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OF

The Madras Agricultural Students' Union.

Vol. XI.

January 1923.

No. I.

Agricultural Stations and District work.

S. N. VENKATRAMANAN, B. A., IIIRD B. Sc. CLASS.

Popularly speaking the object of an agricultural station is the study and practice of improved methods in agriculture. As its nature implies this study has to be conducted in a very careful and systematic way i.e., on a scientific basis as is intended, on all agricultural stations. Although in all stations the aim is the same—the improvement of agriculture—they have to be localised in their functions, as conditions are mostly limited in character. Particular tracts are suited for particular crops and stations established there can be devoted only to the crops in question. Thus the Taliparamba tract is only suited for pepper and a farm in the Ceded Districts can take up nothing more than cultivation as practised in the tracts round about. Sometimes agricultural stations are also established for the study of particular diseases. The Samalkota farm was opened for the investigation of 'red rot' in sugarcane and the Taliparamba farm for 'pollu.' These differences apart, agricultural stations can be divided into the following classes:—

1. Educational stations
2. Experimental stations.
- and 3. Demonstration stations.

Educational Stations. The use of these is obvious. Here men are trained for departmental or other needs. The knowledge that is gained is of a general kind and covers a very wide range. They prepare the way for specialisation. The end justifies their maintenance. Their function is not only to train the educated for the arduous and extensive work that is to be done by these men in experimental and demonstration lines, but also in teaching the large mass of unlettered agriculturists. The latter factor is not the less important as literacy in a ryot smoothens the way for agricultural progress.

Experimental Stations. The experimental work of agricultural stations is by far the most strenuous and certainly also the most useful since it is from the work done here that every other work originates whether experimental or demonstrational. Every experiment has only one object in view. It may be, whatever the kind of experiment, a comparative trial of particular varieties or of different manures; it may be the evolving of a new variety or the improvement of a type; often it is simply the study of a disease of economic importance. In a study of this kind all factors that tend to vitiate the results have to be eliminated and this is by no means an easy task. Ordinarily even conditions over which man has control are difficult to manage and good account has to be taken of conditions over which man has no control as the heat of the sun, the quality of rainfall, and what is of as much importance to the plant, changes biological and bacteriological that occur from day to day in the soil. With such impediments in his way the task before the experimenter is by no means easy. As he aims at accuracy the cost of the experiment should be of no account and considerations of money are not spared in equalising conditions and eliminating interfering factors. Further, much time has to be taken here, as any fact that is given publicity should be verified in all possible ways.

It is an uninformed public whether educated or otherwise that is impatient with the slow work done in experimental stations, for experiments require sufficient time before any conclusive evidence is available in favour of, or against existing or doubtful opinion. For example, plots have to be standardized and this may take us ten years. Experiments have to be carried on for a number of years, plots have to be multiplied, the probable error has to be calculated and allowance made for all factors bearing on the question. This shows the experiment has to be repeated on a field scale and what might have been ascertained in pots may not prove true here. Thus the experimenter subjects his evidence to a very rigorous trial and no wonder much time is taken up. A new type of seed for instance may need as many as eight years for trial before it can be put into the ryot's hands and this period is not at all disappointing as in many cases several types are rejected after a year or two. Even a comparative trial of a local variety in the paddy breeding station has to be taken so far as the F₃ generation and thus one to three seasons. How much more difficult should be the evolving of a new variety by crossing where little is known of the ancestral history of the plants in question and not much about the variation and heredity in the germ plasma.

Demonstration Stations. These deal with the work of publicity and propaganda. That a new type of seed, say company No. 2 cotton is evolved is not enough. It must be made available to the ryot by growing the crop on the farm itself. They are requested to come and judge its merits. Some cultivators are persuaded to grow a small quantity in their own fields. The demonstrator goes from village to village to arrange for such small plots. Companies are given samples for ginning and to assist in the spread of the variety. If after passing through these stages the variety still does not yield its right to merit, it is gradually grown over larger and larger areas.

The above is a simple case. The work of the stations includes a demonstration of improved methods, as the working of ploughs like the monsoon or the tractor; the value of some breeding cattle

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or an economic method in dairying; construction and use of such new appliances as the 'Sindewahi' furnace; it has to show how to grow cleanly and well crops in the locality. The work is therefore extensive.

Publicity and propaganda work is done by the demonstrator. It is not all ryots that can afford to go to the farm; most are rich, many are not interested and the majority of them live a long distance away from the station. But all are concerned in the study and practice of improved methods, the more so as they begin to cultivate on a large scale introduced money crops—crops of commercial and industrial importance. The cultivator must move with the changing necessities. Further a ryot who has learnt of a more efficient and economic factor of production will not be overwilling to confide it to his neighbour. It is not in his interest to do so. On the other hand a demonstrator can do this, since his interest is not narrowed down to a particular ryot but to the ryots as a class. His work lies even further than this. He is in fact, the intermediary between the station and the cultivator—the necessary link in the chain. It is to him that ryots come for help in getting a new plough, a particular manure, or seeds of varieties. The cultivator consults him also with regard to the attack of a pest or fungus on his crop the kind of manure to be applied thereto the growing of a new crop, the introduction of new appliances as the 'Sindewahi' furnace, for example and a thousand other things of the kind. Besides it is not enough that the agricultural station grows a good crop. The ryot may attribute it to the employment of extra labour and capital which is beyond his powers. It is the duty of the demonstrator to show that the crop can be raised in an equally profitable way in the ryots' own land. Herein lies the significance of his work. What has been done in the station to good advantage, it is the duty of the demonstrator to see done in cultivator's lands. The value of his work therefore cannot be over estimated.

Such work as the agricultural stations are doing and intend to do is beset with innumerable practical difficulties. Firstly the ryot is highly conservative, and as he holds on to what has been handed

down to him from his fathers, as a divine injunction, he treats all agricultural advice given, with indifference, sometime even with distrust. To add to this is the question of lifelong acquaintance. He does not believe in the idea of a non-agriculturist taking to agriculture for the advancement of the ryot. In fact he has no faith in education for an agriculturist. To him a literate cultivator is something of an anomaly. With these opinions, the discouragement he gives to demonstration is not suprising.

In agricultural stations another purpose is tackling problems which are considered feasible by ryots for further improvement and scrutiny and training of officers for local conditions.

The opinion of educated classes about agricultural stations is another detrimental factor. This is due to prejudice or ignorance. A common question is, "What has the department done up to now with the aid of agricultural stations." This question is easily answered.

There are at present in India under superior varieties and strains of seed more than $2\frac{1}{2}$ million acres of cotton and a million acres each of paddy and wheat. Even estimating the extra profit accruing from each at the low rate of rupees two per acre, there would be a total annual profit of 90 lakhs of rupees, a sum "which far exceeds, the total annual expenditure of all the departments of agriculture in India. In the Madras Presidency alone the gain due to the eradication of a low grade cotton—the 'pulichi'—and substitution, for the local varieties, of company numbers 2 and 3 over nearly 600,000 acres in the Tinnevely District can be estimated at over several lakhs of rupees. The evolution and introduction of a new variety of wheat resistant to rust by Mr. and Mrs. Howard has been a source of considerable saving to Northern India. The transplantation of paddy in Southern India by improved methods is said to save seedlings for the presidency enough to transplant the whole of the Tanjore Delta. The increase in the income of the ryot population from such improvements in agriculture as have got beyond the experimental stage has been recently estimated at $2\frac{1}{2}$ crores of rupees for 1921—22. The amount spent on the department from the years 1906—7 up to now, is only 80 lakhs of rupees. The comparison is a standing record of

the good work done by the agricultural department. This is not all. The present achievements of agricultural stations is small compared to what they can do in future. To state facts and figures, the damage done to America by the boll weevil is estimated at 12 million pounds per year. '*Chloridea obsoleta*' in Egypt causes no less serious a damage. The danger due to red rot in India is estimated at over hundred lakhs of rupees. Even the saving of one rupee per acre in India will cause a net profit of ten lakhs of rupees to Madras from paddy alone. The loss due to insect pests in our Presidency is estimated at 200 lakhs of rupees. All these losses can be minimised and much saving effected through agricultural stations. One can very well understand then, their importance to the country.

The argument that they have done but little work up to now is both erroneous and misleading. All research *does* take a long time. It took more than 6000 years for a Galileo to appear and prove that the earth moves round the sun, it was later still that Newton propounded his laws of motion; the knowledge of chromosomes is of a very recent date; bacteriology is a science of yesterday and what knowledge we have at present of chlorophyll, protoplasm, chromosomes, enzymes or vitamins is knowledge that has to be considerably supplemented. When progress has been slow even in such sciences as Chemistry where delicate appliances can be used in a laboratory, how much more so in agriculture where we deal with earth, water and air, where environments play a deciding part and where with all systematic study that has begun only very recently much has been done; more can yet be done.

The Sago Palm (*Caryota urens*).

K. G. NAMBIAR, FARM MANAGER, KASARGODE.

The sago palm, a charming tree with a straight trunk 30 to 40 ft. high and 3 to 5 feet in girth is found growing in large numbers in the hilly regions of the West Coast and scattered in the agency tracts and no desire to cultivate it on an improved scale is now shown by the

ryots since the economic soundness of its cultivation is not apparent. Generally the ryots devote their attention to problems that secure immediate returns. By the cultivation of the sago palm there is no prospect of getting returns until the 10th or 15th year, and unlike the coconut palm there is no continuous return. The characteristic feature of this palm is that when it flowers and seeds it dies. Sago palms are found on the borders of coconut gardens in several places on the West Coast.

Two varieties are recognised. They are locally known as 'Vazhapana' and 'Anapana.' The former name is given to those that grow a little taller than the plantain and the latter to those, leaves of which form a very favourite food with elephants. Vazhapana flowers earlier, yields more juice when tapped, and grows to a less height than the Anapana. The sago palm is considered to be a very exhaustive tree. Its roots cover a large area. Volunteer seedlings found below old palms are collected and planted in the beginning of the rainy season near the boundary walls of dwelling houses. Sometimes flying foxes and toddy cats eat the fruits and drop the seeds and thus act as the media for dispersal of seeds. I have seen the seedlings on sale in the Ponnani Bazaar. The price varied from half an anna to two annas per seedling according to the size and age. No care is generally bestowed after planting these.

The usefulness of this tree lies chiefly in the following ways:—

- (1) A kind of flour is made from the pith of the tree. The preparation is very simple. The whole tree is cut down, chopped well in a mortar, mixed with water and strained in a piece of cloth. The powdery substance which settles down as a semi-liquid is separated by decantation of the supernatant liquid. By drying this clean white stuff in the sun the flour is obtained. This is found to be an efficient substitute for the staple rice food and poor people depend upon this food during times of scarcity. This is highly nutritious and palatable. This is also considered a very refreshing and cooling food. This is used mixed with a small quantity of rice flour or alone as bread or boiled into a thick gruel or kanji and eaten.
- (2) Fibre is prepared from the midrib of the leaves. This is strong and durable and is used for fishing lines as it

resists action of water for a long time. The fibre also is used for making brushes and is therefore exported to foreign countries. (3) The split trunk is used in house construction, and in cattle stalls.

The inflorescence appears when the palm has ceased to grow i. e., after about 10 to 12 years of planting or growth. The subsequent inflorescences appear from the axils of leaves regularly one after the other from the top to the bottom at an interval of 3 to 4 months. In all there will be about 8 to 10 inflorescences on a vigorous palm. The first inflorescence is locally known as 'Mudi,' the second 'Molas' and the subsequent ones, 'Kolas.' Of these the Mudi and Mola are not generally tapped for juice. Only the Kolas are tapped for juice either sweet or fermented.

Tapping consists in opening the spathe when the spadix has attained proper maturity. The spathe alone is then cut and removed. The clusters of flower stalks that can be generally seen hanging are now exposed. These flower stalks which are about 120 in each inflorescence are individually treated. The treatment consists in massaging these from the top to the bottom by means of the finger gradually and carefully. This operation demands considerable patience and time working each day both morning and evening and is continued for about 10 days. The flower stalks that are hanging down are all then collected in the hand and tied together firmly, by means of strong fibre prepared from the leaf stalks of the same palm, making in all 10 to 15 knots according to the length of the flower stalks. At the lower end at the tip of the inflorescence, a cut is then made with the sharp tapping knife just to see whether the juice is oozing out and the preparatory operation is successful. If at this time juice is not seen dripping, massaging is again continued probably for another 5 or 6 days more. On or about the 15th day when the juice is found dripping a large mud pot is suspended and tied firmly to the inflorescence. The tip of the inflorescence is then cut off or sliced daily twice or thrice and this operation is repeated so long as the spadix is long enough to yield juice. If the tapping is done for sweet juice, a small quantity of powdered lime is sprinkled in the mud pot kept hanging below the inflorescence to collect juice. In some places the juice is emptied only in the morning, while in other places emptying is done in the evening

also. Boiling the juice and the preparation of jaggery are exactly in the same way as coconut sweet juice is boiled. On an average about 10 to 15 bottles of juice will be obtained from each inflorescence which can be tapped for about five months continuously. Instances are not wanting where a single inflorescence has been tapped for even nine months. The rent for tapping varies from Rs. 1-8-0 to Rs. 2-8-0 per inflorescence tapped. In all about Rs. 20 to Rs. 25 will be realised from a palm by giving out for tapping. In some places in Ponnani where these palms are given for tapping for sweet juice the tapper gives the juice of alternate days to the owner of the Palm who makes jaggery from his house. If the tapping is done for fermented juice the tree tax to be paid to the Government is Rs. 15 per palm per year.

Extracts.

Results in Australia in Planting Sugarcane.

In a summary of 21 years' work of the Sugar Experiment Bureau by H. T. Easterby, Director, which is appearing in the *Australian Sugar Journal*, very interesting data are given concerning the most suitable distances between the plant in the rows and the width of cane rows. In this experiment one variety of cane was utilised for one set of experiments whereas another variety was used for the second set. In the series dealing with a number of plants in a row the distances between the rows was uniformly five feet and interesting data are given as to the amount of cane used per acre as seed which is given below:—

	Distance between plants.	Plants per acre.	Eyes per acre.	Weight of seed per acre. Tons. cwt.	
Continuous stick in the row.	...		34,848	2	10
6 inches apart.		6,969	20,907	1	10
12 do.		4,076	14,927	1	2
18 do.		3,867	11,601	0	16
24 do.		3,168	9,504	0	14
36 do.		2,323	6,969	0	10

And in the second series the same data are given relative to the distances between the rows:—

Distances between plants.	Plants per acre.	Eyes per acre.	Weight of seed per acre. Tons. Cwt.
4 feet apart.	8,712	26,136	1 18
5 do.	6,969	20,907	1 10
6 do.	5,808	17,424	1 4
7 do.	4,978	14,934	1 2

The total results by these distance experiments covering plant, first, second and third ratoon crops are given in the aggregate, and it is remarked the results of the ratoon crop followed very closely those of the plant crop. The total results of these crops are as follows:—

First Series (Aggregate of Four Crops).

Distance between Plants in Row.	Cane per acre. Tons.	Sugar per acre. Lbs.	Sugar per per acre. Tons.
Continuous stick in row.	291.7	63,113	28.1
6 inches.	198.8	62,214	27.7
12 do.	186.2	58,328	26.5
18 do.	166.0	56,619	25.0
24 do.	177.7	57,157	25.2
36 do.	152.1	51,285	22.8

Second series (Aggregate of Four Crops).

1.4 feet apart.	246.2	86,392	38.5
2.5 do.	208.4	75,514	33.5
3.6 do.	190.8	65,447	29.1
4.7 do.	181.0	64,452	28.7

It is noted that the differences in the results between the first series and the second series are very marked. From the data obtained the variations and the difference between the rows are seen to have a more definite bearing upon the crop results than the variation between the plants in the rows, though the extremes in both instances are very great. In discussing these Director Easterby states as follows:—

"The different nature of soils and differences in climatic condition can also have an influence upon the settlement of this question. For example, in the northern districts, with heavy rainfalls and moist conditions, the small distance between the rows may not be so advisable. Again in the South, where droughts can be long and furious, a small distance between the rows can quickly exhaust the moisture content of the soil, so that the crop cannot reach anything like maturity; while if the rows were six feet apart the moisture may be enough to bring a lower weight of cane to a condition fit for cutting. As an illustration of this it may be stated, in connection with the maize crop, that when a drought is imminent, and actually coming on farmers have been advised to cut out every other row, so that the remaining row could get the advantage of the total moisture in the soil, and this has resulted in a half-crop to maturity, whereas, had the whole crop remained upon the ground, not an ear or corn would have been formed on any of it. These facts show how many, and how intricate, are the conditions and factors which relate to the question of planting." In commenting upon the results it is stated that these experiments were carried out where soil conditions and rainfall are relatively uniform and favourable to the cane crop.

The conclusions which may be safely drawn from these experiments at Mackay are, therefore:

First. Plants with three eyes placed 6 inches apart in the row, or even closer, is found to be the best method of planting the sets in the row.

Secondly. Any increase in distance between the rows exceeding 5 feet is likely to result in a low weight of cane and yield of sugar per acre, while 4 feet between the rows has been found to result in a considerable increase, both of cane and sugar.

It has, however, to be carefully borne in mind that these experiments must be considered as applicable only to the Mackay district in normal years. In the North, with its heavy rainfalls and moist humid conditions, thick planting may not be at all advisable, while south of Mackay, where droughts are not uncommon, a wider distance, providing more moisture for the cane, may be imperative."

The results are continuous stick in the row yielded 201.6 tons of cane per acre equal to 63,113 lbs of sugar. 6 inches apart rows gave 198.8 tons equal to 62,214 lbs sugar per acre whereas figures for 12", 18", 24" and 36" apart are 186.2, 166.2, 177.2, 152.1 tons per acre respectively of cane with corresponding decrease in the acre yield of sugar. When the distances between rows were 1.4, 2.5, 3.6 and 4.7 feet apart, the yield of cane in tons per acre was 246.2, 201.4, 190.8, 181.0 with a correspondingly decreasing yield of sugar as they rose up further part. This justifies the methods adopted by the Coimbatore cane growers where they use 15,000 to 20,000 per acre. The yield of jaggery is between 25 to 35 pothies rarely reaching 40 in very good crops where the number of setts per acre is between 40 and 60 thousand per acre, the higher yield being obtainable from better drained soils.

It may be worth our while to get some of the varieties of canes of the more rainy tracts of the Mackay District for trial in the West Coast, as it appears that the canes of the less humid countries do not maintain their purity of juice in the West Coast.

K. U. M.

The effect of Sudan grass on the Biological Processes in the soil.

PAUL EMERSON AND ROLAND D. FLETCHER.

It is a well known fact that plant foods are constantly disappearing from soils regardless of the cropping methods which are followed. Some crops may remove more plant food than others and are spoken of as normal or heavy soil feeders according to the amount of soil derived elements required for their growth. Sudan grass may be classed as a heavy soil feeder. It has an ash content of over 6%, is very rank in growth and therefore may remove large amounts of soluble plant foods from the soil.

It is usually assumed that in the competition for food between soil organisms and the growing plant, the former may be limited in their activities by the needs of the latter. It becomes of interest therefore to determine what effect a heavy soil feeder like Sudan grass has upon the biological processes in the soil.

Sudan grass, in spite of its heavy feeding habits, does not materially reduce the crop-producing power of soil, neither does it influence the soil in responding favourably to the application of common fertilizers.

Sudan grass lowers the total bacterial content of the soil on which it grows, but apparently does not interfere with the physiological activities of the micro-organisms which are concerned in the production of available plant food.

The organisms concerned in the transformations of nitrogen in the soil are favourably influenced by the growing of Sudan grass. This effect is particularly noticeable in its effect on the various crops.

Journal of the American Society of Agronomy.

Indigo crop. The area sown with indigo in the Madras Presidency up to the end of November 1922 is estimated at 149,600 acres, a decrease of about 18 per cent below the area of 180,600 acres estimated on the corresponding date last year. The decrease is general being due to want of good sowing rains and the lack of demand. The area fell from 71,500 acres last year to 46,100 acres in the Circars, from 38,800 acres to 31,400 acres in the Deccan, and from 56,000 acres to 52,000 acres in the Carnatic. The area in Salem increased from 2,000 acres to 34,000 acres owing to the cultivation of indigo as a green manure crop on a larger scale.

The crop suffered from drought in August and September. The yield per acre is estimated to be about 92 per cent of the average.

The crop is mainly manufactured into dye but also applied as green manure. If the whole crop were manufactured into dye, the possible yield would be about 1,700 tons against 2,159, tons of last year.

(Pub. Bu.)

December Paddy Forecast. The area sown with paddy in Madras up to 31-11-1922 is estimated at 9,545,000 acres. This represents an increase of 902,000 acres over the estimate made in October 1922 which referred mainly to first crop sowings.

The first crop has been harvested everywhere. Bumper yields have been reported from the West Coast where the season was favourable. Elsewhere yields below normal have been generally reported owing to the drought in August and September. In Tanjore, heavy showers in June spoiled the physical texture of the soil and impeded drainage facilities while the development of grain was interfered with in some places owing to the heavy rains of September.

The cyclone in Kistna towards the end of November caused some damage to the standing crops and the excessive rains in November affected the crops in other districts also to a slight extent.

The seasonal factor for the Presidency works out to 96 per cent of the average.
(Pub. Bu.)

Notes and Gleanings.

Indebtedness. Farmers head the list of bankrupts in England and Wales for the year ending December 31st, 1922. English farmers purchased farms on the faith of the guarantees in the Corn Production Act 1916—in other words, they bought on the basis of war prices for grains which were guaranteed for five years after the passing of the Act.

