) No. 239 (Use of Alfalfa Pasture for Fattening Cattle (142) No. 240 Alfalfa Wilt in Nebraska. (143) No. 241 Clover in the Subirrigated Meadows of the Sand Hills. (144) No. 242 Nebraska Tractor Tests. 1920—1929, (145) No. 243 Pork Production at North Platte Substation. (146) No. 244 Types of Farming in Nebraska. (147) No. 245 Water supply and Sewage Disposal Systems for Farm Homes. (148) No. 246 Testing Ice Cream for Butterfat. (149) No. 247 Cost of Clothing the Nebraska Farm Family. (150) No. 249 Mechanical Dairy Cooler on Nebraska Farms. (151) No. 250 Raising Early Lambs from Aged Western Ewes. (152) No. 251 Barley as Hog Feed. (153) Sex and Age as Factors in Cattle Feeding. (154) No, 253 Variety Tests of Oats, Barley and Spring Wheat (155) No. 254 Rural Electric Service in Nebraska. (156) No. 255 Nebraska Tractor Tests. 1920—1930—(157) No. 256. Corn, Wheat and Rye for Fattening Lambs. (158). No. 257. Wheat for Fattening Lambs. (159) No. 258. Contribution of Nebraska Farm Women to Family Income through Poultry and Dairy Products. (160) No 259. Alfalfa Molasses Meal for Fattening Lambs. (161). No. 260. Cause and Prevention of Mechanical Injuries to Potatoes. (162) No. 261 Wheat for Fattening Hogs. (163) No. 262. Length of Feeding Period and Plane of Nutrition as Factors in Lamb Feeding. (164) No. 263. Corn, Wheat and Rye for Fattening. Calves. (165) No. 264. Housing and House Operation Costs on Nebraska Farm (166) No. 265. Nebraska Tractor Tests. 1920—1931. (167) No. 266. Cooling Milk on Nebraska Farms. *Kentucky Bulletins.* (168) No. 299. Hopkinsville Experiment Field. (169) No. 300. Social and Economic Effects of Land Speculation on Farm Families in Central Kantucky. (170) No. 301. Cost of Living and Population Trends in Laurel County, Kentucky. (171) No. 302. Quality as a Factor in the Price of Kentucky Lambs. (172) No. 303. Farm Tenancy in Central Kentucky. (173) No. 304. Effect of Vitamin D Supplements on laying Hens.