The Scottish Farmer November, 25, 1922.

Milk. In the course of an article 'Peril of Milk' in 'Nature,' for November 11, 1922, Professor Henry E. Armstrong observes, "To justify Pasteurisation, we have to show that no harm is done to milk by heating it above blood heat. To heat it above this temperature is to treat it *unnaturally*—this has been proved up to the hilt. The contention is that by making a certain addition, we can compensate for the alteration—but we have only superficial evidence in favour of this contention. The bad teeth of our (English) Nation are probably at least in large part due to defective nutrition in early years and *Nations whose children are all breastfed have good teeth.*"

Madras Daily Weather Chart. We regret the decision of the Government that no reports shall in future be published daily of the observations made from the first of January to the thirty-first of March inclusive every year.

Sugar. Owing to the high prices of sugar in 1920, India imported only 236,095 tons of refined and unrefined sugar compared with an average importation of about 700,000 tons and in 1921, the total imports of refined sugar alone were 513,986 tons of which Java supplied 533,943 tons and Mauritius 25,161 tons.

The Louisiana Planter, November 18, 1922.

A New Textile Fibre. Mr. A. S. Moore directs attention to the possibilities of the new textile fibre "arghan," which Sir H. Wickham noticed in native use in South America and introduced four years ago into the Federated Malay States, where the authorities granted 30,000 acres for its cultivation. It is a plant of the pine apple type, and its leaves split readily into fibres 5 to 6 feet in length, which resemble silk and exceed the best hemp and flax in strength. It resists the action of sea water, and will be invaluable for nets and ship cordage; it spins and bleaches well and retains all dyes, and makes a firm cloth when woven either alone or in combination with cotton or flax.

Nature, dated 18th November 1922.

Fiji disease of cane. The Fiji disease of Cane which manifests itself by the appearance of galls on leaves and roots has been determined by Mr. Frank P. Mowhorter of the Department of Plant Pathology, University of the Philippines, to be due to an organism of the order Protozoa or Unicellular animals of the type of Amoeba. This organism was found by him to be invariably associated with galls on cane whether they be formed on the leaves, the roots or sometimes inside the internodes. After making a study of the organism he has

named it *Phytamoeba Sacchari* sp. m. Although it is not known exactly how the organism is carried from one cane to another, it is believed to be insect-borne.

The Philippine Agriculturist November, 1922.

Y. R. R.

Plant Physiology. In his presidential address delivered to the Botany section of the British Association at Hull in September 7, last, Prof. H. H. Dixon controverts the usually accepted view that organic substances are distributed throughout the plant by means of the bast, and develops his argument to arrive at the conclusion that their transport is effected through the tracheas of the wood. These substances, according to him, travel dissolved in the water filling these channels which is moved by transportation, expansion of the growing cells, or root-pressure and the function of the bast is to present a maximum surface to the tracheae.

Vegetable Rennet. Mr. R. Hedger Wallace writing to 'Nature' October 21, 1922 gives the following list of plants used in various countries for coagulating milk in place of rennet obtained from the stomach of young animals and wishes for any information as to plants used in former days or at the present time, the parts utilised and the *modus operandi*. *Galium verum*, *carduus nutans* withania coagulan, *curcus benedictus*, *Ficus carica*, *Drosera peltata*, *cynara cardunculus* *Datura stramonium* *cynana scolymus*. *Pisum sativum*, *Lupinus hirsutus*, *Rhazya stricta*, *Ricinus hirsutus*, *streblus asper*, *Pinguicula vulgaris*, *Leucas cephalotes*, *crotalaria Burhia*.

Arsenical Poisoning. The medicinal treatment for arsenical poisoning should be prompt and thorough. In small animals, such as dogs and cats, an emetic is advisable, such as salt and mustard in about 3 oz. of warm water. With horses and cattle, medicine must be given, which forms an insoluble compound with the arsenic.

The following treatment is recommended:—Take about 2 oz. of ordinary washing soda, and dissolve it in about half-a-pint of water, then add 2 oz. liquor ferri perchlor; a sediment forms, and it is then strained through a piece of fine linen and the sediment collected and mixed in 1 pint of cold water and given as a drench, being repeated every half-hour for at least five or six doses.

Queensland Agricultural Journal.

Wool fat and sheep fleas. Mon-Dealance states that a live sheep is quite as practical an oil-trap, as the wool fat asphyxiates the fleas. There may also be a possible toxic action of the fat. It is well to starve the fleas for a few days before introducing the sheep. These animals are particularly suited for the purpose of clearing such flea-infested buildings as pig-sties, where the oil trap is unsuitable. The pulicidal property of sheep fleeces explains why these animals are free from fleas. It is known that the sheep ticks, especially *Rhipicephalus*, infest the ear, and the author believes that this place is chosen as a shelter against the noxious action of the wool fat. According to a statement by Dr. Weisgerber, a sheep-skin, even if washed, can serve as a flea-trap, and the natives advised him to use a sheepskin as a bed mat in order to rid himself of fleas. He thinks that the flea is held captive by the hairs.

(Le Monton Piegé a Puces—Bult. Soc. Path. Exot. Paris XV, No. 6 14th June 1922 pp 416—418). Rev. App. Ent. series B. October 1920.

Dr. Harold Mann, Director of Agriculture, Bombay Presidency, has been touring the rural areas in Sind for the last fortnight, with the object of popularising his new scheme of carrying on agricultural improvement through cooperative societies.

In an interview Dr. Mann said that there was immediate scope of increasing by 20 to 30 per cent the total agricultural produce in Sind and the Presidency by improved methods of agriculture, and he was of opinion the same was true in the rest of India. The charge of conservatism against the Indian peasantry was a libel. The Indian peasantry, like the peasantry in other countries, were

as conservative as they must be. He also repudiated the popular theory that illiteracy or absence of elementary education was a necessary bar against all agricultural development in the country. What the Indian peasantry really lacked, Dr. Mann pointed out, was resources, chiefly capital, for experiments and improvements. Unlike the European peasantry, the Indian peasantry lived without absolutely any capital, except land, and perhaps a pair of oxen and cheap primitive implements. The rest was borrowed capital at very high interest. His one object was to organise agriculturists in order that they should have resources to improve agriculture, increase produce and safeguard their own interests. At present he may be carrying this out through co-operative societies and by conducting experiments on agriculturists' own farms.

20-11-22. T. S. V.

Research supervision, if conscientiously given, involves the complete absorption of the director's energy and leisure. There is a rich reward in seeing pupils develop as independent thinkers and workers, but the supervisor has to pay the price of seeing his own research output fade away. He will have more conjoint papers, but fewer individual publications, and limitation will be placed on the nature of his work by the restricted technique of his pupils.

I have defined a high standard, almost an ideal, but there is of course, the easy alternative to use the technical skill of the graduate to carry out the more laborious and mechanical parts of one's own researches, to regard these young workers as so many extra pairs of hands. I need not elaborate the outcome of such a policy.

Irvine on "Organization of Research." Nature 16-9-1922.

Educational work of the Ministry of Agriculture. In most cases the Agricultural Department is actually part of the University organization and it is recognised in many respects this is an ideal arrangement. Agricultural students thereby obtain the intellectual stimulus that is associated with intercourse with students in other faculties. Future teachers, scientific workers and agricultural experts all gain by

the indefinable atmosphere which pervades a University course. On the other hand, it has been found that although, theoretically, expenditure should be saved by taking advantage of the courses in general science which a University provides, in actual practice it has proved necessary to provide special teaching even in preliminary science subjects designed for the agricultural students. By means of this special teaching an agricultural flavour is imparted to Chemistry, Botany, Zoology or whatever the fundamental science may be, and thus from the very beginning the students' interests are awakened and stimulated.

Nature, 16th September 1922.

Y. R. R.

How to build up a breed quickly. E. I. Ivanoff, Director, Breeding Station, Moscow, in an article on the use of artificial insemination, in the Journal of Agricultural Science, July 22, observes that its practical importance is to be found in the possibility by means of this method to utilize the seminal fluid, secreted by the male when covering the female, for inseminating a number of other females (10—20) that are on heat, to combat the barrenness caused by various mechanical obstructions (stenosis of the neck of the womb, deglexin of the neck of the womb, polyfrick), to cross animals differing very greatly in size and weight; to utilize the reproductive capacity of a valuable male in case of fatal injury or death resulting from causes of a noninfectious kind. One of the advantages claimed lies in the fact that it dispenses with the necessity of bringing the most valuable male in close contact with the unknown female as the semen can be obtained with the aid of a well known female or one specially selected for the purpose. This is important in areas where such diseases as glanders, and dourine are met with.

Secondly as the whole process takes place under the control of the microscope, a breeder is enabled to determine the productive abilities of the male before his stud career commences and not after as in the case in natural insemination. Its greatest importance lies in its application for purposes of mass raising of domestic animals and fullest utilization of particularly valuable males.

Time is saved and a desired breed can be built up in a much shorter period of time, and a larger number of progeny makes possible a more careful selection. We would refer our readers to the 'Mahabharata' for ancient analogies on the above subject.

Effect of Time of application of fertilisers on quantity and quality of produce:—In the Agricultural Experiment Station at Berkeley, California, W. F. Gericke conducted a series of trials with a number of cereals and non-cereals to determine whether it is the stage of growth of plants or their age when nutrients are applied that affects the quantity and quality of product obtained from a given unit application of nutrient. The conclusions arrived at are as follow:—

"Under certain conditions when the rate at which nitrogen becomes available, is of such a low order as not to permit of fairly good aerial growth of plants, the life of the plant is prolonged.

Under other conditions when the supply of nitrogen is deficient and air conditions make for excessive transpiration, the life of cereal plants may be shortened by the inadequate supply of a given nutrient. Applications of nitrogen made to progressive older cultures resulted in progressive increase of tillers but correspondingly shorter stalks.

Up to a certain age of the plants, the longer after the time planting before nitrogen was applied, the greater was the yield of straw and grain.

The older the plants were, when nitrogen was applied, the higher the percentage of protein in the grain.

Differences in ages of growth of plants produced correlated differences of growth responses. It appears therefore that the relative physiological status expressed by differences in age is an important factor that affects quantity and quality."

We have known certain cakes such as margosa cake applied to paddy crops after weeding in some parts of the Tanjore Delta. Has it any significance?.

Journal of American Society of Agronomy, November 1922.

What brings profit in cultivation. In the course of a letter on Land Tenure which he has written to the Scottish Farmer, December 30, 1922, 'Land Agent' states "Fixity of tenure and free sale were legalised throughout Ireland by the Gladstonian Land Legislation which proved a ghastly failure. It created dual ownership which set every body fighting, produced a pandemonium and to terminate the outrage the British Government had to step in and buy out the landlords which up till now has cost 125 million pounds. There may have been a *prime facie* reason for establishing the system in Ireland as in many cases the permanent improvements had been made by the tenants." This would not apply to countries where landlords have largely contributed to improve the land. The crux of the whole matter is, in his view, *not the fixity of tenure or free sale, but stability of satisfactory prices.* If prices are remunerative the best will be made of the land, but if unremunerative the land will pass out of cultivation by the pressure of Economic Law and no Legislative tinkering will ever keep it under cultivation. This seems only too true when for instance our attention is directed to the increase of bankruptcies amongst farmers in England. In 1918 there were only 30 failures with liabilities amounting to £ 50,000, in 1920 the numbers increased to 44 and £ 100,000 respectively, while in 1921 they were 285 and £ 800,000.

Java Sugar. The Java Sugarcane crop finished now is estimated to be about 1,888,000 metric tons and her output during the last six years has been as follows:—

1916	1,629,823	tons.
1917	1,822,120	"
1918	1,778,208	"
1919	1,336,114	"
1920	1,543,923	"
1921	1,684,565	"

The Louisiana Planter, December, 3, 1922.

Gases in Rice Fields. From the February 1922 Bulletin of Agricultural Intelligence and Plant Diseases, we understand that researches were made in Japan on the gases formed in ricefields during the decomposition of *Astragalus sinicus* and Mr. S. Onodira, the experimenter, concludes that "*Astragalus sinicus*, when used as a green manure for rice fields, sets free larger quantities of gas consisting of methane, carbon-dioxide, nitrogen and a small amount of hydrogen. The last disappears at the end of the decomposition process. Sometimes a little oxygen was found which probably did not emerge from the decomposition of *Astragalus* but was a product of the carbon assimilation of the Algae. If *Astragalus sinicus* is left to decay in a rice field the subsoil gases contain more carbon dioxide than methane, while most of the nitrogen is found in the upper layer. *Astragalus sinicus* decomposes more rapidly in sandy soil than in clayey sands, and more rapidly in the latter than in clays. Hence gases are liberated sooner in sandy soils than in others." In this connection we may refer our readers to the results of similar work in India by Dr. W. H. Harrison and the late Mr. P. A. Subrahmanya Ayyar.

Country method of preparing white sugar in Madras. In North Arcot there are about 20 native refineries scattered all over the District. In a single village—Timiri—in Wallajahpet Taluk, there are four refineries. For sugar refining "Chakkeru Pavu" (treacle for sugar) is prepared and stored in earthen pots with narrow mouths. These pots are piled one over the other on a sloping cemented floor with their mouths turned down so that the molasses runs out without difficulty along a long gutter and collects into a pit. In this position the pots are left until they are required for use, which is never earlier than two months. The raw sugar which is left over in the pots after the molasses drains away is called *Rapu*. This *Rapu* is transferred into cylindrical bamboo baskets three feet deep and three feet in diameter. Each basket holds about 10 to 12 maunds. These baskets, when filled are placed over a bamboo platform about 6 to 9 inches high fitted on the cement floor of a room and covered over with a layer of water weeds. Here also the floor slopes to one side and the

molasses that trickles down reaches a pit. The molasses from the above two sources is then filled in casks and railed to Bangalore for being distilled into liquor. It is also sold to Messrs. Parry & Co., and the price per candy delivered at Madras or at Bangalore is Rs. 10.

At the end of 4 or 5 days the layer of weeds is removed and the contents examined, when a layer of 2 to 3 inches of white stuff which is formed is scraped off; this stuff is known as "Patchi china" (raw sugar). Each time a layer of sugar is scraped off a fresh layer of weeds is placed and the old weeds are sometimes again placed over the fresh layer. This process continues for about three months by which time all the available sugar has been gathered and the baskets become empty. This "*patchi china*" is dried in the sun and trodden over so that the mass assumes a fine condition. The product thus prepared goes by the name of "*china*" sugar and is stored awaiting a good market.

Whenever demand arises 12 maunds of china are melted in a pan over a slow fire with a constant addition of diluted milk and the scum is very carefully removed. The whole syrup is later on transferred into another pan from which small quantities are taken and subjected to a further course of boiling. From each boiling about 2 maunds of sugar is obtained. Even in this final boiling a small quantity of thin milk is added from time to time and the impurities removed.

When ready the pan is removed from the hearth and another put in its place to save time. Thus two pans are always working. After the pan is transferred to the floor the contents are very briskly agitated by 3 men with ladles, while another follows behind scraping bits of sugar adhering to the sides. These men walk nimbly round and round, and at times suddenly turn back and work round in the opposite direction. This process lasts about half an hour.

The colour of the final product entirely depends on the final working, and therefore, special care is taken during this operation and all the tools used are kept quite clean. The final product which is called *Bura* is then dried over mats for a day or two and filled

into sacks for railing to Madras. In most markets of South India this sugar always fetches a higher price than white crystalline sugar which is not considered so sweet. From 20 maunds of treacle 8 maunds of refined sugar are obtained and these 8 maunds sell for the original price paid for the treacle. It is the molasses that pay the cost of manufacture and bring in any profits. On an average the manufacturers make a profit of about Rs. 2 on each candy of treacle they purchase.

[The above note is an extract from a report on this subject prepared in 1911 after a detailed enquiry by Mr. D. Balakrishnamurthi, —now, Prof. of Agriculture, Coimbatore.—*Editor.*]

Ploughing trials at the Central Farm, Coimbatore on 22nd January 23.

Name of ploughs.	Monsoon.	*C.F. No. 1.	Chattanooga.	Country.	Konkan.	Victory
Time in Hrs. Mts. and seconds	1 17 0	1 13 15	1 15 0	1 15 0	1 15 0	1 15 0
Stoppages (a)	0 9 24	0 16 1	0 28 26	0 1 19	0 9 24	0 11 0
Actual time "	1 7 36	0 57 14	0 54 34	1 13 41	1 5 36	1 4 0
Depth of furrow in inches.	4.91	5.42	5.5	5.0	1.75	5.3
Width of furrow in inches (b)	8.52	9.60	10.25	9.7	5.2	10.6
Area ploughed in square feet.	5830	4240	3843	6885	10335	7165
Draught in cwt. (c)	2.75	3.25	2.125	2.0	0.75	2.50
Volume of earth turned over per trip in Cubic ft. (d)	77.12	97.87	103.62	44.79	16.70	103.35
Draught for 100 c. ft. of earth turned over. (e)	3.5	3.39	2.06	4.46	4.5	2.41
Weight of plough in pounds	65	53	59	42	48	84
Cost of plough in rupees. (f)	20	10	85	5	10	47

(a) Stoppages include time taken in turning at headlands and for setting and cleaning.

(b) Calculated by dividing width of plot by the number of furrows opened.

(c) Mean.

(d) Calculated by multiplying the product of depth of furrow and width of furrow by 265 feet the length of the plot.

(e) Comparative draught.

(f) Cost at Coimbatore.

N.B.—Place of trial, F. No. 17, dry land, stiff red soil land fairly dry. Number of pairs used in each case,—one of average Kanjiam breed, weighing about 1400 lbs.

*C. F. No. Plough designed by Mr. Newland.

Students' Corner.

Tour. On the 1st instant B. Sc., Class III students returned from tour in Chittoor and the Ceded Districts in the course of which they visited the graft mango gardens in Chittoor and Panyam and the wet lands under the Cumbum tank. They spent a few days in Nandyal and Hagari to inspect the neighbourhood and study the dry land cropping as representative of the black cotton soil tracts of Kurnool and Bellary. A short stay at Penukonda familiarised them with the 400-year-old grape vine cultivation in that locality. Through the hospitality of the Mysore Agricultural Department and the kind attentions of Dr. M. K. Venkata Rao and Mr. Badami Venkat Rao, the party spent a very pleasant but instructive and useful day at the Hebbal Farm.

Senior students of the short course on return after Christmas Holidays met the Professor at Katpadi on the 16th and were taken on tour to the Tamil Districts. Vellore, Tiruvannamalai, Panruti, Palur, Nellikuppam, Devanampatnam, Chidambaram, Sivapuri, Tanjore and Trichinopoly were the halting places in the Eastern Districts. In the course of this tour they were given opportunities of studying the cultivation of groundnut, cane, paddy, casuarina and tobacco and of having a view of groundnut decorticators, rice mills, the Nellikuppam sugarcane factory and Messrs Parry's steam tackle at Kozhippakkam. From Trichinopoly they proceeded to Koilpatti where they could compare the dry land cultivation of the black soil tract with similar croppings in the light soils of Vellore and South Arcot. On their way back they visited Uttangudi near Madura, had ocular demonstration of the immense benefits of irrigation as typified by the Periyar Works and could call in review the economic meaning of the interminable dead level plains of paddy in the Cauvery delta they had left behind.

On behalf of the parties of students, we tender our thanks to the district Agricultural staff stationed in the various places visited and to officers of the Mysore Agricultural Department and to Messrs. T. Sivasankaram Pillai, M. L. C., and Hanumantha Rao of Panyam for helping to make these tours extremely pleasant and interesting.

Reopening.—

The College reopened on the 16th instant and all classes except Class II re-assembled after Christmas Holidays.

University Examinations.

Announcement has been made that the Agricultural College, Coimbatore, will be the centre for students appearing for the B. Sc. Ag., Examination and the dates and papers are as follows:—

PART I.

Monday, 19th March.	7-10 A. M. 1-4 P. M.	Engineering (Written). Animal Hygiene (do.)
Tuesday, 20th "	7-10 A. M. 1-4 P. M.	Chemistry (do.) Zoology (do.)
Wednesday, 21st "	7-10 A. M. 1-4 P. M.	Botany I (do.) " II (do.)
Thursday, 22nd "	7-10 A. M. 1-4 P. M.	Agriculture I (do.) " II (do.)
Days and hours to be notified.	Engineering Animal Hygiene Zoology Botany Chemistry Agriculture	Practical work.

PART II.

Monday, 9th April.	7-10 A. M. 1-4 P. M.	Botany I (written) " II (do.)
Tuesday, 10th "	7-10 A. M. 1-4 P. M.	Chemistry I (do.) " II (do.)
Wednesday, 11th "	7-10 A. M. 1-4 P. M.	Agriculture I (do.) " II (do.)
Thursday, 12th "	7-10 A. M.	Agriculture Essay. (do.)
Days and hours to be notified.	Botany I " II Chemistry I " II Agriculture I " II	Practical work.

Estate News.

Mr Mukundaram Fotikdar, the Kashmir State Scholar, who had been with us for over six months studying Breeding Work in the Paddy Breeding Station, left for Pusa on the 31st January for further training and on the eve of his departure was entertained at a teaparty by the Agricultural College Officers' Club of which he was a member.

Plague. Conditions considerably improved during the month and there were no rat casualties (due to plague) since the beginning of the New year and the residents returned one by one to the Estate and re-occupied the quarters which they had vacated for varying periods of 4 to 10 weeks.

Quarters. A few more quarters of the Intermediate types were handed over and occupied.

Livestock. Agreeably to a reference made by the Director, Mr. Anstead, in a former issue, cows were bought of the Military Dairy Farm, Bangalore, to facilitate the study of the milk problem which Mr. Littlewood, Deputy Director of Agriculture for Livestock on his return from leave from England intends to take up at Coimbatore, which has now been made his head quarters.

Twin calves. Milker, the newly bought Bangalore Cow has given birth to twins.

Anti-rinderpest measures. Serum simultaneous inoculation was again undertaken during the month under a scheme of work laid out by the Superintendent, Civil Veterinary Department. Mr. W. H. Ware was present here to start work which was supervised by his staff. The number of animals under test was 108 which includes three private animals and 5 controls.

Editorial Notes.

Research and Teaching.

The September issue of the Experimental Station Record of the United States of America has as its editorial a review of the progress of agriculture in the United States during the last quarter of a century. Whether judged by quality or quantity in Teaching, Research or extension (demonstration) work, the results achieved are enormous. Government grants continue to be the chief source of income for carrying on investigation, though latterly private endowments have been largely coming in. It is clearly pointed out that the system of utilising Research staff for teaching purposes is detrimental to serious investigation. "Teaching involves the regular performance of routine duties, which constitute a drain upon the energies of the teacher that cannot easily be measured by the time spent in the class room. The value of the best performance of either teaching or experimenting, cannot be estimated in terms of the hours actually spent at the task. The essential thing is that the worker, whether teaching or experimenting, shall have such full command of his time and energies as to secure the best results of which he is capable." Within recent years, the amount of teaching by leading workers has considerably been reduced, being confined only to advanced or post graduate student.

Administrative work entrusted to Scientific workers is also much deprecated.

Weather lore.

It is a matter of common knowledge, with the actual cultivator that his crops depend upon the local weather conditions. Bluebooks and Bulletins find cogent reasons for the occurrence of famines in the failure of rains. A study of the weather is thus important both to the toiler in the field and the general public. Government have been publishing daily weather charts, but they

are little good to the ryot, as the number of reporting stations is so small and the data are so incomplete that no definite forecasts are possible—forecasts that will be applicable to particular tracts. It should therefore be the aim of every modern agriculturist to acquire a working knowledge of this science, so as to enable him to profit by an intelligent appreciation of the periodical weather changes. Vernacular almanacs include some sort of forecasts for the year which are often treated with contempt by the English-educated classes, who forget that the principles underlying such forecasts were recognised ages ago, and that no one has during the immediate past taken any pains to note the changes which the present day prognostications of weather would necessitate. We suppose no one of our countrymen would light-heartedly condemn the following Tamil stanza as the product of a frenzied imagination.

பாணு தனுவில் பதின் மூன்றே முக்கால்மேல்
ஆனிக்குச்செல்லு நானறு காலாம்—மானேகேள்
நண்டுமுதல் தேன் வரையில் நாலையே நாமாகாணி
கொண்ட தனுவுக் கொன்று கூறு.

This means that the quantity and direction of movements of clouds that may be visible during the period extending from the fourth quarter of the 14th to the second quarter of the 28th Margali (December—January) are a sure indication and a reflex of the weather that may prevail during the subsequent half year June—July to November—December, the first 1½ days representing June—July, the last 1 day November—December, the intervening 11½ days being equally divided to represent the five months July—August, August—September, September—October, October—November, November—December.

We would not be vain enough to think that similar opinions are not current in other parts of India. We would therefore urge upon the attention of the literati amongst the public the need for

investigating this branch of literature and popularising it in the interests of the country. We are aware that spasmodic attempts have been made by a few gentlemen, but success will not result, if such efforts are not strenuous. In this connection we would only instance the self-sacrificing labours of Mr. Mushti Subbayya of Cocanada whose death has been recently announced and of Rai Sahib S. Subrahmanya Ayyar of Mayavaram. We commend the study of this subject to the several academies and scientific bodies in India.

Lower Subordinates.

We have perused a copy of the Memorial that the Lower Subordinates of this department have, we understand, submitted to the Government. Considering the circumstances set forth, under which, these essential limbs of the Agricultural Department are reported to work, their case needs sympathetic consideration.

We hope ideas of retrenchment will not act adversely in their case as the logic of averages has no application for subordinates who draw almost minimum pay and who have but few chances of promotion.

Agricultural Engineering.

One of the means of improving Indian Agriculture is by the utilization of labour-saving implements, tools and machinery. This object has been steadily kept in view since agricultural improvement was taken up, and as a result, indigenous implements and appliances have been condemned and foreign implements and machinery introduced without scrutiny or investigation. Some of them no doubt like the Junior Hoe, Ransome's Turnwrest plough, the iron sugar-cane mill and maize hand-sheller have proved useful, but a great many have turned out to be costly failures being unsuitable for local conditions, as the makers had absolutely no knowledge of the Indian climate, Indian conditions and Indian methods of working. It was therefore but appropriate that the Government should have

later on decided to attach mechanical Engineers to the agricultural departments to investigate the usefulness of indigenous implements to improve them where necessary and to introduce and try under local conditions, wherever possible, foreign implements and machinery before they could be recommended for general adoption. This branch of departmental activity therefore is at least of as much importance as, and much more difficult of accomplishment than, the introduction of a new crop. Every ryot knows the business of crop-raising, but his knowledge of mechanical principles is extremely meagre. We are afraid this aspect has not been sufficiently impressed upon the attention of the authorities concerned. Research in this line, as in other lines of work, requires men, skill, patience, resources and leisure and would tax the energies of a score of officers. Ipswich Implements Works were not built in a day. And without any engineering work shop it is rather unreasonable for one to expect the agricultural engineering section to design suitable implements, and it is certainly very creditable to Mr. F. T. Newland that he has found time to design a plough which has been tested along with a few other types of ploughs and found satisfactory. The results are tabulated elsewhere. We would very much wish that the agricultural engineering section is much further strengthened and a work shop of the necessary size and sufficient funds provided so that suitable implements and tools may be designed and manufactured at moderate prices for the benefit of the ryot. The present staff, are without doubt capable, but would seem to be quite inadequate, since two of the assistants are devoting their entire time to teaching and will get no relief if the short course is reorganized and the third one attends to the construction of departmental works, maintenance of roads, and repairs to buildings, which work has been recently transferred from the Public Works Department. We trust the Government will not bring about any diminution of efficiency in response to the persistent demand for retrenchment, for while the standard of teaching cannot without serious detriment

be lowered in view of the importance of engineering studies in the University course, research work in Agricultural Engineering can no longer be put off without a serious set-back in agricultural improvement. We are sanguine that the person interested—viz., the ryot—would, if he could directly speak, vote for sums larger and larger still than now, as by his taking to improvements advocated by the department, he has endorsed the view that such a course is economical and beneficial to him in the long run.

Departmental Notes.

Appointment:—

1. Mr. C. Tadulinga Mudaliar, Assistant Lecturing Botanist, to act as Government Lecturing Botanist, vice Rai Bahadur K. Ranga Achariyar from the 22nd January 1923.

2. Mr. M. V. Vellodi, Deputy Collector, to be personal Assistant to the Director of Agriculture.

3. Mr. U. L. Srinivasa Rao, Sub Assistant, on probation, Government Agricultural Bacteriologist's section, transferred to the Government Mycologist's section.

4. Mr. T. G. Anantharamayyar, Assistant Agricultural Demonstrator, transferred to the Central Farm, Coimbatore.

Leave:—

1. Rai Bahadur K. Rangachariyar, Government Lecturing Botanist, leave for one month from the 3rd January 1923 in continuation of the Christmas Holidays.

2. do. do. do. extension of leave on average pay for three months.

3. Mr. E. Ballard, Government Entomologist, extension of leave for seven months and twenty-four days in continuation of leave already granted.

4. Mr. P. H. Rama Reddi, Deputy Director of Agriculture, III Circle, Bellary, leave for two months from or after 15th March 1923.

5. Mr. R. W. Littlewood, Deputy Director of Agriculture, Livestock, an extension of leave on half average pay for twelve days from 2nd May 1923.

6. Mr. E. S. Sundaram Ayyar, Deputy Collector and Personal Assistant to the Director of Agriculture, leave on average pay for four months and leave on half average pay for 2 months in continuation thereof with effect from the date of relief.

7. Mr. T. V. Subramanya Ayyar, Assistant in Entomology, extension of leave on average pay for 12 days.

8. Mr. P. Abishekanatham Pillai, Teaching Assistant, extension of leave for four weeks.

9. Mr. C. V. Ramasawmi Ayyar, Assistant in Chemistry, leave on average pay for 9 days and extension by 22 days from 10th January 1923 on Medical Certificate.

10. T. S. Ramakrishnan, Assistant in Mycology, leave on average pay for 1 month from 3-1-23 with permission to avail of the Christmas Holidays.

11. Mr. K. Narayana Ayyangar, Farm Manager, Chintaldevi, leave on average pay for one month and eight days.

12. Mr. S. Kuppuswami Ayyangar, Farm Manager, leave on average pay for four months from the date of relief.

13. Mr. A. Chinnathambi Pillai, Farm Manager, on deputation to the Sierra Leone Government, leave on average pay for eight months in continuation of the leave said to have been granted to him by that Government on the termination of his deputation to them, provided that he spends his leave elsewhere than in India or Ceylon. If he returns to India or Ceylon before the expiry of his leave, the leave will be treated as leave on half average pay from the date of landing in India or Ceylon.

14. Mr. V. S. Ramasawmi Ayyar, Agricultural Demonstrator, Nandyal, leave on average pay for four months.

15. Mr. K. G. S. Bhandari, Farm Manager, Nanjanad, leave on average pay for one day the 3rd January 1923 with permission to prefix the Christmas holidays.

16. Mr. R. Vasudeva Rao, Farm Manager, Samalkota, leave on average pay on medical certificate for one month from the 11-1-23.

17. Mr. K. Srinivasa Charya, Agricultural Demonstrator, on probation, leave on average pay for 1 day on 22-12-22, with permission to suffix Christmas holidays from 23-12-22 to 2-1-23.

18. Mr. R. Narasimham, Sub Assistant in Mycology, leave on average pay for one month from 3-1-23 with permission to avail of the Christmas Holidays.

19. Mr. K. Vasudeva Shenoi, Assistant Agricultural Demonstrator, Udipi, leave on average pay for one month from 20-11-22.

20. Mr. C. Subba Rao, Assistant Agricultural Demonstrator, Pakala, extension of leave on half average pay for 52 days and leave not due on half average pay for 88 days (three months).

(v)

**The Journal of
The Mysore Agricultural & Experimental Union,
BANGALORE.**

**A Quarterly Journal published for the Union by
an Expert Board of Editors.**

Chief Editor—Dr. B. Narasimha Iyengar, B. A., Ph. D.,
Agricultural Chemist in Mysore.

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No. 2.

**Mixtures and Adulteration of Agricultural
Produce.**

D. BALAKRISHNAMURTI.

The term 'mixture' is very loosely applied in agricultural and commercial parlance. In a general way it indicates the presence, in however small a degree, of matter in a crop or produce that ought not to be in it and that detracts from its value. Additions which result through accident or arise from natural or unavoidable causes are also treated as mixtures, but are taken no notice of.

Adulteration is, however, by common consent, held to mean the addition, with a fraudulent intent and with a view to pecuniary profit, of foreign matter, in order either to increase the quantity, to improve the appearance, or to give it a plausible strength, or perhaps it may even mean the removal from it of a valuable ingredient. Mineral matter may be added, or the adulterants may often be of animal or vegetable origin. The produce when adulterated loses its pure character and ceases to be regarded as genuine.

Adulteration therefore becomes a fit subject for judicial enquiry and comes within the purview of the Legislature of a country.

The trade has always leant towards the view that the seller of the produce is responsible for adulteration and advocated measures for enforcing purity of samples. This has mostly proceeded from an ignorance of the conditions under which the ryot produces his crop, and of the several stages in manipulation the ryot's produce undergoes before it reaches the market. The product has been sought to be penalised to the great detriment of the ryot, though he has little or no hand in it.

Until a century or two ago in most progressive countries it used to be (and in old countries like India, even at the present day, it is) the practice to grow a mixed crop in the same field. The Indian ryot has become so accustomed to it, that it is impossible for him to think of the possible disadvantages arising from this mode of cultivation, nor have favourable conditions been created for him to become fully alive to the necessity of combination to resist the effects of middlemen's and other influences operating against him.

In several tracts it is rare even now to find pure crops. It may be that the crops sown as a mixture are grown with a view to cause the least depletion of the plant foods to the soil. In almost all cases they mature at different periods. Yet we invariably find a few grains of one or more of these other kinds always mixed in the produce gathered from a field in a particular season. They have perhaps resulted from a ryot's not having cleaned the stubble of a harvested crop which consequently ratoons and matures at the same time as the crop left over. In some instances the produce is an admixture of two types or varieties of the same crop as Uppam Kappas or Pulichai Kappas in Karunganni. A few cholam grains in a bag of green gram is not at present a matter of serious consideration to the Indian ryot or to the Indian consumer. The cultivator who may sell a mixed grain, albeit unknowingly, takes little note of the inconveniences caused to the consumer. He is not fully aware of the extreme unpopularity his produce and, for the matter of that, all Indian products are likely to incur in the world's markets.

Evidently he is ignorant of the rapid strides which scientific analysis has made in recent years in the region of spotting out and isolating even the minutest speck of admixture in any article exposed for sale in a market where rival nations compete for supremacy. This would tend to affect the prices of Indian produce in foreign markets. Those Indian articles which are also produced in other countries, for example, wheat, ginger, copra and groundnut, would be driven out of the world market, while as regards those in which this country enjoys a monopoly, like jute, she would likewise be affected and would have to be satisfied only with lower prices. It is therefore to the interest of the Indian ryot and no less of the Indian Government that the complicated question of mixtures and adulteration should be closely studied.

The Tanjore ryot exports his *Kuruvai* paddy to Colombo. The Godavari Lanka ryot ships his tobacco to Burma. The Vizagapatam Gavara sells his jaggery to a Mahratta merchant from Ahmednagar or a sowcar from Warangal. A Guntur ryot digs his turmeric, prepares his rhizomes and sells the product for export by the Guzarati merchants at Duggirala. A Vridhachalam cultivator lifts his groundnut, dries and sells it for shipping to France. The Avanashi Goundan picks his cambodia cotton which agents of foreign merchants buy. The Ganapathi ryots maintain each a few cows and buffaloes and sell their cream for disposal at Wellington. An Erode ryot buys his cake at Pollachi or his paddy fertilizer from Ranipet. Unless these articles are genuine, they will not fetch a decent price, the agricultural industry will be crippled and the position of the ryot will worsen. A ryot should therefore be very careful to see that the farm products are not adulterated or allowed to mix up whether in the field, in the thrashing floor, in his store or in the market. In a tract, however, where crops are produced for local consumption the question of adulteration does not assume much importance, and certain farm products such as vegetables, are not from their very nature, capable of such adulteration. In the places above named, neighbours know each other's trade and integrity. Public opinion acts as a powerful deterrent and the desire for fraud is kept in check.

With the advent of free trade and the creation of facilities for transport of articles further afield to distant markets for disposal to unknown persons, or to buyers ignorant of the conditions of production and the processes involved, the practice of adulteration has become perfected into a fine art in which the knowledge of science and the ingenuity of trade have been freely utilised. The Indian ryot is poor, and helpless, and has to struggle often against unfavourable seasons. He cannot afford a pakka thrashing floor, nor can he, without much expense, undue trouble, or risk to himself or his neighbours, carry his paddy sheaves long distances home to his house in the village for thrashing, for there are few roads and those that exist are in ill repair and get slushy even after a moderate shower. He therefore improvises a temporary floor, in the middle of his field or on the nearest waste land and takes all care he can to winnow and clean his produce. The little admixture therefore found in his grain-heap is due to unavoidable causes and the surprise is that it is so little when one looks at the conditions under which the ryot works.

Not unoften, the farmer is made the victim of forces which overpower him. The broker, the middleman, the whole-sale dealer, the retailer, in fact, the innumerable gang of intermediaries between him and the actual consumer, mix, and mix deliberately, without the ghost of a chance of suffering for such nefarious practices. Thus the middleman thrives in his trade as a parasite on the producer and the consumer alike, in times of plenty as well as in times of distress.

When the ryot and the consumer suffer grievously, the intermediary plies a roaring trade flying false colours. Space does not permit of the treatment at great length of the iniquity the ryot is subjected to under a system which makes it possible for the middleman to be the sole arbiter of the destinies of the ryot and his adherents.

The middleman acts as a great impediment to the eradication of this evil of adulteration. The Government Economic Botanist

may evolve a variety of paddy which yields sixteen per cent more grain, and the Millets Specialist may discover a strain of cholam which gives a bigger yield and is sweeter than the local variety. The Sugarcane Expert may raise a seedling which gives 5% more sugar, while the Fibre Expert may bring about an improvement in the local gogu. The Cotton breeder may study and introduce a better cotton to increase the out-put. And the Indigo Research Officer may investigate and put forth a plant which gives a heavier crop and yields a better quality dye. All these efforts will, it is manifest, be of little avail if the middleman is there to thwart the attempts and nullify the effects of the good work of the Agricultural Department, to damp the trade, and chill the enthusiasm of the ryot for the production of a more valuable product and to kill the incentive for his betterment, by adulteration and the dictation of unremunerative prices for clean produce. In some instances, on account of competition amongst rival firms, adulteration is encouraged, and ryots are tempted, abnormally inflated prices being paid for articles of admittedly inferior quality.

The middleman's greed, or what goes by the name of 'business' when corporate bodies or their agents resort to such questionable tactics, clashes with natural interests. Sensible and prudent nations have therefore taken steps to direct the energies of wily traders into more straight-forward channels not only by imposing restrictions but also by making it obligatory on the vendor that he should unequivocally give a description of an article he is selling, and its composition, under certificate from an authorised public functionary. The Bengal Ghee Adulteration Act is an instance from our own country. Such efforts account for the presence, in the statute book of all commercial nations, of laws for prevention, detection and suppression of adulteration in all articles of trade for the benefit of the community.

The chief group of articles in which both as producer and consumer the Indian ryot is concerned includes food grains and pulses, milk, commercial products like jaggery, indigo, turmeric, ginger, fibres, fertilizers, seeds and improved implements and tools.

In the Coimbatore market, a cheaper rice like the Nellore rice is mixed with a superior quality like the Ponnur rice. In a similar way wheat is adulterated. Mud, small stone, sand, and even chaff freely find their way into bags of grain sold. A stained or discoloured ragi is mixed with a good quality ragi and sold. Other grains and pulses are dealt with likewise. Stamens of safflower are added to "kesari." Articles from places which are unknown or have suffered in reputation are palmed off upon the public as coming from places which command universal acceptance. Groundnut is almost wholly moistened before preparation.

Buffalo milk is adulterated with water so that it may pass off as cow's milk. Sugar or starch is stirred into warm skim milk, when it becomes whole milk. Bran, fine mud, even clay is mixed in treacle, before the mass gets solidified into jaggery. Colouring matters are added to several articles. To secure better colour or increase of weight of cotton lint, it is wetted or exposed to dew. Crushed cotton seed or nitre-dust is added for the same purpose. Lint of two different qualities is mixed up before baling is done.

Sand and small stones are added to fish manure, and particles of clay or sand form a common constituent of cakes. Commercial fertilizers do not escape similar treatment.

Boiled and devitalised seeds and sometimes even old seeds, are mixed up with good seeds as in the instance of indigo. Ragi is added to mustard seed. A bag of cummin seeds is usually badly mixed up with seeds of weeds.

India, situated as she is, stands to lose a good deal in competition with other nations if she is not wakeful. There is no doubt that she produces enormous quantities of Agricultural products, but as she uses up only small quantities thereof and has but few home industries, she has to depend solely on world markets for the disposal of her surplus which is not an inconsiderable proportion. She must take stock of her present situation and become conversant with factors that affect her trade with other countries in order that she may not be laid low on account of her unweariness, as has

happened in the case of a few states of Europe after the Great War. She cannot afford to shut her eyes to the advance of science, specially of chemistry in methods of analysis which can attack apparently homogeneous objects and bring into bold and inconvenient relief the presence of even the tiniest bit of foreign matter in the bulk produce. In great part owing to ignorance, the Indian ryot has not kept himself abreast of the changing and changed world-conditions in this essential aspect—a point of vital importance to him. The educated classes should come to his help as they wield enormous influence with him for weal or for woe. The intellectuals can surely educate the ryots and tenants under their control in improved methods of cropping, preparing agricultural produce and marketing. Thus alone can complete co-operation for the benefit of the country be created between the ryot, the educated classes and the Government whose sole consideration is the maintenance of peace and of the prosperity of the nation.

Stomata in Cotton Flower.

BY

P. S. JIVANNA RAO M. A.

An inquiry into the cause of bud and boll shedding in cotton undertaken during the season of 1921 (1) necessitated a study of the ovules for their development after pollination. Sections of ovules examined in chloralhydrate iodine disclosed the presence of stomata in the outer layers of the integuments and these were rendered more conspicuous in surface sections by reason of the starch grains included in the guard cells which take a light blue tint. More extended observation showed that all the floral parts of cotton, except the petals, contain them in fairly large numbers, and the starch content is a characteristic feature in all cases.

Material for study was obtained from collections made at 10 A. M. every day for seven days after flowering.*

* 12th to 19th September 1922.