(174) No. 305. Farm Management and Incomes of Farm Families in Laurel County, Kentucky. (175) No. 306. Virus Diseases of Tobacco in Kentucky. (176) No. 307. Share Leasing Contracts. (17) No. 308. Potassium, Chlorine and Sulphate Content of Kentucky Tobacco as Related to Grade. (178) No. 309. Relation of Some Tobacco Viruses to Potato Degeneration. (179) No. 311. Agricultural Credit Situation in Kentucky. (180) No. 312. Budget Method of Improving Farm Organization & Management. (181) No 313. Analyses of Commercial Fertilisers. (182) No. 314. Effect of Soil Reaction on the Growth of Tomatoes and Lettuce and on the Nitrogen, Phosphorus and Manganese Content of the Soil and Plant. (183) No. 315. Commercial Feeds in Kentucky in 1930. (184) No. 316. Standard of Living of Farm Families in Grayson, County, Kentucky. (185) No 317. Farm Organization and Management in Grayson, County. (186) No. 318. Adaptability of Red Clovers from Different Regions to Kentucky. (187) No. 319. Organization and Management Problems of Co-operative marketing Associations in Kentucky. (188) No. 320. Studies on Shigella Equirulis. (189) No. 321. Effect of H-ion Concentration on the Growth of Strawberries in Gand and in Soil. (190) No. 322. Report on Soil Experiment Fields. (191) No. 323. Some Factors affecting the Price of White Burley Tobacco. (192) The Potato in Alaska. (193) Wisconsin Studies on Aster Diseases and their Control. *Alabama Polytechnic Inst. Bulletins.* (194) No. 231. Steer Feeding Experiments in the Black Belt of Alabama. (195) No. 232. Experiments with Legumes in Alabama. (196) No. 233. Oats with Vetch or Austrian Peas as Grazing crops for fattening Hogs. (197) No. 234. Grading up Hogs by the use of Purebred Hogs. (198) No. 235. Relation of Quality of Cotton to Prices Paid to Farmers in Alabama. *Columbia Bulletins.* (199) No. 296. Columbia Oats, A newVariety for Missouri. (200) No. 297. Influence of Yield on coasts and Income in Agricultural Production. (201) No. 299. Cotton Production in Missouri. (202) No. 301. Spraying Investigations. (203) No. 302. Factors affecting Sweet Potato in Missouri. (204) No. 303. Silo Filling Methods and Costs. (205) No.304. Electric Hotbeds. (206) No.305. Bee-keeping in Missouri. (207) No. 306. Inspection and Analysis of Commercial Fertilisers Spring 1931. *Illinoi Bulletins.* (208) No. 371 An Investigation of the Quality of Illinois Grown Wheat. (209) No. 352 Living Expenditures of a Selected Group of Illinois Farm and Smalltown Families. (210) No. 373 Harvesting of Corn Crop in Illinois. (211) No. 374 Management Factors that Influence Farm Profits in Southwest Illinois. (212) No 375 Food Requirements of Pregnancy in Swine *Florida Bulletins* (213) No. 212 Diseases of Sweet Potatoes in Florida. (214) No. 213 Potash in Relation to Cotton Wilt. (215) No. 214 Cotton Diseases in Florida. (216) No. 221 The Tung—Oil Tree. (217) No. 225. Diseases of Watermelous in Florida. (218) No. 226 Development of Strains of Cigar—wrapper Tobacco Resistant to Blackshank. (219) No. 227 Citrus Propagation. (220) No. 228 Native and Exotic Palms of Florida. (221) No. 229 Diseases of Citrus in Florida. (222) No. 230. Spraying and Dusting Cucumbers for Control of Downy Mildew from 1925 to 1930. (223) No 231. I. Salt Sick: Its Cause and Prevention. II. Mineral Supplements for Cattle. (224) No. 232. Florida Truck and Garden Insects. (225) No 233 Determination of Winter Survail of the cotten Boll Weevil by Field Counts. (226) No. 234. The two spoted Mite. (227) No 235. Crimp—A Nematode Disease of Strawberry. (228) No. 236. Swine Productions in Florida. (229) No. 237. General Properties of Some Tropical and Subtropical Fruits of Florida. (230) No. 238. Florida Truck Crop Competition. 231. No. 239 Heat Treatment for Controlling the Insect Pests of Stored Corn. 232. No. 240. Hibernation of the Cotton Boll Weevil under Controlled Temperature and Humidity. (234) No. 242. Bottom Rot and Related Diseases of Cabbage Caused by Corticium Vagum B & K. (233) No. 241. Methods for Making Counts of Boll Weevil Infestation.