The distribution of stomata in the vegetative parts of the cotton plant has been noted by Balls (1912) (2), who has seen them on the cotyledons, the hypocotyl, the stem and on both the surfaces of leaves in Egyptian cotton (*Gossypium barbadense*). This holds good for *G. herbaceum* which was the species investigated by the writer, but the occurrence of stomata in the interior of the flower has not been described in any of the works on cotton known to him. The presence of these organs in out-of-the-way parts of plants is not a novel feature in itself, for they have been known to occur in all parts of plants except root and endosperm (3), but certain features characteristic of these are believed to be of importance in elucidating their true functions.

The bracteoles possess stomata in considerable numbers, and owing to their leafy nature and permanent stay underneath the flower must be credited with assimilatory work for the nutrition of the flower and fruit. Starch is found in them in varying proportions.

Similarly, the calyx is rich in stomata and does the work of assimilation which is probably of a negligible quantity. The petals contain reducing sugar and stomata are totally lacking in them.

Of the remaining parts of the flower the anther surface, the epidermis of the ovary, the style and the non-hairy portion of the stigma were observed to contain many stomata and the starch content of the guard cells is a constant feature of them all. None were, however, found in the inner lining of the fruit corresponding to the internal stomata described by Bergman (1920) for Ericaceous and other fruits.

The stomata on the surface of the ovary and on the ovules have their guard cells much larger than the surrounding cells and this peculiarity has been noted in the case of Canna seed by Bergman.

Further observations will be made so as to include other plants and Malvaceae in particular.

References.

1. An inquiry into the cause of bud and boll shedding in cotton—Year Book of the Madras Agricultural Department, 1922, (in the Press).

2. Balls, W. L. 1912. The Cotton plant in Egypt, p. 39.

3. Bergman, H. F. 1920. Internal stomata in Ericaceous and other unrelated fruits. Bull. Torr. Bot. Club 1920. p. 213. The papers quoted by Bergman were not available to the writer.

Cultivation of Turmeric in the Bhavani and Erode Taluks.

C. S. RAJARATNAM, SUB-ASSISTANT IN MYCOLOGY, COIMBATORE.

Turmeric is cultivated on fairly large areas on both sides of the 'Bhavani' River and the 'Kalingaroyan channel.' It is a very important crop of the area and is popular, since it can be grown within the period of one year and moreover brings ready money to the ryot with comparatively little expenditure.

It is propagated by planting bits of underground stems (rhizomes). The crop thrives well under river irrigation but fails in garden lands under wells. In places where there is no direct flow of river water, water is baled on to the land from the river with the help of country mhots (kavalais).

Varieties. There are two varieties (1) Chinna Nadan and (2) Perum Nadan. Of these Chinna Nadan is more popular, better liked and grown more largely because of its vigorous growth and its sweet smell. The other variety Perum Nadan does not possess these good points and sells at a lower rate than the Chinna Nadan. Perum Nadan may therefore be expected to become almost extinct.

Soil. The soil best suited for the Turmeric crop is good loamy soil (called locally 'padugai') containing a large amount of alluvium or deposit of silt with facilities for good drainage. It is also grown in lands which have a fair proportion of sand in the soil. Generally the crop is grown wherever there is good soil drainage.

Preparation of the land. Preparation commences in Chittrai (April 15—May 15). After the harvest of ragi, which usually precedes turmeric, the land receives about a couple of ploughings after heavy

showers in Chittrai. If the rains fail the field is irrigated and ploughed when dry. By the 15th of Chittrai, four ploughings are over and about 40 cart loads of cattle manure and 20 or 30 cart loads of village rubbish which is collected during the slack season and preserved are applied per acre.

Some ryots who can afford pen sheep @ 3,000 per acre, (i. e. at 100 sheep per night for 30 nights). The manure is well spread evenly and the land is ploughed three or four times till a good tilth is obtained. On the whole, the land receives seven or eight ploughings. The beds are afterwards formed by means of mumatties. Each bed roughly measures about 7 or 8 square yards with channels for irrigation between every two rows of beds.

Collection of seed. During harvest a small plot in a healthy portion of the field is left for seed purposes as per requirement of the area which is to come under Turmeric the following year.

In Panguni (March 15—April 15) the seed crop is given one light irrigation, and a digging and the rhizomes are lifted. All the wounded ones are rejected and the healthy rhizomes are collected and preserved till the time of sowing (i. e.) in Chittrai or Vaikasi—April—June).

There is no special care taken for the preservation of seed rhizomes, and they are simply heaped in a dark corner of a shed. Sometimes they are mixed with sand and covered over with straw or other light objects such as Turmeric leaves. Occasionally a thick coating of cow dung and mud over the heap is given.

Planting and seed rate. The proportion of seed plot to an acre of land is roughly 1:8 or 1:7. In quantity they require $1\frac{1}{2}$ to 2 sattaish for planting an acre.

Planting is done either in the latter half of Chittrai or in Vaikasi (May). This varies in different localities. Healthy rhizomes (both big and small) are collected from the heap and planted. A man will go on digging pits in the soil (by means of mumatty) at regular intervals about 9" or 1' apart and a woman drops the seed in the pits and covers it. Immediately after planting, the first irrigation (sprout irrigation) is given.

There are two seasons for planting all crops. One is "*Keelnokki*" season (கேள்நொக்கிப்பட்டம்) and the other is "*Melnokki*" season (மேல்நொக்கிப்பட்டம்). It is the most common belief that all root crops like Turmeric should be sown in *Keelnokki* season and the other crops in *Melnokki* season.

Mixtures. Crops that are generally grown mixed with Turmeric are Castor and maize. Castor is planted for shade, for rearing goats and for oil for domestic use. Maize is grown as it fetches a certain amount of ready cash for the ryot within a short period. It comes up in two or two and a half months, when the cobs are collected and sold in the weekly markets of Komarapalayam (an adjacent village on the other bank of the river Cauvery). They sell at 12 or 15 cobs for an anna. On the whole the ryot gets about 50 rupees per acre from maize alone.

After Cultivation. The number of weedings and hoeings is mainly dependent on the nature of the land, and the presence of weeds. In some fields they hoe three or four times, there being never more than four hoeings in any case. Hoeing is generally done by means of mamatties and weeding is done either by hand or mamatti. The first weeding is always done in every garden 25 days or a month after planting.

Subsequent weedings and hoeings are done once a month. And no other operation is done besides these, except regular watering given once every week or ten days. There is a popular saying to the effect that the Turmeric crop requires seven weedings and seventy waterings. But it is not observed in practice. In all, the crop receives about four weedings and about 40 or 45 irrigations which suffice, the receipt of seasonal rains being taken into account.

Signs of Maturity. At the end of the 9th or in the 10th month, i. e. Thai and Masi (January—February) the crop comes to harvest. The proper signs for the maturity of the crop are:—

- (1) Central shoots fail to come up.
- (2) The lower leaves turn yellow.

It is also tested by actually digging and seeing the rhizomes. If they are well developed the crop is harvested.

Harvest. First the leaves are cut and the field is allowed to dry for a week, so that the buds of the rhizomes may dry well. A light watering is given afterwards in order to facilitate the digging and the lifting of the clumps. Men are engaged for digging (20 to 30 men per acre) and women for collecting (40 to 60). The stuff is heaped in a place under shade after removing the adhering soil and roots.

After the whole field is dug out and the rhizomes are collected, it is again ploughed once or twice and two or three women are employed to collect the rhizomes that are brought up by ploughing. With this the harvest terminates.

Yield per acre. It is generally 16,000 lbs. to 18,000 lbs. (green stuff) or 4,000 lbs. to 4,500 lbs. (dry stuff). The proportion of green to dry stuff is 4 : 1 roughly.

The average yield per acre is 16 or 18 Sattais (dry), in healthy fields. In diseased fields it is only 10 sattais (dry). In extraordinary cases a yield of 20 sattais may be obtained in this locality. (1 sattai = 10 maunds or 250 lbs.)

Rotation. Turmeric is not grown after Turmeric continuously in the same land. It is generally rotated with ragi. The following is the rotation generally adopted in Bhavani and Erode taluks in garden lands.

1st year: Vaigasi to Masi or Panguni	}	... Turmeric.
May-June to Feb-March.		
Masi to Chittrai	}	... White cholam.
March-April-May-June.		
2nd year: Vaigasi (May-June) Ani (June-July).	}	... Fallow.
Adi to Purattasi		
(July-August-September-October.	}	... Ragi..
Arpasi-Karthigai October-November		
November-December.	}	... Fallow.
Margazhi-Panguni		
(December-January & March-April)	}	... Ragi.
3rd year: Chittrai (April-May).		
		... Turmeric(count)

Curing. The different processes concerned in the Curing of Turmeric are:—

- (a) Boiling,
- (b) Drying,
- (c) Shaking.

Boiling. It is generally done in iron pans. Formerly they were using mud pots. The pans have a rectangular bottom measuring 3' by 2' ft. and are 2½ ft. in height. Ordinary country furnaces are erected by simply making pits in the ground. An opening is left for the feeding of fuel and as an outlet for smoke.

Fresh rhizomes are put in the pans, mixed with cow-dung water filled to the brim and covered by wet gunnies to retain heat and avoid evaporation. Fuel or dried twigs of red-gram are used for boiling.

To know the proper stage at which the boiling ought to be stopped the boiled rhizomes are examined from time to time and tested by pressing them between the thumb and the fourth finger. The other way of testing is by breaking the rhizomes and noting the colour. If the colour becomes quite yellow instead of red (as seen in green unboiled rhizomes) they stop boiling. If it breaks at a gentle pressure it is also the stage proper to stop boiling. On the whole, the boiling lasts for about 20 or 25 minutes.

Drying. The boiled stuff is dried for about a week or so. The drying requires a turning over after three or four days so that the other side of the rhizomes also may be dried well.

Shaking. It is done by putting the dried stuff in hanging baskets (swing baskets) and moving it speedily to and fro so that the impurities adhering to the stuff and the skin may be removed. And it is also a belief that shaking adds to the colour of the stuff besides removing impurities.

Labour for curing an acre's produce in a day.

Boiling. Two men and two women with one pan (capacity ¼th sattai) can boil 18 pans in a day, i. e. 3 sattais a day, so that an acre's produce (16 sattais), will need 5½ days to finish boiling. In other words, 10 men and 10 women with 5 pans of same capacity (¼th sattai) can finish an acre's produce in a day.

Drying. 1 man for 8 days.

Shaking. 2 women with 1 basket (capacity $1\frac{1}{2}$ maunds) at $1\frac{1}{2}$ satta a day can finish an acre's produce in 10 days, so that 20 women with 10 baskets can finish it in 1 day.

Cost of curing an acre's produce in a day.

Boiling: 10 men and 10 women at 12 annas & 8 annas a day ...	Rs. 12 8 0
Drying: 1 man for 7 days at 8 annas a day ...	" 3 8 0
Shaking: 20 women at 10 annas per head per day ...	" 12 8 0
Miscellaneous expenses ...	" 5 0 0
Total Rs.	33 8 0

In practice the ryot does not spend so much on this, because he himself and the other members of his family work with the coolies. So the actual amount spent by a ryot on curing may be taken as Rs. 25 per acre.

Marketing. Colour is the most important thing for fetching a good price. Well-cured stuff must be brittle and have a shining yellow colour.

Price of this year (1923) and previous years (1921—22).

For the last two years, the price per sattai (250 lbs) varied from Rs. 35—60. Last year, it was Rs. 45 to 50 per sattai, and this year it was Rs. 91 a sattai in January and it came down to Rs. 60 passing through Rs. 75, 71, 69, and 55 per sattai. The prices of this year are rather tempting and the ryots have shown an inclination to increase the turmeric area this year.

Cultivation charges per acre.

Preliminary cultivation.

8 ploughings @ Rs. 2/ per ploughing (both ways) Rs. 16—0—0

Manuring:

Cattle manure 40 cartloads @ 1 Re. a cart load Rs. 40—0—0
If it is sheep penning, they pay 1-8-0 per 100 sheep; and for 3000 sheep, the cost of penning, is Rs. 45. But this is done only by a few rich ryots.

Covering the manure.

1 plough @ 1 Re. for 2 days or 2 ploughs @ Rs. 2/ per day. „ 2—0—0

Bed forming:

4 men @ 8 as per head per day „ 2—0—0

Planting:

6 men @ 8 as. per head per day and 6 women @ 4 as. do. „ 4—8—0

Weeding:

4 times @ Rs. 2 per time (8 women or 4 men per time) „ 8—0—0

Irrigation:

45 irrigations @ Rs. 3 per irrigation (2 mhots each time) „ 135—0—0

Harvesting:

20 men @ 8 as. per head per day and 40 women @ 4 as. do „ 20—0—0

Tax per acre:

Water rate for an acre (irrigated by means of mhots from the river) „ 4—8—0

Cost of curing „ 234—8—0

Total Expenses „ 33—8—0

The total income (@ Rs. 60 per sattai for 16 satta) „ 960—0—0

Nett gain „ 692—0—0

Diseases. The turmeric crop in this locality gets affected chiefly by two diseases. One is locally known as "Pottu Novu" (Leaf spot) and the other is known as "kulai novu" (Wilt disease).

Of these two diseases, the latter one (wilt), appears only occasionally, but the damage due to that is very great. The plant dries out and not even a single rhizome is seen in that plant.

The leaf spot disease appears on the leaves of turmeric plants 4 months after planting (in Adi or Avani—July—August or August—September). The diseased spots appear on the upper surface of leaves and expand elliptically with concentric rings inside. Black pustules are seen in the spots. The spots have brown margins with a pale brown or whitish brown centre. If the spots appear on the margin of the leaves, they begin to dry and shrivel backwards and at the mid-rib they shrivel forward.

The ryots say that the leaf spot disease does not cause much loss, but at the same time they want an immediate remedy for rooting out the disease from the locality. They say that a spraying given a month before the appearance of the disease (which generally happens in Adi) and another spraying after Adi will root out the disease; and most of them were anxious to have their turmeric crop in the coming season sprayed at the end of July or beginning of August. Last year's spraying has convinced them that the disease can be checked and the spreading arrested.

Loss due to the disease, per acre.

Yield of a healthy field	16 satais (average).
do. diseased "	10 do.
Loss.	6 satais per acre; i. e. Rs. $6 \times 60 = 360$ rupees per acre.

Extracts

The West Indian College of Tropical Agriculture. From an account published in 'Nature' for December 9, 1922, we gather that "this College was opened on October 16, last. The Government of Trinidad has presented a magnificent site of 15 acres at St. Augustine which is considered ample for present and future requirements. The site lies 7 miles east of Port of Spain, the capital of the island which is situated 10° north of the equator (Madras Presidency

except Ganjam, Vizagapatam and Godavari lies between 8° and 15° north of the equator). Not only is the land open and well drained but it is sufficiently well exposed to the trade wind which blows, through the greater part of the year, to assure an agreeable and healthy climate.

The College is in close proximity to a principal experimental station, enabling students to follow the raising of such tropical products as sugar, cocoa, rubber and coconuts and study the same crops grown experimentally. At River Estate, they will study methods of propagation and cultivation of cocoa and other plants.

In addition to granting the site, the Government of Trinidad and Tobago have given £ 50,000 towards the cost of erection and equipment and this and other Governments are contributing an annual subvention of a half of one per cent of their revenues. The Imperial Government is providing £ 15,000 spread over five years on the understanding that the work of the existing Imperial Department of Agriculture in the West Indies which was created in 1898 shall be carried on by the College. Substantial contributions are also made by Messrs. Fry and Messrs. Cadbury, the Empire Cotton Growing Corporation and the British Cotton Growers' Association.

The Academic year has been made to conform with that of the British Universities. The following courses have been provisionally arranged:—

- (1) Diploma Course.
- (2) One year course in Elementary Agricultural Science.
- (3) Courses for Agricultural Officers, Scientific and Administrative.
- (4) Post graduate Research.

The Diploma course will extend over three years, and its object is to give a thorough training in the science and practice of tropical agriculture to students intending to become tropical planters, investigators or experts in different branches of agricultural science or technology. These students are required to have passed the College entrance examination of the same standard as the Matriculation

examination of an English University and evidence of having passed such a Matriculation examination or its equivalent test may be accepted in lieu thereof.

The one year course is intended for those requiring a less extensive acquaintance with the scientific aspects of agriculture and the standard is based on school record to show that they are able to profit by the instruction offered.

Special facilities are afforded to officers selected for the tropical agricultural services to obtain familiarity with the application to tropical conditions of principles they have acquired a knowledge of in Europe or elsewhere and enable them to bridge the gap which has hitherto existed between the University in Britain and the work that awaits the scientific officer in his district. It is not contended and it must not be expected that the training now available for scientific officers at the West Indian College can replace this University type of education. What it can do and will do is to enable them to utilise the results of that education and make it of more immediate and practical value. The motto of the College is *Via Colendi haud facilis* and emphasises the difficulty of agricultural problems. Finally, in its provision for research it is following an excellent course. Technological courses are also contemplated to prepare men to take their part in manufacturing processes as in sugar."

V. M. A.

Notes and Gleanings.

Cows or Buffaloes:—Mr. M. S. Pandya in his article on 'Cows or Buffaloes' in the Poona Agricultural College Magazine for December 1922, contends that from the point of view of a dairyman who wants to deal only with milk, cows are superior to buffaloes and enumerates several items in which buffaloes are a distinct disadvantage. A few of these are the following :—

Items for consideration.	What they ought to be as good milch-cattle.	How they are in Indian cows.	How they are in Indian buffaloes.
Male progeny.	Male calves must be strong and good breeding as well as draught animals.	Cows' progeny serves both the purposes of breeding and draught even when they are heavy milkers.	Male progeny is not of much use for draught and if one calf dies of some disease others also die one after the other. It is not so in cows.
Climate.	Must not be susceptible to any climate.	Ordinarily any climate is suitable to cows and they can generally resist heat and cold.	Buffaloes seem to like cold and wet, rain-water and mud but in chilly monsoon weather they drop down in yield. They stand neither excessive heat nor excessive cold e. g. there are few buffaloes in Northern India (due to heat) and none in cold countries like England (due to cold).
Oestrus period.	The longer the better.	A cow remains longer in heat usually 24 to 30 hours and is most likely to hold the service if covered when going off heat.	The period of heat is of short duration in the case of buffaloes, being only a few hours and so they should be put to bull at once.
Diseases.	As far as possible they ought not to be liable to disease but should be resistant.	Not so susceptible to diseases as buffaloes are. Liver fluke has attacked only one cow on our college dairy until now.	Buffaloes are extremely susceptible to diseases, especially to contagious diseases. In the case of calves it is horrible. Internal parasites of all kinds are found, even some that are not yet investigated.

There have been nearly ten cases of liver-fluke among buffaloes in the College Dairy. Even with a trifling ailment, buffaloes do not allow themselves to be drawn.

Paper making materials:—Analyses and laboratory tests made at the Imperial Institute, London, have shown that leafstalks of the Talipot palm and the stem of the elephant grass provide satisfactory paper making material. Talipot palm is common on the West Coast. Elephant grass grows well in South India, and in the Coimbatore Farm during the course of the past two years of its cultivation, it has yielded over 30 tons an acre and seed slips are available for sale at 800 a Rupee and 10,000 will plant an acre. This thrives on all kinds of soils. Will the Punalur Paper Mills care to have it introduced in the Southern districts in waste lands and odd corners? The Talipot palm yields a brown paper and the elephant grass a white paper of good quality.

Sugar:—A cheap source of sugar is found in the Nipa palm growing in the Sunderbans of Bengal, in Burma and in the Philippines. This palm comes up well in marshy places in the deltas. The advantages claimed are that (1) the tree reproduces itself under natural conditions by the growth and branching of old creeping stems, (2) the tree is not a tall grower and the juice is obtained without climbing, (3) the juice contains 15 per cent of sugar and the rate of production is about 3105 lbs. an acre, far above the alleged cane yield in India obtained at a comparatively heavy annual cost, and (4) the plant is productive for about 50 years and tapping is commonly begun in the 5th year. For further details reference may be made to the Journal of the Imperial Institute, London. Vol. XX No. 3, 1922.

Arecanuts:—1,000,000 Cwts. of betel nuts are imported into this country each year, principally from the Straits Settlements and Ceylon. These cost 4 as. a lb. The arecanut garden owners of the West Coast should try to be more patriotic, and by spraying check the Mahali disease which attacks the nuts and save all the money for the country.

Communal coconut plantations are a novel method which the Government of the Gold Coast Colony has adopted of improving waste

ground and weaning large masses of fishermen from poverty and idleness. The local chiefs have loaned lands for a period of 15 to 20 years and the Government plant and tend the plantations and receive the produce until the cost of establishment has been recovered, when they will be handed over to the chiefs for the benefit of their communities.

Jl. of the Imp. Institute, Vol. XX No. 3, 1922.

Milk yields. The Scottish Farmer, for January 6, 1923, publishes an account of the milk yields of Ayrshires in Dalribble herd during the past year. The herd contains 64 cows and heifers for which finished records are available. These show an average of 957 gallons at 3.70 per cent butter fat in 45 weeks.

For the last week in May, and the months of June, July, and August, no concentrated foods are given at all when the cows are at grass. For September and first half of October about 3 to 4 lbs. cake and linseed mixed is given to each cow in milk. Dry cows get only turnips and grass. When once the cows lie in at night about the middle of October the milk cows still get the same cake with about 4 lbs. of meal, consisting of Paisley meal, bran, dried grain and soya meal made into a drink about 3 gallons each, cooked eight hours previous to giving the cow. This is continued, until the cows again go to the grass, along with the turnips and one feed of hay and two of straw. Dry cows never get any meal or cake, but as long as a cow is milking and in the recording book, she gets the same as a cow in full milk and is thus fit to do without special feeding for two months or so and the calves are much healthier thereby.

Philippine Cattle Round Worm. B. Schwartz records (Philippine Journal Sci. XX No. 6, 1922) observations on the life-history of *Ascaris vitolorum* a parasite of cattle and of water-buffaloes in the Philippine Islands. The eggs develop rapidly—but if exposed to the heat of the tropical sun are quickly destroyed—and contain larvae after about twelve days. Such eggs hatch in the intestine and the larvae migrate via the liver and lungs back to the alimentary

canal, as in the common round-worm of man, *Ascaris lumbricoides*, but appear to have a greater tendency than in the latter species to linger in the liver.

Nature, December 16, 1922.

K. U. M.

Spacing of Cotton. The results of the cultural experiments at San Antonio Experiment Farm, United States of America, show that with a season at all favourable for cotton the yield can be materially increased by leaving the plants close together in the row. This close spacing increases the chances of making the crop either by setting the bolls before the weevils become very numerous, or, when weevils destroy all of the first squares, by the greater drought resistant qualities of the single stalk plants. At South Mississippi Sub-Station, cotton spaced 6 inches in drill out-yielded that at 12 and 24 inches distances. These results suggest the advisability of trying similar experiments in India as regards spacing of cotton and whether the American results are borne out here or not, they are bound to be very interesting.

K. U. M.

Kapok—Silk cotton—*Eriodendron anfractuosum*. Kapok is used extensively as a 'filler' for mattresses, pillows and other articles of upholstery and on account of its buoyancy and non-matting qualities, it is superior to any other filler. If it becomes hard with much use it should be exposed to bright sunlight when it rapidly regains its excellent properties. It is also used for life-belts and ocean jackets.

Java practically supplies the world and in 1921 exported 17.5 thousand metric tons mainly to the United States of America, Holland, Australia, and England. Other exporting countries are the Philippines, Venezuela, Ceylon and India. The tree flourishes in a wide range of soils, but those of a light friable nature are preferable. The best planting distance is twenty feet square,

2--3 seeds should be sown per hole. Not much attention is required later on. The trees commence to bear in four years, when about 50 pods may be expected. The yield may rapidly increase to above 400 in the eighth year and trees yield for over 30 years. Hundred pods will generally produce one pound of clean Kapok. Kapok seed contains 20 per cent of oil, and large quantities are exported from Java.

There is a world-wide demand for kapok. The present price of Java kapok is 12½ d. per lb. The one advantage in its cultivation is that the land can be utilized for a number of additional crops, limes, fibre crops etc.

(Abstracted from the Malayan Agricultural Journal for February 1922.)

Winter Egg Production. Upon proper feeding and housing, the egg supply in winter mainly depends. It is not necessary to give very expensive foods nor need the variety be very great, it is enough if the proper kinds are chosen and feeding given regularly. To keep the birds active and busy, grain feed is necessary, and to it may be added bran, middlings, and 10 per cent of fish meal. The household scraps ought to form a considerable saving, and nothing need be wasted unless it is salty, when it must not be used, as too much salt will cause mortality among fowls.

The house should be well lighted, so that all the daylight and sunlight available may enter in, and it ought to have a well-littered floor where the birds can scratch and search for every grain buried therein. For their health and to help in egg production, activity and exercise are imperative. The birds are far better confined in a roomy scratching shed in cold damp days than allowed in the open run. . . . The supply of green food in winter and summer must not be neglected, as it is very

necessary. Where it is not to be had, a substitute must be obtained. Plenty of grit and shell are other commodities that must always be before the birds.

Adapted from the Scottish Farmer, No. XXXI. January 23.
K. U. M.

Economic value of water Hyacinth. At a demonstration held at Crowley, Louisiana, on September 16th last, samples were exhibited of paper pulp, two grades of alcohol, two grades of ether, two grades of oil, tannin, a fertilizer, a fire-proof compound and a stock food all prepared from the water hyacinth.

It was shown that approximately 28 per cent of the hyacinth plants may be converted into paper pulp and five per cent into stock food. No other detailed yields were given.

Experimental chemistry has thus indicated a possible economic value for this plant, which heretofore has proved such a scourge to navigation in the smaller sluggish streams, and a positive menace leading to the blocking up of the drainage channels on many plantations. The possibilities of utilising this weed for industrial purposes have been demonstrated and the prolific abundance and the non-expensive nature of the material sought to be utilised ought to offer great inducements to enterprising capitalists.

The control of water hyacinth has been a source of great expense for years, and the prospect of its assuming some economic importance is an encouraging feature in the problem of its eradication.

Abstracted from the Louisiana Planter, 23rd September, 1922.
T. S. V.

The Role of camels in the Epidemiology of Plague in Astrachan. As a result of extensive investigations it has been definitely ascertained that in the Kirgiz district, camels are an important source of plague infection in man. The method of infection of these animals under natural conditions has not yet been proved, but evidently ground squirrels are of importance in this connection, as they probably contaminate the green fodder. Mice are even a more probable source of danger, as by infecting the hay they create suitable conditions for disseminating the disease by inhalation, this form generally proving fatal.

Review of Applied Entomology, Vol X Part II. Nov. 1922.

Cyanophoric plants of the Philippines. That hydrocyanic acid is widely spread throughout the plant Kingdom is a well known fact. A systematic examination of such plants has been made at Kew and Haarlem and in Queensland to find out the relative toxicity of the plants. Such work is valuable from an economic stand-point in affording an indication of possible losses of stock from eating these plants. Further, where material was available, root, stems, leaves, flowers, and fruits were examined and the results showed considerable variation in amount, but on the whole the bark contains the largest quantity of the acid. Notes on the following plants which also occur in India may be of interest.

1. *Paspalum dilatatum*. Contained more hydrocyanic acid than other grasses.
2. *Phaseolus lunatus*. Well-marked re-action in stem, a trace in the leaves, and none in the roots, but mature seeds contained a large quantity of prussic acid.
3. *Strychnos nux-vomica*. Positive reaction in leaves, bark and roots.
4. *Piper betel*. Positive in the leaves, but very faint in other parts including fruits.

(The presence of hydrocyanic acid in young sorghum is a well known phenomenon in India. Similar work might not only be of interest but also of much economic value in India).

The Philippine Agriculturist Vol. XI No. I. August 1922.

Y. R. R.

Gingelly Forecast. The area sown up to the end of 31-12-22 is estimated at 5,63,900 acres. The present estimate is made up of 2,62,900 acres in the Circars, 1,72,000 in the Central districts, and 1,29,000 in the other districts.

The crop suffered from drought in Godavari, South Arcot, and the Deccan and the Southern districts. Yields above average are reported from Trichinopoly and the West Coast and average yields, from other places. The yield is estimated at 76,200 tons as against 66,800 tons estimated last year.

(The Publicity Bureau, Madras)

The receipts of loose cotton at presses and spinning mills in the Madras Presidency up to 13th January 1923 amounted to 3,51,604 bales of 400 lb. These include arrivals from the Nizam's Dominions and the carry over of the 1920-21 crop which together are estimated at about 11,000 bales. The estimate of the Madras Cotton crop of 1921-22 is 3,47,000 bales.

1,46,228 bales mainly of pressed cotton were received at spinning mills and 1,74,499 bales were exported from the Presidency by sea and rail.

(The Publicity Bureau, Madras)

Sunflower. Of the several oil-yielding plants which are frequently brought to the notice of the public, sunflower is one. It is

an important crop in Russia and is commonly grown in other countries. In India it is not unknown and during the past 40 years attempts have been made from time to time in this Presidency to introduce it into regular cropping. The seeds are elsewhere used for cakes and in a variety of other ways. They also supply an excellent flour for cake making, while the stalks furnish a very good fibre and the petals, a brilliant yellow dye. It is also attempted to be utilised as an ensilage crop. Visitors to the Hebbal Farm would be delighted to see magnificent crops. In the earlier years at Koilpatti this crop was grown but did not set seed. With fuller knowledge of the crop now, it would seem profitable to grow it at least in small plots. With its oil which is equal to olive oil it should prove acceptable for ordinary purposes.

Household Hints.

An emetic in case of poison. Stir one heaping teaspoonful of mustard or salt into one cup-ful of tepid water and give the patient the mixture to drink. Repeat the dose every 10 or 15 minutes, until 3 or 4 cupfuls have been swallowed, if vomiting does not occur sooner. An emetic of this kind is used to empty the stomach of any irritating substance.

Cuts and Scratches. Always apply tincture of iodine at once by means of a cotton swab to the surrounding tissue as well as the wound: then cover with a dressing of sterile gauze and bandage securely. The inner side of an old handkerchief or napkin that has not been unfolded since it was ironed is a good substitute for sterile dressing.

Spraining an ankle or wrist. Sprain is the injury produced by twisting, stretching, or tearing of the tissue around a joint. Raise the joint in question. Keep it absolutely quite, apply either heat or cold or heat and cold alternately. A good treatment is to soak the joint in hot water and then let cold water

from the tap run upon it. As for this treatment will increase the pain, but it will soon be alleviated.

From the Journal of Jamaica Agricultural Society, Dec. 1922.

Y. K. R.

Recent Events

Pusa Entomological Conference. Messrs G. K. Wilson and Rao Sahib Y. Ramachandra Rao, visited Pusa in connection with the Pusa Entomological Conference which lasted from the 5th to the 10th February and returned to Coimbatore on the 19th February.

Cotton Committee Meeting. The Cotton Specialist left Coimbatore for Bombay at the end of the month to attend the meeting of the All India Cotton Committee.

Govt. Sugarcane Expert's tour. Rao Sahib T. S. Venkatarao, who was away in Northern India during December and January on his annual tour of inspection of Coimbatore seedlings under trial in Farms in Upper India, returned to Coimbatore on the 3rd February. Mr. K. Krishnamurti Rao, Assistant Sugarcane Expert who assisted him in this work in the Punjab and United Provinces returned a few days earlier.

Assistant Mr. Gowrisankarayar was sent to Pusa to attend to the planting of Coimbatore seedlings on a much larger area this year in Pusa Farm and outside for purposes of distribution to planters later on.

The Officers' Club. The club is to be congratulated on having been able, at long last, to finish relaying the Tennis Court and to present it to the members in an excellent condition for playing. The play has been started once again after an interval of nearly one year.

Mr. A. K. Subrahmanyayyar. We are glad to learn that Mr. A. K. Subrahmanyayyar, lately Assistant in Engineering at our Agricultural College and Research Institute, has been confirmed as a Circle Officer in the Bihar and Orissa Department of Industries in the Provincial Service on Rs. 200—20—750 grade.

Students' Corner.

Special Lectures.

The following lectures were specially given for the students during the month.

1. "Rothamsted Experiments"—Rao Sahib M. R. Ramaswami Sivan, Government Lecturing Chemist.
2. "Paddy Cultivation"—Mr. D. Balakrishnamurti, Professor of Agriculture, with lantern slides.
3. "Agricultural Experiments"—Mr. F. R. Parnell, Principal and Government Economic Botanist, with Dr. Norris presiding.
4. "Chemistry in relation to Agriculture"—Dr. R. V. Norris, Govt. Agricultural Chemist.

Games.

The R. C. Wood Tennis Cup Tournament is now on and the semifinals and finals are expected to be keenly contested and exciting.

The Coimbatore Football Tournament has begun and our College is competing for the shield: the finals are expected to be played in March.

Cricket Match.

The Boy Scouts of the Agri. College Estate *cum* Rao Sahib Ramasami Sivan's wards played against a team made up from the rest of the students. After an exciting game, the former were declared winners with 55 runs against 33.

Correspondence.

To the Editor, M. A. S. U. Journal. Anent the note in the December 1922 issue of our Journal entitled, 'Record sugar yields per acre, it may interest readers to know that the Hawaiian seedling, H. 109, which has done so well in Hawaii was imported into the Breeding Station at Coimbatore about five years ago, but had recently to be destroyed at Palur owing to its developing suspicious patches similar to the much dreaded Mosaic. It is idle to think of any permanent increase in acre production until the cane in this Presidency receives the very elaborate attention that it has been receiving in Hawaii.

T. S. V.

Departmental News.

Deputy Directors' Conference. The annual conference of the Deputy Directors which usually took place in previous years on the occasion of the College Day and Conference, was held this year, owing to the postponement of that function, at Madras at the Office of the Director of Agriculture from the 31st January to 2nd February. In addition to the Deputy Directors, the Cotton Specialist, the Government Economic Botanist, the Government Agricultural Chemist, the Government Sugarcane Expert and the Government Entomologist were also present on the occasion of the discussion of certain special items like the Pest Act work, Cotton work, manures etc.

Mr. Percival Venkataramiah, M. A., B. Sc., (Edin). Some time ago appointed as Assistant Chemist, is now under orders of training in Farm Management at the Central Farm, Coimbatore.

Mr. R. N. K. Sundaram, C. D. A., (Glasgow) N. D. D. who has had several years' training in Agriculture in Scotland, has been appointed Assistant Director of Agriculture on probation in the

Madras Agricultural Department. He is to receive the usual training in Farm Management at the Central Farm. He comes of a well-known Roman Catholic family and is the nephew of Mr. Arokiasami Mudaliar B. A., B.E., Superintending Engineer, Madras, who was for some years stationed at Coimbatore.

Free Night School—Anamalai Farm. A free night school for the depressed classes and sons of labourers was started on the Anamalai Farm on 3rd November 1922 and was formally opened by R. D. Anstead Esq., Director of Agriculture, on the 23rd January 1923. On the day of celebration, the premises which, through the kindness of the Deputy Director of Agriculture, VIII Circle, housed the school on the Farm was tastefully and suitably decorated. In spite of the late invitations a good number of landlords and other gentlemen of the locality assembled on the occasion. Messrs F. R. Parnell and G. N. Rangaswami Ayyangar were also present. Mr. W. Raghavachari, Agricultural Demonstrator, in the unavoidable absence of the Deputy Director of Agriculture, gave a short account of the starting of the school and acknowledged the strong support and keen sympathy of the local landlords as evinced by their liberal donations, and requested the Director to open the school. The President, in declaring the school open, made a short speech laying special stress on the importance of the education of the masses and the dignity of labour. He also expressed his sympathy towards such movements and promised his help to place the school on a satisfactory basis. Slates and books were then presented to Adi-dravida pupils.

After a few songs and dialogues by the boys, the function ended with the distribution of sweetmeats to boys and the singing of the National Anthem.

At night, lantern lectures on Agricultural improvements and plant diseases were given by officers of the Department.

C. S. G.

Agricultural Exhibition at Kizhur Cattle Fair. Mr. Abdulla, Assistant Agricultural Demonstrator, Calicut, reports that an Agricultural Exhibition was held from the 11th to the 19th December in connection with the Kizhur Cattle Fair. The following were some of the exhibits on the occasion. 1. A typical loose box constructed in front of the stall, for purposes of demonstration. 2. A Meston plough, the use of which was demonstrated in a neighbouring field. 3. Various artificial manures and green manure seeds. 4. Varieties of cane, chillies and paddy. 5. Pictures of crop-pests and diseases.

Magic lantern lectures were given and were well attended.

Inspector of Agricultural Offices. Owing to increase of work, a second Inspector of Agricultural Offices was appointed last year and now orders have been issued as to a division of the sphere of work of these two officers. Mr. J. G. Rodrigues will inspect Circles I to V, while Mr. A. C. Rajagopalayyengar, the second Inspector, will inspect the offices of the Agricultural College and Research Institute, Circles VI, VII and VIII and the Planting Districts. The latter's head-quarters have been changed from Madras to Coimbatore from March 1st.

The Standing Finance Committee of the Madras Lg. Council.

Proceedings of the 18th Meeting, held at Fort St. George on Tuesday 9th January.

Present.

- (1) The Hon'ble Sir Charles Todhunter, K. C. S. I. (Chairman)
- (2) M. R. Ry. Rao Bahadur C. Natesa Mudaliyar Avergal.
- (3) Khan Bahadur Muhammad Usman Sahib.
- (4) Dr. P. Subbarayan.
- (5) M. R. Ry. Rao Bahadur T. A. Ramalinga Chettiar Avl.
- (6) „ A. Ranganatha Mudaliar Avergal.

(7) Mr. A. M. Mac Dougall.

(Rao Bahadur O. Thanikachala Chettiar did not attend).

The committee scrutinized the budget estimates for 1923-1924 (Part 1).

5. *34—Agriculture.* The Committee would recommend that the Retrenchment Secretary should examine the necessity for the continuance of the posts of Inspector of Agricultural Offices (permanent and temporary) and that the temporary provision should be omitted meanwhile.

6. The Committee are not satisfied that it is necessary to maintain a Superintendent of the Central Farm, in addition to the Professor and Assistant Professor of Agriculture and Farm Managers at the Agricultural College. They would recommend that this appointment, which appears to be a new one, be omitted from the budget.

7. They would recommend that the Retrenchment Secretary should examine the necessity for so many Supervising officers in the District staff, also of the retention of the Agricultural Engineer in addition to the lecturer in Agricultural Engineering, also the Assistant Farm Manager in the Potato Seed Farm and the Farm Manager and Assistant Farm Manager at the Botanical Gardens.

8. The Committee request that they may be provided with details of the lump provision of Rs. 50,000 for District Experimental Cultivation and of Rs. 7,000 for 'other contingencies' for the Agricultural Engineer, and of Rs. 13,000 for working charges and other contingencies of the Botanical Gardens.

9. The Committee suggest that the necessity for the expenditure of Rs. 990 on the Old College Park and Rs. 3,960 on the up-keep of other public gardens and parks should also be examined.

The Hon'ble Mr. C. P. Ramaswami Ayyar.

We offer our hearty congratulations to our Patron, the Hon'ble Mr. C. P. Ramaswami Ayyar B. A., B. L., on his having been appointed Member of the Madras Executive Council for Law and Justice.

National food economy.

In these days of unemployment, distress, corners, and high tariffs, the question of finding and economising food is a matter of supreme necessity to such nations as do not produce or cannot command enough for their vital needs. One of the means of effecting economy is a study of the food requirements of man and the domestic animals. Empirical methods alone have hitherto done duty in this respect though genuine attempts have of course been made in certain countries, notably in Germany and U. S. A., to estimate actual requirements. Dietary studies and feeding experiments are often reported upon, but they have at best proved sterile as the fundamental principles of nutrition have not in all cases been taken as the basis for experimentation or guidance.

Recent advances in physiology, bio-chemistry, bacteriology and pathology have disclosed the futility of the methods hitherto followed and focussed attention on first principles. The visible embodiment of a full appreciation of this fact is to be found in the Rowett Institute, Aberdeen, which was formally opened by H. M. Queen Mary on September 12, last, though it had begun to work as early as 1914. The objects kept in view, according to the North British Agriculturist for January 4, 1923, consist of "investigations into the energy and material requirements of farm animals under various conditions of maintenance and for various kinds of production and the best means of meeting these requirements; and on the other hand, of investigations into the constituents of and digestibility and nutritive value of the various feeding stuffs, along with the continuance of research work which would throw light on human nutritional disorders." Attention was, we learn, first

directed to the "mineral requirements of Farm animals which hitherto had not been factors calculated in the animal food economy except under the heading of manurial value and it was found that the cause of malnutrition was due to the lack of balance of different minerals."

Departmental Notes.

Appointments, Postings etc :—

1. Mr. R. N. K. Sundaram to be Assistant Director of Agriculture on probation in the Madras Agricultural Service.
2. Mr. P. B. Subrahmanya Ayyar, Assistant Agricultural Demonstrator, to do the duties of Agricultural Demonstrator, Mr. A. M. Muthayya Nattan, during the latter's absence on leave.
3. Mr. S. Venkataramayyar, Assistant Agricultural Demonstrator, under training in Tiruvalur sub-circle posted to Kumbakonam—to join forthwith.

Promotions :—

The following promotions in the Lower Subordinate Service are ordered with effect from 1st February 1923.

4. Mr. T. G. Anantaramayyar, from V grade to IV grade.
5. " K. Vasudeva Shesoi, Do.
6. " K. Balaji Rao, Do.
7. " M. Chinnaaswami Nayudu Do.
8. Muhammad Asizudeen Sahib, from III grade to I grade.
9. Mr. M. Ramaaswami Pillai, from V grade to IV grade.

Leave :—

10. Mr. D. Balakrishnamurti, Probationary Deputy Director of Agriculture, leave for four months from the 7th May 1923.
11. Mr. B. Thomas, Deputy Director of Agriculture, Madras, an extension of leave for 14 days from 24th February 1923.
12. Mr. B. Viswanath, leave on average pay for five months from 1-3-23.
13. Mr. S. Narayaniah, Teaching Assistant, leave on average pay for ten days from 27-2-1923.

14. Mr. T. E. Rameshkrishnayyar, Assistant in Mycology, extension of leave on average pay for one month from 2-2-1923.

15. Mr. M. Krishnarao Nayudu, Agricultural Demonstrator, extension of leave without pay for one year.

16. Mr. A. Muthayya Nattan, Agricultural Demonstrator, leave on average pay for one month from 23-1-23.

17. Mr. K. P. Sankunni Menon, Assistant Farm Manager, extension of leave on average pay for six weeks.

18. Mr. B. V. Ramana, Assistant Farm Manager, leave on average pay for one month from 6-2-1923 or from date of relief.

19. Mr. W. S. Soans, Assistant Farm Manager, leave on average pay for one month from 1-3-23.

20. Mr. T. D. Easwara Ayyar, Assistant Farm Manager, Government Botanic Gardens, Ooty, leave on average pay for one month from 12-2-23.