D. Pamphlets, Circulars, etc.

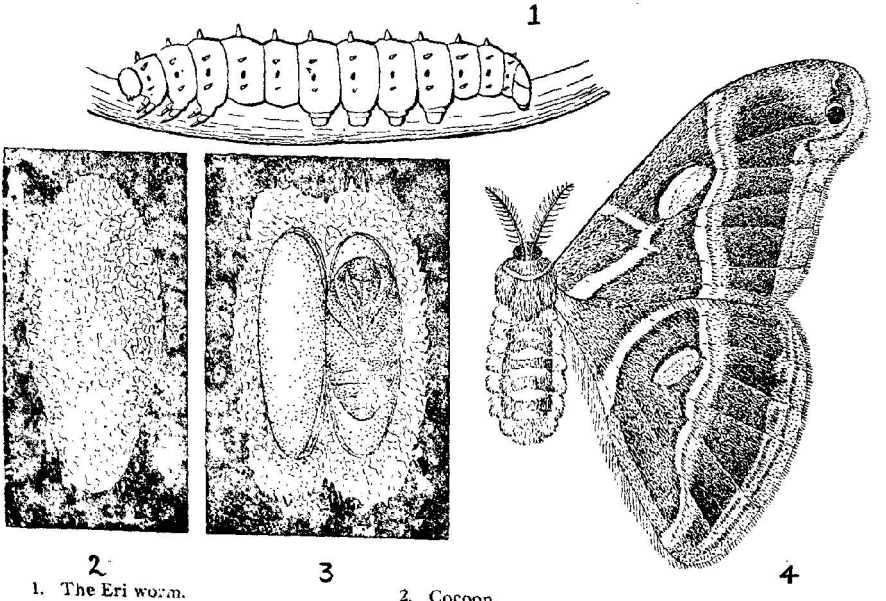
(235) The Deccan Grasshopper Pest. (*Mad. Agri. Dep. Leaflet 39*) (236) The Manuring of Coconut Palms. (*Imp. Chem. Ind. Pub.*) (237) Soil Drifting and its Control. (*Univ. Alberta. Cir. 13.*) (238) Control Soil Erosion by Crops, Terraces and Dams. (*Wisconsin Cir. 249.*) *Nabraska Circulars* (238) Seed Corn Treatments at the North Platte Substation. (240) No. 39 Swine Sanitation. (241) No. 40 A Manual for Hog Raisers. (242) No 41 Selection and Management of Kerosine Cook stoves. (243) No. 42 The Use of a small Electric Motor in Silo filling. (244) No. 43 The University Fruit Farm. *Iowa Circulars* (245) No. 121 Pork Products in Foreign Trade. (246) No. 122 Swine Publications and Associations. (247) No. 123 Weeds in the Vicinity of Elevators. (248) No 126 Manufacture of Cottage Cheese in Iowa Creameries and Milk Plants. (249) No. 127 Prevention of Wind and Fire Losses to Farm Buildings. (250) No. 129 Feeding Hens for Egg Production. (251) No. 130 Feeding and Management of Horses. (252) No. 131 Varieties of Tree Fruits for Iowa Planting. (253) No. 132 Strawberries for Ice Cream Manufacture (254) No. 133 A Survey of Iowa's Poultry Industry (252) No. 134 Asparagus Insects in Iowa. (256) Kudzu—A Forage Crop for the Southeast. *U. S. A. Leaflet 91.* (257) The Write—Pine Weevil. *U. S. A. Leaflet 91 Cir. 221.* (258) The Glenndale Gooseberry. *U. S. A. Leaflet 91. Cir. 223.* (259) Notices of Judgment under the Food and Drugs Act. 18551—18650. *U. S. A. Leaflet 91. Pub.* (260) Notices of Judgment under the Food and Drugs Act. 18651—18700. *U. S. A. Leaflet 91. pub. Alabama Circulars.* (261) No. 54 Johnson Grass Hay Versus Timothy Hay As a Feed for Horses and Mules. (262) No. 57 Kudzu in Alabama. (263) No. 58 Experiments with Hay Crops in Alabama. (264) No. 59 The Trench Silo. (265) No. 60 Small Grain Crops in Alabama. *Florida Press Bulletins.* (266) No. 435 Powdery Mildew of Crape Myrtle. (267) No. 436 Orange Rust of Blackberries. (268) No. 437 Brown Patch of Lawns and Golf Greens and Its Control. (269) No. 438 Pear Blight and Its Control. (270) No. 439 Fig Rust and its Control. (271) No. 440 Formaldehyde Seed Treatment for Loose and Covered Smuts of Oats. (272) No. 441 Insect Pests of Cotton. (273) Laying Hens Do Not Need Charcoal. *Mississippi Press Cir. No. 425.* (274) Threshing by Portable Power Threshers. *Agri. Supp. No 47 to Cyprus Gazette No. 2218 dated 27—5—1932.*

Fig. 1 STAGES OF MULBERRY SILK WORM



1. The Silk worm. 2 & 3. Cocoons.
4. Male moth. 5. Female moth. [From I. M. N.]

Fig. 2. STAGES OF ERI SILK WORM



1. The Eri worm. 2. Cocoon.
3. Cocoon cut open to show pupa inside. 4. Female moth shown with wings of one side only.
[From Fletcher].