21. Mr. N. E. Rajagopalayyar, Assistant Agricultural Demonstrator, leave due on half average pay for 54 days and leave not due on medical certificate for 5 days.

22. Mr. K. Sitharamayyar, Assistant Agricultural Demonstrator, leave on average pay for one month from 34-1-1923.

23. Mr. G. Rangayya Nayudu, Assistant Agricultural Demonstrator, leave on average pay for three months and four days from 16-1-23.

24. Mr. N. Ramadoss, Farm Manager, Bangalore, leave on average pay on medical certificate for two months from 9-1-23.

25. Mr. T. Lakshminipathi Esq., Assistant Agricultural Demonstrator, I circle, leave on average pay on medical certificate for three months from 25-1-23.

26. Mr. Soopi Haji, Assistant Farm Manager, Govt. Botanic Gardens and Parks, Ootacamund, leave on average pay for 25 days from 16-8-23.

27. Mr. S. Subrahmanya Ayyar, Agricultural Demonstrator, extension of leave for six months on half average pay in continuation of the leave for one year sanctioned from 21-2-22.

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No. 3.

Ginger Cultivation in the Tanjore District.

C. RANGASAMI AIYANGAR, SUB-ASST. IN MYCOLOGY.

In the Tanjore district this crop is grown on a small scale by a class of labouring people, known as Padayachis, and by some Muhammadans, at Kanjanur, a village 5 miles from Aduturai railway station, and in certain villages roundabout, such as Kottur, Tuli, Thirukkodikaval and Narasingampet.

Soil: This crop grows well on sandy loam possessing good drainage. At Kanjanur, Kottur and Tuli, this is planted in *Coconut topes* and at Narasingampet and Thirukkodikaval on *Padugai lands*.

Preparation of the field: The field is ploughed twice and a thorough mummatty digging is given in the month of Chitrai, (April 15—May 15.) After removing weeds and stubble, cattle manure is applied at the rate of 10 cartloads per acre if the land is poor, and rich lands are left unmanured. Beds are, then, formed with irrigation channels at intervals. Nearly 760 beds are formed per acre, the average size of a bed being 3 yards by 2 yards.

Planting: In each bed 96 small shallow pits are dug at distances 9" apart and disposed in rows likewise 9" apart, there being 12 pits in each row lengthwise and eight breadthwise. Each pit receives one seed rhizome having one bud (growing point) or two, and after planting the seed is covered over by a layer of soil and an irrigation given.

Seed-rate: 36 to 40 maunds or 288 to 320 viss, costing Rs. 44 per md., are required to plant an acre, and on an average 72,960 plants occupy an acre.

Irrigation and after-cultivation: This crop is always sown under shade and for this purpose, Castor, Sunhemp, and Red-gram (in some places) are grown along with this crop. Till the shade crops come up two irrigations are given per week, and after they grow to a height of 1', the field is irrigated only once a week. It takes 40 to 50 days for the ginger seed to germinate and the sunhemp seed takes only 3 days to sprout, with the result that a good shade is secured before the ginger crop grows a foot high. Hand hoeing is done once in 15 days. After planting, the only attention needed is to give an irrigation at regular intervals so as to keep the soil moist without stagnation of water.

Harvesting: This crop is an eight months' crop and is harvested at two different periods. (1) Ginger planted in coconut topes is sown in Chitrai and is harvested in Arpasi or beginning of Karthigai, (when the rhizomes are very tender and not well-developed). These tender rhizomes are very delicious and are used for pickles or eaten raw. (2) Ginger planted in Padugai lands in the month of Vaiyasi is harvested in the month of Thai after the rhizomes are well formed. Some portion of this crop is also harvested while green and tender, the well developed ones being left in the field for seed purposes.

The soil is turned carefully by mammatties and the rhizomes are then picked up. The average yield per acre comes to 4 to 6 barams or 400 edais to 600 edais, the prices ranging from 50 to 65 rupees per baram.

The plants left for seed purposes are dug up at the end of Thai, and the seed rhizomes are stored in a shaded pit 6" deep, attention being paid daily to turn them over in the pit to prevent rotting.

Curing is not done in these parts and the whole produce is sold green.

Cost of cultivation:

Preparatory cultivation and formation of beds and channels.	} Rs. 40-0-0
Planting	... 10-0-0
Cost of seed (at Rs. 4 per maund)	... 160-0-0
Irrigating charges	... 5-0-0
Harvesting charges and marketing	... 25-0-0
	Rs. 240-0-0

The above charges do not include the owner's labour.

Value of yield per acre @ Rs. 65 per baram (65 x 6)	390-0-0
Cultivation charges	240-0-0
	Gain Rs. 150-0-0

If the whole produce (of an acre) is sold in retail :—

the produce of each plant costs (yield per plant being $\frac{1}{4}$ to $\frac{1}{2}$ edai)	... 3 pies.
Total yield per acre	... Rs. 1,140-0-0

Diseases: There was no disease in the fields inspected and the ryots report that in Adi, 3 months after planting, *small brown spots* appear on the upper surface of the leaves which gradually disappear during the growth of the plants and that no damage is done to the crop by the formation of these spots.

If there is stagnation of water, the leaves turn pale yellow and the rhizomes never develop, the affected area showing a stunted growth.

Insects sometimes attack the leaves and often prove harmful to the crop.

N. B. 1 baram = 20 maunds or 160 visses = 100 Edais.

The Pruning of Fruit Trees.

M. S. RANGANATHA RAO.

Pruning fruit trees is an essential operation that requires a trained eye and a skilled hand. The worker must be thoroughly versed in the principles on which the art is based and be an expert in applying them. Injurious results may follow from irrational or unskilled pruning. The beginner should never attempt on valuable trees, but should place himself under the trained guidance of a chief and practice first on wild plants till he attains sufficient dexterity. At the same time he should observe the nature and habit of orchard stock and learn the proper methods of treating different varieties.

Objects. One should know first why pruning should be done, then how it should be done and when it should be done. The aims to be kept in view are (1) to form the tree, (2) to admit sufficient air and sunlight, (3) to induce fruiting, (4) to facilitate cultural operations and (5) to remove dead and decayed or diseased parts. For definite reasons each variety of fruit tree should be shaped so as to assume a particular form and this form is obtained by pruning. Air and sunlight are necessary to enable the trees to perform their functions properly. By pruning the entire plant is maintained in health and productiveness. The operation also improves the quality and quantity of fruit and facilitates tillage, spraying and the gathering of fruit.

The only motto for pruning is, "Clean and decisive manipulation." The limbs, shoots and buds remaining on the tree must not be compromised by bad strokes. The implements should be clean and in perfect order. Saw-cuts and large wounds on limbs must be trimmed smooth with the knife and sealed over with tar. To train a tree into bush form from a maiden plant is a process taking three years. In the first year the tree should be headed back to a well defined wood bud about three feet above the union. This height is necessary to permit easy cultivation of land. 'This heading back' must be performed at a season when the trees do not put forth new buds.

Root pruning. The necessity for root pruning is brought about by several causes. Chief among them are careless and improper planting, vigorous root stocks and shallowness of fertile soil. We will consider first the planting, as upon it largely depends the future of the trees. The most common mistake probably is planting deeply. If this is done the roots are of necessity placed farther away from the influence of sun and air and are consequently in greater danger of drying or remaining inactive. It is then the mischief is wrought. While the surface roots are inactive, the lower and stronger roots are pushing straight down into the subsoil. Thus the advisability of shallow planting becomes clear to every thoughtful gardener.

A too vigorous fruit stock is the next point. It often occurs that the trees are grafted on stocks much more vigorous in constitution than the scion or graft. This is done in order to make a weak growing tree more productive than it would be on its own roots or on a stock of medium strength. But it has also a tendency to induce sappy growth by the roots entering the subsoil. Hence the need of root pruning.

A shallow surface is no fault of the gardener and it is under such conditions that root pruning becomes a periodical necessity where satisfactory crops of fruits are required. It is therefore well for us to have if possible a knowledge of the depth and nature of the soil as well as of the stocks. Having considered what makes root pruning a necessity, let us see what results are obtained from pursuing such a course and why it should be done at all. When does a tree require to be root-pruned and what are the signs to go by? What is the best part of the year to do it? Which roots should we sever? Briefly, the real purpose of pruning is to make the tree more productive of fibrous roots situated as near the surface as possible. These will tend to produce wood of medium strength that will develop properly and produce plenty of fruit buds instead of sappy growth. Of course it does not follow that every tree requires its root-growth to be checked, for it would be absurd to tamper with the roots of one that is annually bearing heavy crops. Rather give help in the shape of mulching and liquid manure. It is those trees that produce nothing but long succulent growth till late spring

which indicate to a careful observer that something is wrong somewhere and one may rest assured the mischief is at the roots.

The best time to do this work is as soon as the fruits have been gathered, as the new roots will then have time to lay hold of fresh soil before the advent of the hot weather. It is an operation which requires to be done quickly and well. Commence about 4 to 6 feet away from the bole of the tree and remove the soil with a fork to a depth of 9 inches to 2 feet according to the size of the tree and the depth of the fertile soil. Retain all fibrous roots, severing the thick and dead ones. Always make the cut from bottom to top so that the cut side will face downwards. After getting down to the required depth proceed to undermine the tree in the same careful manner making a clear cut wherever it is necessary, as fagged ends will cause roots to decay. It is important too that as many severed portions of roots as possible be removed, since if left on the ground they will favour the growth of fungi which will in time attack the living plant.

Replace the soil firmly adding to the soil a liberal supply of good turfy loam which will induce formation of root fibres, so essential to a good crop of fruits.

Some Common Fodder Grasses of South India.

P. S. JIVANNA RAO M. A.

During the year 1915, in connection with the preparation of a hand-book on South Indian grasses by the Government Lecturing and Systematic Botanist, information was desired from the Deputy Directors of Agriculture as to the grasses that were common in their districts, their local names and their fodder values as known to the ryots. In response to this request specimens of grasses and certain weeds were received from the District Farms and the matter then collected is now published for general information.

It must be noted that the vernacular names often vary, the same grass going by different names in different places or the same name being similarly applied to different grasses. The value of certain grasses as fodder also differs, as cattle do not appear to show the same liking for them everywhere.

Bellary District. Hagari (1915).

No.	Scientific name.	Telugu name.	Fodder value.
1	* <i>Alysicarpus rugosus</i> , DC	Nalla alumu	Forms rich food for cattle with grasses.
2	* <i>Alysicarpus longifolius</i> , W & A	Bidara alumu	Do.
3	<i>Andropogon annulatus</i> , Forsk	Maravalligaddi	Has good feeding value and does well in the presence of moisture.
4	<i>Aristida Adscendens</i> , L	Chilla obagaddi	Of little grazing value except when tender.
5	<i>Chloris barbata</i> , Sw	Upugaddi	Withstand grazing well. Fairly nutritious.
6	<i>Cynodon dactylon</i> , Pers	Hariali	Good fodder, withstands grazing well.
7	<i>Digitaria sanguinalis</i> , Scop	Garika	A good fodder for cattle.
8	<i>Eragrostis major</i> , Host	Eddukommalagaddi	Liked only in early stages of growth.
9	<i>Panicum Isachne</i> , Roth	Gubbipuchugaddi	Of high feeding value.
10	<i>Panicum colonum</i> , L	Chippigunagaddi	Of fairly good feeding value requires plenty of moisture.
11	<i>Panicum javanicum</i> , Poir	Nirragaddi	Of high feeding value.
12	† <i>Phyllanthus maderaspatensis</i> , L	Thaparagaddi	Not found on a large scale for fodder.
13	<i>Isajema anthepheroides</i> , Hack	Gugulu alumu	A good fodder grass, requires fair moisture.
14	<i>Setaria verticillata</i> , Beauv,	Chengali or kudalai ganguri Entrika	Of fair feeding value.
* Leguminous weeds.			
† Weed belonging to the Euphorbiaceae.			

Bellary District (1915).

1	<i>Aristida Adscendens</i> , L	Chirupoothigaddi or Chiru-cheepura gaddi.	Not much liked by cattle.
2	<i>Chloris barbata</i> , Sw	Abothugaddi	Do.
3	<i>Cynodon dactylon</i> , Pers	Garika	Very much liked by cattle.
4	<i>Digitaria sanguinalis</i> , Scop.	Chippura gaddi	Do.
5	<i>Eleusineegyptiaca</i> , Desf	Gujjangi gaddi	Not very much liked.
6	<i>Eragrostis tenella</i>	Poothika gaddi	Do.
7	<i>Eragrostis bifaria</i> , Wight ex Steud	Ledigaddi	Do.

Bellary District. (1915).—Contd.

No.	Scientific name.	Telugu Name.	Fodder value.
8	Eragrostis ciliaris, Link	Poothika gaddi	Liked by cattle.
9	Leptochloa filiformis, Roem & Sch	Vattioheri gaddi	Not much liked by cattle.
10	Panicum colonum, L	Manchi voode, Karu voode	Liked by cattle.
11	Panicum prostratum, Lamk	Chippara	Do.
12	Panicum ramosum, L	Revasigaddi	Very much liked.
13	Panicum psilopodium, Trin	Revasigaddi	Do.
14	Perotis latifolia, Ait	Nakkoragaddi	Do.
15	Sporobolus tremulus, Kunth	Seema garika	Do.

Godavari District. Samalkota (1915).

1	Digitaria sanguinalis, Scop	Poola chengali	Eaten by cattle.
2	Eleusine aegyptiaca, Desf	Gujjanna, Gunuku	Do.
3	Eragrostis bifaria, Wt ex Steud	Kodijuthu	Do.
4	Panicum Isachne, Roth	Kakichippali	Do.
5	Rothoealia exaltata, L, f.	Punuku	Do.
6	Setaria glauca, Beauv	Nakkukorra	Do.
7	Tragus racemosus, Scop	Antrintha	Do.

Godavari District, Samalkota.

No.	Scientific name.	Telugu name.
1	* Alysicarpus monilifer, DC.	Elaknejedikada
2	Andropogon annulatus, Forsk	Podachengali
3	Andropogon contortus, L	Ledi gaddi
4	Aristida Adscensionis, L	Cheepirapoothika

Godavari District, Samalkota.—Contd.

No.	Scientific name.	Telugu name.
5	+ Borreria hispida, L.	Madanabudatha kada
6	+ Celosia argentea, L	Gurugu
7	* Crotalaria linifolia, L	Kondajannmu
8	Digitaria sanguinalis, Var ciliaris, Scop	Ragesa gaddi
9	Digitaria tridentata, Roxb	Seethammavari savaram
10	* Kyllinga triceps, Roxb	Tellaboddu tunga
11	** Molingo stricta, L	Sasaleakoda
12	* Molingo stricta, L	Neetichama
13	Panicum flavidum, Retz	Pitchika gaddi, Pitchi Ooda
14	Panicum ramosum, L	Neeti arika
15	Paspalum scrobiculatum, L	Elaka thoka
16	Perotis latifolia, Ait	Pilli pesara
17	* Phaeocolus trilobus, Ait	Punuku
18	Rothoealia perforata, Roxb	Ohinna pallan
19	* Tephrosia procumbens, Pers.	Chilakamukku kada
20	* Zornia diphylla, Pers.	X Cypersaceae.
	† Leguminosae.	** Aisocnem.
	† Rubiaceae.	† Convolvulaceae.

Tinnevely District, Kcilpatti (1915).

No.	Scientific name.	Tamil name.	Fodder value.
1	Andropogon pumilus, Rox	Senganarikaradu	Not of high value as fodder.
2	Digitaria sanguinalis, Lamk	Seesai pillu	Much liked by cattle.
3	Eleusine aegyptiaca, Desf	Mathangai pillu	Of high feeding value. Fetches more price in the market. Increases quantity of milk.
4	Ischaemum pilosum, L	Aruppan Pillu	Much relished by cattle. it is belived to lessen yield of milk.
5	Isailema laxum, Hack	Kakamuchi pillu	Liked by cattle.
6	Panicum Isachne, Roth	Kuthiravali or Adipulla	Much relished by cattle.
7	Panicum Colonum, L	Samsai pillu	Do.
8	Panicum ramosum, L	Vennai thiratti pillu	Very much liked by cattle. Increases quantity of milk and butter when fed to cows.
9	Sporobolus scaberrifolius, Bhide		

Tanjore District, Manganallur (1916).

No.	Scientific name.	Tamil name.	Fodder value.
1	<i>Axonopus cimicinus</i> , Beauv	Thinaai pillu	Cattle eat this well.
2	<i>Cynodon dactylon</i> , Pers	Arugam pillu	Much liked by cattle.
3	<i>Digitaria sanguinalis</i> , Lamk	Oitu pillu	Relished fairly well.
4	<i>Eleusine ægyptiaca</i> Desf.	Mattanga pillu	One of the best relished by cattle.
5	<i>Imperata arundinacea</i> , Cyril	Viewamitrani pillu	Cattle do not relish this much although they do eat it.
6	<i>Leptochloa filiformis</i> , R & S	Venchamarai pillu	Cattle feed on this well.
7	<i>Paspalum scrobiculatum</i> , Beauv	Kamban pillu	Cattle eat this well.

Coimbatore District, Kangayam (1918).

No.	Scientific name	Tamil name.
1	<i>Andropogon purillus</i> , Roxb.	Belvarugam pillu.
2	<i>Andropogon pertusus</i> , Willd.	Sola pillu
3	<i>Andropogon monticola</i> , Schult.	Oosi pillu
4	<i>Aristida Adscencionis</i> , L.	Kuruthu pillu
5	<i>Ciliaria barbata</i> , Sw.	Arugam pillu
6	<i>Cynodon dactylon</i> , Pers.	Mattangai pillu
7	<i>Eleusine ægyptiaca</i> , Desf.	Periyamosulam
8	<i>Eragrostis major</i> , Host.	Arisi pillu
9	<i>Eragrostis pilosa</i> .	Kolakkattai pillu
10	<i>Panicum colonum</i> , L.	Udam pillu
11	<i>Panicum ramosum</i> , L.	
12	<i>Pennisetum cenchroides</i> , Rich.	
13	<i>Setaria verticillata</i> , Beauv.	

Agricultural College &
Research Institute
Coimbatore, Lawley Road. }

"Donda"—*Coccinia (Cephalandra) indica*.

G. JOGIRAJU.

This is a vegetable largely cultivated in the Vizagapatam District, especially near Thallavalsa in the Bimilipatam Taluq. It is comparatively little known or grown elsewhere. The fruit is sometimes raised to several large towns and sells there at a high price, 4 as. a pound not being uncommon at Bezvada. The plant is easily propagated by cuttings from old vines. Each cutting may measure a foot or more long. These are laid flat on the surface of prepared pits and covered over by a thin layer of soil. Sometimes a long cutting is tied up in the shape of a ring and one ring is placed in each pit. Cuttings are also sometimes planted vertically, three or four being planted in each pit. Pits for planting cuttings may be prepared a little in advance of planting, the best time for which is in January, and the soil dug up may when it has dried well be mixed with a basketful of well-rotten farm yard manure. The cuttings will put forth shoots in about a week and will soon require some support to creep on. A bushy branch or two of any tree e. g., tamarind, or some leaves of the date palm may be put in for this purpose. In another month a *pandal* will be required and may be made of bamboos and coir rope. The vines will begin to flower when about a month or six weeks old, and in another fortnight the fruit will be ready for picking. The fruit should be picked before it gets ripe, for then it becomes coarse. The vines bear well till the weather grows very hot in May, when there is, in spite of watering, some distinct check on account of the extreme heat. A dose of manure may be given at the beginning of the rains. Fish guano has been found to give very good results. A small plot of 4 cents of these vines grown at the Samalkota Agricultural Station, which previous to the application in August gave a maximum yield of only 65 lbs. in any month, yielded 163 and 128 lbs., in September and October. The vines appear to rest during the winter months, and a pruning in January followed by another dose of manure will rejuvenate them. The vines will go

on yielding for 3 or 4 years, but it is advisable to remove them once every two years, to prevent the increase of the stem weevil (?) which attacks old vines and makes them gouty.

The yield of the 4 cent plot referred to above during the 12 months ending with January 1922 was 584½ lbs., which fetched Rs. 33-7-1 at one anna or less per lb., or in round figures Rs. 836 per acre. In towns it should certainly fetch 2 as., or more per lb., in which case double the amount may be obtained. The cost of cultivation is estimated at Rs. 175 per acre including cost of bamboos, coir ropes etc. for pandal.

There are two varieties of Donda, one small-fruited and the other long-fruited. The latter which is called 'Bobbili Donda' is more profitable to grow. This vegetable, which is rather rare outside Vizagapatam district will, if cultivated near towns, be a profitable item to the grower, and, as the vines bear well for about nine months in the year, it may relieve the market from the dearth of vegetables.

The fruit may be cooked in a variety of ways to suit individual tastes. It may be noted here that unless the fruit is picked very tender it is not easily digestible, and cannot be used by patients or others with a weak stomach.

Extracts.

Vitamins. The sections of Physiology and Agriculture of the British Association held a joint discussion on Vitamins at Hull on Friday, September 8, 1922.

Professor J. C. Drummond spoke of the great strides that have been made since the discovery of the vitamins by Hopkins in 1912. Both the existence and the indispensability of these substances are now generally accepted. The far-reaching importance of the qualitative composition of the diet of man and animals is being gradually appreciated, and the significance of those factors

which exist in extremely minute amounts recognised. Three substances of the so-called vitamin class have been differentiated with certainty, and it is possible that more exist. They do not appear to be of one chemical type, and the only ground for grouping them together is that they occur, and are effective, in very small amounts. Parallel examples from the inorganic food constituents are known, such as the value of minute doses of iodides in the treatment and prevention of foetal athyrosis in swine.

The green tissues of plants would seem to be the chief site of vitamin synthesis, although lower forms of plant life devoid of photocatalytic pigments can apparently produce the vitamin B. Plant tissues undoubtedly form the direct or indirect source of the vitamin supply of animals, but we are entirely ignorant as to the role of the vitamins in the plant itself.

Storage of the vitamin A may take place in the tissues, liver and body fat of animals, and may serve as a reserve from which are drawn supplies to maintain the vitamin concentration of milk if the diet during the lactation period should be deficient.

In collaboration with Dr. Zilwa a prolonged investigation of the origin of the large stores of vitamin A in cod-liver oils has recently been made. It has been ascertained that the marine diatoms synthesise the vitamin, and that it is transferred to the tissues of minute animals (plankton) which thrive on the unicellular plants. These in turn form the food supply of larger species, particularly small fish, which in their turn are devoured by the larger fish, such as the cod. Through all these stages there is apparently a transference of the vitamin, ending finally in the storage in the liver of cod. The modern methods of manufacture of cod-liver oil do not appreciably lower the vitamin value, but there are wide variations in the value of different samples which are probably connected with the seasonal changes in the feeding habits or physiological condition of the fish. Considerable work has been done on the chemical nature of the vitamin A, but an isolation

has not yet been made. It is very stable, except to oxidative changes, and passes into the unsaponifiable fraction of the oil. Cholesterol, pigment, and other fractions of this fraction may be removed without loss of potency.

Captain J. Golding gave a number of illustrations of the value of the application of vitamin theories in practical pig-feeding. Frequently the usual type of pig diet is deficient in vitamins, particularly vitamin A, and the beneficial influence of cod-liver oil or of feeding on pasture or lucerne in such cases is remarkable. In the compounding of rations care should be taken to ensure an adequate supply of food-stuffs rich in vitamins, otherwise there is danger of subnormal growth, impaired resistance to infections, and disturbances of the power to produce and rear normal young. The majority of the cereal products are deficient in vitamin A, and the amount in the diet is not raised much by the use of separated milk. Such diets can be supplemented by small additions of cod-liver oil, 1—2 ozs daily for full-grown pigs, or by access to pasture. Cod-liver oil is also valuable in maintaining the vitamin value of the milk yielded by cows on winter rations in stall, which otherwise tends to fall. The administration of cod-liver oil, if of good quality, does not produce flavour or taint in pigs or milk and butter.

Dr. Atherton Seidell (New York) described his attempts at the separation of the vitamin B from yeast by chemical methods. By adsorption of the vitamin from yeast extracts on to fuller's earth, and extraction of the activated solid with alkalies under suitable conditions, considerable concentration of the active substance could be effected. The resulting extract when fractionated by precipitation with silver salts gave active fractions but these have not yet yielded a pure substance.

Prof. W. D. Halliburton referred to the need for caution that enthusiasm for a new word such as vitamin did not overwhelm the importance of other dietary units. There must not be a loss of

perspective in viewing the function of these newly discovered substances. There is also need for further research on the nature of the substances (auximones) which are believed to act as vitamins for plant growth.

Dr. Monkton Copeman agreed with the importance of vitamins for the young and growing organism, but questioned whether they are as important, or not actually deleterious, to the mature animal. In some researches which had recently been made under the auspices of the Ministry of Health, evidence had been obtained that patients suffering from malignant growths had received benefit from a course of feeding on dietaries deficient in vitamins. There was also a definite, if microscopic, fall in the Registrar General's figures for cancer during the years of the war, when food restrictions were in force.

Nature (Nov. 11, 1923, p 562). H. S. R.

Review.

A Popular Account of the Work of the Madras Agricultural Dept:

It was a happy idea that the Hon'ble the Minister for Development conceived—that of causing the publication being made of a popular account of the work and achievements standing to the credit of the Madras Agricultural Department in the short space of time that has elapsed since its re-organisation in 1906. It was but fitting that the work of compilation and editing should have been entrusted to Mr. Sampson, at once the Senior Officer and the Head of the Department. We believe none will welcome this publication more than the legislators of the country in whose power the voting of the Budget grants demanded by the various departments lies, but who have to be satisfied as to the reasonableness of such demands before they can sanction them, since they are responsible for their actions to their constituents who expect a higher standard of vigilance from their present representatives, than from those under the old regime. A publication of this kind may also be expected considerably to ease the situation that has been created since influential

public men with the best of intentions started criticizing Scientific departments, a knowledge of the working of which they were for obvious reasons ignorant.

A perusal of the book would reveal that Mr. Sampson has brought to bear on this work an assiduity and care which we are accustomed to associate with him. The treatment of the subject leaves nothing to be desired. Mr. Sampson rightly begins his introduction with a statement of the primitive methods of cultivation, which for example the Badagas and Kotas of the Nilgiris resort to and thence leads the reader on through easy steps to the extremely wasteful though much vaunted agriculture of the twentieth century ryot. Incidentally he refers with cogent reasons to the necessity for the establishment and continuance of a department of Government which is charged with the duty of tackling agricultural problems.

The immediate object of all successful farming being enhanced crop returns with increased and increasing fertility of the land, the means are summed up by him to be

- (1) Improving the soil itself by such processes as manuring, liming, draining, levelling, and embanking.
- (2) Improving the conditions of plant growth or conserving a sufficiency of moisture in the soil.
- (3) Improving the kinds and varieties of crops grown, and selecting strains which can make the best use of the conditions present.
- (4) Improved methods of performing any of the above operations, whether for quality or quantity, and the preparation of produce for the market.

How far these means exist, what attempts have been made to secure them, how far they have been successful and what yet remains to be done to make further progress possible are the main considerations, which Mr. Sampson has kept in view in writing this book and this he has done admirably well, for which he and his co-workers are to be congratulated upon.

The Agricultural College and Research Institute and the Central Farm with the Cane the Paddy and the Cotton Breeding Stations situated close by, appropriately occupy a large part of his attention by reason of their being the main centres of research in the department. It is not the imposing array of buildings of the Institute that matters; it is really the outcome of patient, plodding truthful research conducted with infinite care and pains that does. It is such work that stimulates the district officer, enables him to utilise it on the district farms and helps him to improve the agriculture of the tract. Short accounts are given of the work of the several expert officers and of the improvements they have been able to effect.

Work in the districts, which includes the activities of the several agricultural stations which are the tangible exponents to the tax-payer of the real work of the department, is briefly related and the book closes with a succinct summary of work done with a statement of the gains that have accrued to the Madras ryot as a result of departmental activities. A list of publications of the Department is appended which adds to the usefulness of the book.

We feel ourselves unable to single out any statement for quotation from a book which should really be read through and through for a proper appreciation of the activities of a department, the useful nature of which is apt to be forgotten in the bustle and stir of public life in the presidency at present.

We trust the book will be translated into all the vernaculars of the presidency and distributed broadcast, along with the village calendars and leaflets.

We wish every voter were supplied with a copy of the publication and that other departments of Government would similarly follow the excellent example set by the Development Ministry.

Gleanings.

Sugar Notes. Failing to keep pace with modern developments, China's sugar industry has declined to the point where the country depends mainly upon foreign sugar for its supply. Fifty years ago China was an exporter of sugar, says Consul General S. Cunningham, Shanghai, in a report to the Foodstuffs Division of the Department of Commerce, but modern methods have won China's old markets. In China the juice is still pressed from the cane between granite or hardwood rollers through which it is drawn by cog wheels turned by bullocks. A stone basin beneath receives the juice which is boiled, without any attempt at clarification, in open iron pans. The boiled juice is then poured into earthenware jars which are left open to the air for 30 or 40 days, according to the weather, until the contents are thoroughly dry. The sugar obtained is sorted into three grades—the first, or uppermost in the jar being white; the middle, green; and the lower most, brown. In some parts of the country, however, the natives are beginning to realize the importance of proper methods and attempts are being made to install modern machinery.

Louisiana Planter & Sugar Manufacturer, January 6, 1922.
T. S. V.

Identification of cows. Finger-prints serve for criminals' identifications, and nose-prints are suggested for cows. In registering pedigree cattle or conducting official milk tests, difficulties concerning identities have arisen which it is proposed to eliminate by this method. The herdsman tucks the cow's head under his arm, wipes its nose with a dry flannel, and then the nose is well-inked with an ordinary stamping pad. A piece of soft paper mounted on a board is then rolled upward from the base of the upper lip

to the face, and there is left an impression which is unique and unaltered from birth to death.

(The Malay Mail, December 7th, 1922.) P. S.

Suitable Soils for Poultry. Much depends on the soil as regards the health and productiveness of poultry, much more than the average poultry-keeper imagines. Certain breeds thrive better on certain soils than do others, and it would be well if the poultry-keeper gave more thought and consideration to this aspect of the question.

To simplify matters, birds may be divided into three classes: the layers, the table birds, and utility fowls.

In the first class we have the Leghorn, the Ancona, and the Redcap. All these do well on a clay soil, while on a medium soil the Minorca and the Andalusian thrive. All the non-sitting breeds give a good account of themselves on a gravel soil.

The second class, which includes the table birds, such as Sussex, Game, Dorking, and Favorelle, do extremely well on sandy soil, but for a clay soil they are absolutely unsuited, for they will not succeed or thrive on it.

In the third or utility class, there are birds with which one is always safe, for they are adapted for a clay or medium soil, and thrive equally well on a gravel soil. They comprise Rhodes Island Reds, Orpingtons, Wyandottes, and Plymouth Rocks.

Unless one intends to specialise for egg production or for table birds, the last class is really the most suitable; and any of the breeds mentioned, if of a good laying strain, will produce quite a satisfactory number of eggs and when their period of usefulness in this respect is ended they will be found serviceable for the table, while the cockerels of such breeds make quite good table or marketing birds at a fairly early age.

(The Scottish Farmer).

K. U. M.

Pear Midge Parasite. In order to secure, if possible, consignments of the pear-midge parasite for liberation in the midge-infested areas of New Zealand, the High Commissioner in London, at the request of the Department of Agriculture, communicated with the Director of the Imperial Bureau of Entomology. The outcome is that the Honorary Managing Committee of the Bureau has voted the sum of £ 200 for the investigation of the parasite. This work is being carried out at the Rothamsted Experiment Station, Harpenden, Herts, and as soon as material is available arrangements will be made for a shipment of the parasites. The work of establishing the parasite in New Zealand will be carried out by the Department of Agriculture.

New Zealand Journal of Agriculture, Jan. 20, 1923.

Seed sample for analysis.—Samples to the Department's seed-station for analysis should be of at least one oz., of the smaller and 2 ozs., of the larger seeds. It is particularly important that the sample should be representative of the line from which it is taken. This is a matter requiring special attention, as many, if not all, of the discrepancies arising in the germination of certain of the seeds are due to the sending-in of samples not carefully made. Seed should be taken from the top, bottom, and middle of a sack, and from every sack in the line, then well mixed and the sample put up.

New Zealand Journal of Agriculture, Jan '23.

Limewash for Cow-byres.—Mr. A.T.P. Hubbard, Inspector of Stock at Masterton, states that he has found the following very effectual as a limewash for cow-byres. Quicklime, 1 sack; fat, 25 lb.; treacle, 5 lb.; salt 5 lb. The method of preparation is to slightly wet the lime and add the other materials while it is hot, then

thoroughly mix with more water to right consistency. Being weather-proof, the wash is also suitable for painting the exterior of buildings, etc.

New Zealand Journal of Agriculture, Jan. 1923.

A Wholesale Rat Trap. The following method of destroying rats has been clipped from a Sydney paper:—

Get an old tub, take away the top, and supply its place with parchment or stout brown paper. On this for two or three nights in succession leave a few fragments of cheese, bacon, or other dainty dear to the rat palate. Lean a piece of board against the side of the tub to serve as a ladder, allow the rats to become thoroughly accustomed to the future trap. After a few days place a brick upright at the bottom of the tub, fill with water to a depth of 6 inches so that the top of the brick is just high and dry, and cut the parchment in slips in such a manner as to give way at the slightest pressure. The first rat that ventures on this falls, of course, into the water, and quickly makes its way to the brick; so does the second; and then ensues a battle royal, accompanied by much squeaking. Now the cry of a rat in distress invariably attracts every other rat within hearing, with a view to a possible meal upon their unfortunate relations. So others quickly share the fate of the imprisoned rats, and large numbers are thus caught.

Journal of Agriculture, Victoria, January 1923.

Y. R. R.

The Arghan Fibre. This fibre has been known and woven for many centuries. In the Philippines they take it from the leaves of the cultivated pineapple and call the fabric Pina Cloth.

In Columbia they wrapped their mummies in fibre taken from the wild pineapple, the robes of their Emperors were woven from

it (some of them now in the Museum in Botoga), they used it for their bow strings, their lariats, their fish nets and hammocks (the latter so fine that they could be carried in the pocket); in fact, it was used for everything requiring strength and pliability.

It has plenty of natural twist for spinning and no difficulty has been experienced in that direction with the flax spinning machinery. It has not been adapted to cotton spinning machinery and that may not be possible, but it has been woven with cotton and its unusual brilliance makes a beautiful fabric.

One of the largest rope works in the United States has declared their intention of putting up a special mill as soon as they can be assured of a permanent supply, and there are already many enquiries for the yarn.—G. A. Lowry.

Journal of the Roy. Soc. of Arts, 2nd Feb. 23.

Educated Landlords & their Tenants. The landowners have not been, but can be, leaders; they can become intelligence centres, they can stimulate the education of their tenants and of their tenants' sons: they can even insist on education in selecting their tenants. It is the lack of appreciation of science among landowners that has made it a plant of slow growth among any of their tenants.

Nature, 14-10-22.

Copper Acetates as Fungicides. One of the main defects of Bordeaux mixture is, in spite of its being an effective fungicide, its colour. Very often ornamental plants such as crotons could not be sprayed with Bordeaux mixture without affecting their beauty and appearance. Butler and Smith have got over this difficulty by finding out the fungicidal properties of copper ace-

tates after a series of experiments. Copper acetates are said to be excellent fungicides, and to be quite colourless. The preparation of the spray is as follows:— Stock solutions of copper acetates should be prepared by suspending the salts in a gunny sac near the surface of the water. Water should be cold. Hot water should never be used to hasten the dissolution of the salts. The stock solution should be made to contain 1 lb. per gallon. The recipe for the spray mixture is:—

Water	Strong. 46 gallons.	Weak. 49 gallons.
Basic acetate of copper (stock solution.)	4 „	1 „
		C. S. G.

Interplanting trees in Coconut Estates. Sr. Pedro Correia Afonso of the Department of Agric., Portuguese India, in an article contributed to the Planters' Chronicle of January 20, 1923, on the above subject, refutes the statement made by Sr. C. X. Furtado in the same periodical for March 1921, to the effect that the interplanting of trees like Jak and Mango in a coconut grove was beneficial to coconuts by (1) improving the drainage conditions and (2) by creating a moist atmosphere. Sr. Afonso, on the other hand, shows by actual statistics collected and by observations made, that interplanting has an actually adverse effect which is most noticeable in years of scanty rainfall. He further observes that it is in the interplanted groves that the stem-bleeding disease is found in greatest evidence.

In March 1922, when agriculturists in Goa were unanimously clamouring against the effects of the 1920 drought, he examined several groves and actually took countings of the nuts borne by trees (1) in interplanted grove (A) and (2) in one not so interplanted (B).

The following were the results, wherein it is evident that the grove which was not interplanted was distinctly more productive:-

	Number of trees.	
	A	B
Trees with no nuts for next picking	23	5
„ with from 1 to 10 nuts	31	17
„ „ 11 „ 20 „	10	26
„ „ 21 „ 30 „	8	21
„ „ 31 „ 40 „	2	12
„ „ 41 „ 50 „	9	2
„ more than 50 „	0	5
Total number of nuts	370	1875
Number of nuts per tree	5	22.6

V. M. A.

Right thinking is the desideratum. Why are there so many dupes in this world? Wherefore the victims? The secret, we opine, lies in a defect of education. The young are taught to think, but not *how* to think. It is of minor import whether the conclusions in which thoughts terminate are or are not in accordance with fact. What is of vital importance is the character of the mental process. It is wrong thinking rather than wrong thoughts that so often mars the individual, undermines society, and imperils the state. *Circumspice!* So long as the young growing child does not learn how to think, there will inevitably be an undue proportion of grown ups whose pitiful logic consists in drawing false conclusions from unsound premises and to whom error appears as truth provided it be shouted sufficiently loudly and frequently.

C. Marsh Beadnell. Nature, February 3, 1923,

V. M. A.

Students' Corner.

Abraham Football Cup Tournament.

This tournament which should have been over by the end of November last had, unfortunately, to be postponed, on account of the severe plague epidemic, to the early part of this year. This change of date handicapped our College a great deal in as much as Sivarajan (Captain), Doraiswamy Ayyangar and Eggiasamy—all regular members of the team—could not be in, by reason of their passing out of the College in the meanwhile after a successful career.

Only four teams, including the Forest College which made its *debut* this year, competed for the cup. The first match was between the Agricultural College and the London Mission School which ended in an easy win for the former, although the score one to nil does not indicate the one-sided nature of the game. On the second day the Foresters tried conclusions with the Coimbatore College. The Foresters were a heavy lot and consequently they lacked pace which was their opponents' *forte*. Added to this, the latter exhibited a telling combination which enabled them easily to break through the Foresters' defence many a time and to win by two goals in a total of four.

The final game between Agricultural College and Coimbatore College—two teams of equal strength and weight, was both exciting and interesting. The opening chances were all in favour of the opponents, but they threw them all away without effecting an opening. Our College in the meantime warmed up to their work and made tracks to the opponents' citadel and while nearing the penalty area the whistle went off suddenly and a free kick was awarded to us. This kick, which was cleverly taken by Ratnavelu, was adroitly manipulated into the net by Balakrishnan with a graceful heading. The game after this event became more exciting, but nothing happened till half time was sounded to alter the lead which our

College maintained. The second half's game was marred by foul play which originated from the opponents with the result that one of their forwards was temporarily suspended from the game. Nothing eventful happened in this half and our College was left the winners. This is the second time in running that our College secures the cup.

Cecil Wood Cup Tennis Tournament.

This tournament which attracted only 14 competitors, a poor number indeed compared to the number of tennis players in the College, was brought to a finish on Saturday the 3rd instant after a busy week's games. The games were contested both on the College Tennis Court and on the one situated in Rao Sahib M. R. Ramasami Sivan's compound, very kindly lent by him for the occasion. After the first round of matches was over, the remaining rounds were played solely on the latter court, which was in excellent condition. The early games in the tournament were almost all one-sided, in which either Anantanarayanan or Ratnavelu or Sudarsanam had his own way with the opponents, rarely, if at all, conceding a set to them.

Of the various ties, the one between Ratnavelu and Anantanarayanan—one of the semifinals—was, in fact, the best contested match in the whole tournament and was most interesting. Both showed steady base-line play and Ratnavelu evidently lacked the graceful style of Anantanarayanan, and the success which he attained over his opponent was due mostly to his swift foot work; but his successful lobs which he resorted to when cornered, his whirlwind drives which he occasionally indulged in and lastly his volleys had their share in contributing to his success. Anantanarayanan who played a sound game from the base line was rarely seen at the net and whenever he approached it he miserably failed to finish the point.

On the first day these met, the game had to be given up due to failure of light while the third set was being contested. The next day the game was played over again and owing to an early start not only

was this brought to a finish, in spite of Ratnavelu, who ultimately won the match, being stretched to the full, but also the other semifinal—in which Sudarsanam easily settled matters with Rangabrahma Rao without having to play the third set. The finals were looked forward to with great interest as Ratnavelu, judging by his previous performance, was expected to lay insurmountable obstacles in the way of, if indeed he could not floor, Sudarsanam, the winner of the two previous years. These expectations were however not realised, Sudarsanam vanquishing his opponent in two straight sets, in spite of the superior foot work shown by him. Sudarsanam is to be congratulated on his superior game both at the net and the base line. It was in fact his deadly volleys from every part of the court and his accurate placings, which served to unnerve his opponents, that stood him in good stead in defeating every one who was pitted against him.

After the match was over, Mrs. Parnell kindly gave away the Cup to the winner and a medal each, to the winner and the runner-up. The cup which Sudarsanam annexed by winning it thrice successfully was very sportingly presented by him back to the College, as was done by his predecessors, Messrs. Dwarakanath Sastri and T. G. Muthuswamy Ayyar of old fame who won it outright during their career in this College.

Farewell Entertainment.

The students of the College availed themselves of the short stay in our midst of Rai Bahadur K. Rangachariar, M. A., L. T., F. M. U., who had come to conduct the Botany Examinations of the B. Sc., Ag. degree and gave a very successful entertainment in honour of his laying down the reins of office after a successful and brilliant service covering over a quarter of a century. The farewell entertainment could well have been postponed to a later date considering that he is due to retire from office only in October next, had it not been for certain cogent reasons, the chief of which was that two of the present batches of students would by that time have passed out of the college and might not find it possible to meet him again. The guest of the evening and others invited on this occasion met at 4 P. M. in

the Hostel Dining Hall to hear the musical performance of the well-known Master-Musician Rama Bhagavathar of Palghat. His excellent and pleasing tone and the scientific and masterly manner in which he handled various difficult but well-known Ragams and Kirthans, won universal appreciation and his delightful performance was brought to a conclusion with a Ragamalika (or a garland of music) which included such favourite and majestic ragams as Saveri, Ananda Bhairavi, Sahana, Athana and Mohanam.

Then students from the various classes spoke a few words in honour of the guest of the evening, eulogising his depth of learning and his scholarly attainments in the realm of Natural History in general, and in Botany in particular; his many-sided activities, as an able Professor, a shrewd examiner and a devoted research worker; his charitable nature, his unassuming and retiring disposition and many other traits in his character too numerous to enumerate here. All the speakers expressed sorrow at his retirement, but consoled themselves with the idea that he was embarking on a new sphere of activities in which he could extend his usefulness to a wider circle of people. They wished him a long and happy life to carry on his research work. Mr. Rangachariar, amidst loud applause, thanked the students for the very kind words and sentiments expressed about him, but, at the same time said that he did not deserve even a hundredth of what they had said. In the course of a long speech, he gave much sound advice to the students and exhorted them particularly to learn agriculture with a view to adopt it as a profession and not merely to acquire an academic qualification. He suggested to them many ways in which they could make themselves useful, both as students and later on as men settled in life, to their motherland which is essentially an agricultural country and whose welfare and prosperity is so intimately bound up with the advancement of agriculture on modern and scientific lines.

With three rousing cheers to the respected guest of the evening, the function came to a close at 8 p. m. Sometime later, the retiring Botanist and staff were entertained at a dinner prepared on an elaborate scale, including many choice and varied dishes.

H S. R.

Special Lectures.

In continuation of the lectures given last month, the following were delivered for the benefit of the students:

1. "*Cyanamide Experiments*" by Mr. B. Viswanath, Assistant Agric. Chemist, presided over by Rao Sahib M. R. Ramasami Sivan and accompanied by Lantern slides.
2. "*Cultivation of the Plantain*" by Mr. D. Balakrishnamurti, Professor of Agriculture, with Lantern slides.
3. "*Cotton*" by Mr. G. R. Hilson, Cotton Specialist, presided over by Mr. Balakrishnamurti.

On Sunday the 4th March, at a meeting of the Students' Association, M. R. Balakrishnan read a paper followed by discussion on "Certain impressions of cultivation in the Ceded Districts" under the chairmanship of Mr. G. N. Rangasami Aiyangar, Millets Specialist.

Examinations.

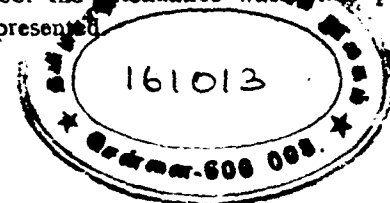
B. Sc. Ag. Part I, at which both the II and III year B. Sc. students sat, began on the 19th instant.

The Certificate course examinations began on the 26th. The Practical and *viva voce* Examinations for Part I B. Sc., are still in progress.

Departmental News.

Pusa Entomological Conference.

The fifth Entomological meeting was opened at Pusa on the 5th February 1923 at 2 p. m. by the Agricultural Adviser to the Government of India. Owing to the prevailing epidemic of Financial stringency, some of the Provinces such as Bombay, Burma, Central Provinces, Assam etc., did not sanction the deputation of their Entomological workers to attend this Conference, while those Provinces that did send delegates sanctioned in most cases only a single representative; and as a result thereof the attendance was rather poor. Only three of the states were represented.



There was however a much larger representation this year of Veterinary Entomologists. The number of papers presented was however quite large (being nearly seventy) and the papers were in no way lacking in quality. Many of the papers were, in truth, very interesting, and elicited a great deal of discussion. They were representative of the various aspects of the Entomological Science; some related to Veterinary problems, others to questions of public health and touched certain aspects of Medical science. Certain other papers were of general interest and dealt with the organisation of research and of mutual help between workers in the various branches of Entomology. Some related to systematics, others to life-history work and a great many dealt with the economic aspect of agricultural entomology. It is the last item that is of special interest to the practical agriculturist and several of the papers were very informing. Owing to the difference of conditions, the entomological problems of the different provinces usually differ to a great extent and a discussion on these is productive of good to all workers, as even in case they may not be confronted with the same problems, it will serve to forewarn them and keep them guarded against a possibility of their occurrence in the future. The problem of Field-rats in the Punjab is a case in point and curiously enough there have been several reports of late in Madras as to the occurrence of great damage to paddy by field-rats under altogether different conditions. The cotton bollworm problem is quite different in the various provinces, as for instance, in the Punjab, it is the spotted bollworm that invites attention, whereas in Madras and United Provinces the pink one is far more serious. The paper on "The shedding of buds and bolls in cotton" by Mr. Hilson, supported as it was by an array of statistics and illustrated by graphs, evoked much discussion. Dr. Kunhikannan's new method of controlling the sugarcane shoot borer pest by trapping the moths in cane-trash, opened a new line of attack on this serious evil. The Imperial Entomologist read a paper detailing all that is known about the cotton boll-weevil of America and indicated the possibilities of unknowingly importing into India this serious menace to cotton cultivation, and pointed out the likelihood of such an introduction by stating that some of

the cotton mills had of late been actually importing American cotton directly from America. Ways and means of preventing such a catastrophe were discussed at length and resolutions were passed for action to be taken by the Cotton Committee and the Government. The meeting also resolved to recommend to the Universities in India the introduction of Entomology as one of the subjects for the Degree Examinations on an independent basis and on a status equal to Zoology, Botany, Chemistry etc. Of the papers from Madras those dealing with fruit moths, crabs as pests on paddy and the coconut caterpillar pest of Mangalore, were interesting. Dr. Kunhikannan gave a lecture—illustrated by Lantern projections—on his experience of "Entomological work in America." The Entomological section at Pusa was at home on one of the evenings to the visitors and to the staff of the other sections of the Institute. The Conference lasted till the 10th February and was on the whole a success and proved altogether instructive and interesting.

It is a pity that the Mycological, Chemical and Bacteriological Conferences had to be given up this year, as there was not much response from the Provinces, but the moral as well as the enthusing effect of Conferences on the delegates is, in our opinion, well worth any expenditure that the State may be put to by their organisation.

Analysis of Soil Samples.

Dr. Norris attended a meeting of the United Planters' Association of South India at Coimbatore, on the 28th February 1923, at their invitation and took the opportunity to explain to the planters his position as regards the delay in sending up results of analyses of soil samples—about which there had been some complaint from planters. He said that delays were unavoidable in many cases and that they were caused mainly by three chief heads. Firstly, the samples were not always forwarded to the address of the Agricultural Chemist, Coimbatore, direct, but were in many cases addressed to the Secretary U. P. A. S. I. or the Deputy Director of Agriculture, Planting Districts, or to the Chemist personally by name so that there was considerable delay thereby. Secondly, there was always other Government work on hand

and unless Planters were prepared to pay *priority* fees (suggested @ Rs. 56) it was not always possible to give them precedence. The fees charged at present were Rs. 30 per sample, which were small as compared with the fees of the Indian Tea Association, Calcutta. Lastly, the analysis by itself actually required a certain amount of time. Mechanical analysis alone took about 7 weeks and the time taken varied much according to the nature of the soil. Moreover, there was sometimes a heavy rush of samples at one time especially towards the end of the year.

Dr. Norris further remarked that he was often handicapped by lack of information regarding the soil samples, e. g. as to the crop proposed to be raised, the previous manurial history, details of the climate and the rainfall etc., and in the case of manures, the alleged ingredients as well, since these points would enable him to keep a check during the time of the analysis.

Extracted from the Planters' Chronicle, March 3, 1923.

(These various points should be kept in mind by any gentlemen who propose to send samples to the Agricultural Chemist, Coimbatore, for analysis.—*Editor*.)

Mrs. Dorothy Norris—Govt. Agricultural Bacteriologist—has availed herself of 5 months' leave granted to her by Government, after having handed over charge of office to Dr. Norris. It is believed that Mrs. Norris will accept an appointment as Bio-chemist to the Lac Association at Ranchi, (Behar and Orissa) and that the Bacteriological section here will be absorbed by the chemical.

The Exhibition which was proposed to be held in Madras in December 1923, as a preliminary to the Empire Exhibition at Wembley, has been abandoned owing to financial reasons.

Correspondence.

We have much pleasure in publishing below a very interesting account from one of our old members—Mr. H. C. Javarayya, L. Ag.,—regarding a visit paid by himself and Mr. T. Lakshmana Rao also of our college to Dr. C. A. Barber at his home in Cambridge. Mr. Javarayya is Superintendent of the Maharajah's Gardens at Mysore and has been sent up by the State for higher training in Horticulture in England. His narrative, which is couched in a lucid and pleasing style, needs no further introduction and we trust our readers in perusing it will experience the same pleasure as we did when the English Mail brought us his letter.

Editor.

A Day with Dr. C. A. Barber.

Having acquainted Dr. Barber of our stay in London and our desire to see him, Mr. T. Lakshmana Rao and myself were glad to have his invitation to go to Cambridge and spend a day with him. We readily accepted his kind invitation and having intimated to him the day of our visit, we took an early train on a Saturday (2nd December, 1922,) to Cambridge, arriving there at about 11-30 in the morning.

Dr. Barber was so good as to meet us at the Station and to give us a warm greeting. We soon found ourselves outside the Station and on our way to the famous old Botanic Garden belonging to the University which was not far from the Station. We were introduced to Mr. Carter, the Director, formerly of the Botanic Gardens in Calcutta, who took us round the garden. We had explained to us the history and the habit of the various plants in the garden, Dr. Barber adding now and then remarks about his experience of the plants. Coming to a Hornbeam, Dr. Barber told us of an interesting incident of about thirty

years ago, as to how, when questioned about the name of this tree (which he had never seen before since it was confined to the South of England which he had not visited) he was able by a process of elimination to guess its name correctly, as the only English forest tree he did not know.

We strolled on and met a few Japanese Bamboos which were a pleasing contrast to the naked deciduous trees of England such as the elm, oak, beech, ash, plane, etc. One of the few trees whose family we knew was *Ailanthus glandulosa*, (*A. excelsa*—'Pee Maram' is common in and around Coimbatore).

The finest sight in the garden was that on either side of the main walk, with the pond and the green lawn and the large conifers which make a pleasing landscape scene. A pit was being dug for storing manure and we walked across to see what the soil and the sub-soil were like. The soil was only 12 to 18 inches deep and below it was stony gravel, the kind which we find in river beds. We noticed the roots of trees were chiefly on the stratum of the soil and Dr. Barber suggested to Mr. Carter that it would be a good idea to have a photograph of the section taken.

We continued our walk, taking a front view of the range of glass houses, which was a pretty one, through the collection of conifers and entered the houses at the side. This building consists of a long corridor with potting sheds, etc., at the back and a number of bays jutting out in front. This is a very good idea from the point of view of cultivation, for the arrangement allows green house climbers to have a good bed for their roots and plenty of room for their growth along the passage. And the separate houses render possible the cultivation of temperate and tropical plants which require all degrees of heat from the climate of the Cape to the hottest stove.

Dr. Barber had his eye on his watch all along and in the little time at our disposal in the hot houses we saw a good number of our familiar friends, such as Paddy, Ragi, and sugar cane, raised from seed given by Dr. Barber.

On our way back we saw some plants grown against the walls, amongst which we were delighted to see *Jasminum nudiflorum*, with bright yellow flowers, the Japanese cousin of our good old Jasmine. This is one of the very few out-door plants which flowers during the winter. The red berries of the Holly and *Pyracantha* are very attractive and serve to lend colour to the winter landscape. While in the garden we had pleasant recollections of the work we did in our College Botanic Garden which owes its existence to Dr. Barber. (Only a few days ago I had occasion to show Mr. Lakshmana Rao the photographs of the little pond and rock garden and of the entertainment which the Officers' Club gave us before we left the College, in the Botanic Garden. We were so happy looking at them and looking back on days ten to twelve years ago at the A. C. R. I.)

Well, after thanking Mr. Carter for having shown us round his garden, we hurried back and were in time to catch the bus going to Cherryinton Road, where Dr. and Mrs. Barber have their home. After a drive on the top of the bus for about ten minutes we got out at the corner of the house. As we entered the house we were greeted by Mrs. Barber whose kindness will be remembered by many on the Estate at Coimbatore. Soon after, we had our lunch—a delightful one, which we much relished. The vegetables and fruits were of Dr. Barber's own raising. Mrs. Barber then showed us photographs of their daughter and son, both of whom have grown quite big and are doing splendidly in their respective spheres of work. Their son is scholar and Head Prefect of the Leys school and the daughter is in training as a lady nurse.

Dr. Barber showed us round his fruit and vegetable gardens, the fruit store and the poultry yard. He grows large quantities of apples, pears and plums. The plums were so abundant last year that there was difficulty in finding a market for them, and he told me there were between 30,000 and 40,000 that season. We saw his small grape house and the lawn and rockeries which provide a fine view from the dining room.

We then looked over Dr. Barber's study and found everything arranged with the precision and system so characteristic of him. We had no more time to spend at the house as Dr. Barber was going to take us to the various Schools and Colleges in Cambridge, and thanking our kind hostess we wished her goodbye.

It was about 3 o'clock when we came to the centre of the Educational institutions. The first of these visited was Christ's College,—Dr. Barber's Alma Mater. It was founded in 1505 by Lady Margaret Beaufort, mother of Henry VII. Entering through the massive front gate we found ourselves in the first Court. From there we got into the Hall, where at the well-worn tables the Fellows and students sit for their dinner. In the dim religious light which, by the way, characterises all the older colleges, we could see on the walls the portraits of Milton and Darwin, former members of the College, besides that of the Foundress, Lady Margaret. We next passed on to the second Court surrounded, as is the first Court, by ranges of rooms where the students live. We then went into the garden which is one of the most beautiful of the old College gardens. Here on seeing the perfect lawn I recapitulated what Dr. Barber had told us ten years ago about the story of the American who asked an Englishman how they made such fine lawns and the latter's answer, which was "Prepare the ground well, sow the seed evenly, when the grass grows cut and roll and wait for 400 years." We saw here the bowling green and the pond where Milton used to swim, and an ancient Mulberry tree propped up with an immense number of

supports on all sides, said to have been planted in 1625 by Milton when he was pensioner in this College.

The School of Agriculture was the next building we visited and here we saw the hall where Dr. Barber gives his lectures on Tropical Agriculture and his little museum where he showed us his collection of millets, paddy and wheat from Coimbatore, rubber, cacao, copra and other tropical products. We were then shown the inside of the principal Schools of Science. In one of these buildings we had a glimpse into a small place where Dr. Barber studied his Botany as a student. It was not large enough to hold a dozen students.

We then passed to some of the larger Colleges. King's College is an imposing building. On entering the Courtyard we were taken into the Chapel which is practically a Cathedral and of course, the biggest of all the College Chapels. It is a magnificent old structure with beautiful stained glass windows and tracery. Having a very high roof the Chapel was very cold. The back of this College is very pretty with the Cam river flowing at the bottom of a fine sloping lawn.

Trinity, with its spacious Courtyard, the largest in Europe, and St. John's, the next largest College in Cambridge, were also gone through. We saw the "Bridge of Sighs" over the Cam at the back of the latter. We then went into the University Union, a Club with an excellent library, tea-room, etc., and where the students have their debates often visited by Members of Parliament, and where many of our Legislators got their first training in public speaking.

A word or two more may be said with regard to the general impression left on us after a visit to these famous Colleges. The idea which a stranger has, or at any rate we had, of Cambridge, was of a nest of ancient Colleges situated in an old town where the students carried on their studies and researches in quiet retirement

The reasons for this are not far to seek. Firstly, inadequacy of funds placed at the disposal of the Department, secondly, dearth of trained staff and thirdly, want of local knowledge on the part of the Departmental Officers.

In the present financial stringency, it is not probable that the Government will be in a position to allot sufficient funds to educate the actual cultivators through Demonstration Farms, cinematograph exhibitions, magic lantern lectures, etc., commensurate with its importance, while the people keep clamouring for retrenchment in all directions. As things at present stand, the Department will not be able to absorb all qualified students that come out of the Agricultural College year after year.

In the interest of the improvement of the premier industry of this Presidency and also for giving wider prospects to such students, may I suggest the giving of grants-in-aid to Demonstration Farms started by fully qualified students of the Agricultural College. If this system is encouraged by Government I am sure it is very likely to increase the number of Demonstration Farms in our Presidency at considerably less cost to the Government than they incur at present by running the farm themselves, not to speak of the heavy loss which the Government incurs in winding up costly farms as they are found to have outlived the purpose for which they had been started. Besides this there are other advantages, for the persons running the farms will have ample local influence to popularise improvements in the agriculture of the district. These farms will have none of the features objectionable from the point of view of the illiterate ryot. Further the local ryots will also have greater confidence in the improved system of cultivation. To do effective work and to maintain a persistent policy, the person who undertakes the business will have to make this his life work. So he cannot afford to launch into such an undertaking in a light-hearted manner.

For the above reasons this kind of farm is more likely to be popular with our cultivating classes, who are too timid to approach Government Officers for help in the various difficulties they meet with in their daily avocations.

The person who conducts the farm can also take up the following work on behalf of the Department:—

1. The sale of improved implements, fertilisers and seeds.
2. The storing of insecticides fungicides, sprayers, etc., for the use of the cultivators if the Department supplies the same.
3. Getting up of Agricultural exhibitions, Lantern lectures, etc., at the time of religious festivals in co-operation with Departmental Officers.
4. Starting Agricultural Co-operative Societies and Associations for the betterment of the cultivating classes.
5. Distribution of books, leaflets, etc., published by the Department.
6. Publication of the market prices of the various Agricultural products from time to time.

The system of giving Grants-in-aid is not a novel method for the Government, as it has been in existence in the Education Department with beneficial effects. Besides the occurrence of such a precedent, a fresh bill has been recently introduced (since passed, *Ed.*) by the Honorable the Minister of Development in the Legislative Council for giving Grants-in-aid or subsidies to industries.

In my humble opinion a fair trial may be given to this scheme for popularising Agricultural improvements by Grants-in-aid.

Corrigenda

The following correction is desired to be made by "K. U. M." in the body of the extract entitled "Results in Australia in Planting Sugarcane" which appeared in the January issue of this Journal of the current year.

Vol. XI, page 12, lines 11 to 14: please substitute for "is between 25 to 35 pothies.....better drained soils," the following "is between 25 to 35 pothies rarely reaching 40 in such cases, but where the number of setts per acre is between 25 to 30 thousands, the yield goes up to 60 pothies, the higher yield being obtainable from the better drained soils."

Editor.

Estate News.

Mr. Wynne Sayer, Secretary Sugar Bureau, Pusa, with his Assistant Rao Sahib Kasanji D. Naik, M. A., visited the Cane Breeding Station about the middle of the month.

An auction sale was conducted of a few animals on the Central Farm—details of which will appear in our next issue.

Re-laying of pipes to meet the increased demand of water was taken up during the month and was pushed on with vigour.

A fresh attempt at boring in F No. 5 well proved successful and has given a large supply of water and will serve to satisfy the needs of irrigation in the north-western portion of the Estate.

Rai Bahadur K. Rangachariar, M. A. L. T., F. M. V.—Govt. Lecturing and Systematic Botanist on leave—and Doctors K. Kunhikannan, M. A., Ph. D., and M. A. Sampatkumaran, Ph. D. visited Coimbatore in connection with the Practical Examinations in Agricultural Zoology and Botany of B. Sc. Agriculture, Part I.

The Director of Agriculture visited Coimbatore and stayed on the Estate on the 23rd and 24th on his way to Coonoor.

Radhakalyanam.—This annual function which ought to have been gone through in the cold season had been on account of the plague put off and was performed in March with great eclat. The central idea of this ceremony is the celebration of the marriage of Lord Krishna representing the "soul" and Radha—His Beloved—representing "Divine Love," and is the great concept of the Devotional School of Hinduism. There was the usual procession accompanied by the singing of highly devotional songs and a Bhajana party in the evening.

Ramanavami Celebration.—In connection with Rama Navami—the reputed birthday of the Indian National Hero and Avatar—Sri Ramachandra,—the services of a very learned exponent—M. R. Ry. Rama Baghavathar of Palghat—were obtained and expositions of various important portions of the Ramayana were given on several days. Not only was the explanation of the Sanskrit stanzas excellent and learned but the deliverance was given in a uniformly charming musical tone. On Rama Navami Day, a procession was organised at night with the aid of power lamps and was a complete success.

The expenses in connection with these religious celebrations were met from contributions from interested persons and an account will appear in our next issue.

Editorial Notes.

The University Act.

We congratulate the Local Minister for Education for the very courageous step he has taken in piloting through the Council a measure which has excited undue animation and raised active controversy from almost every section of opinion. Education is the very breath of the Madras's life and Lord Curzon's Act of 1904 gave a rude shaking to it. It had been running in unprofitable channels and had been manufacturing at the University factory a large mass of material which was but little productive. Law and literature which had until then monopolised the attention of the students gradually gave place, it is true, to sciences, but the absence of large industries naturally led to stagnation or arrested progress. Nineteen years therefore is not too short an interval to examine the machinery of education and it is quite opportune that this question should have been taken up and very tactfully handled by the first ministry of the people under the Reforms Act. We do not say that the measure just passed has no defects; but they are such as can be rectified in a large measure through the creation of more Universities (for which there is ample provision)

and through generous and judicious allotment of funds, for the present low scale of which the Minister, who boldly conceived this educational reform, is not the person to blame.

The one idea that lies at the root of the Act is to utilise the talents of the best intellects for the good of the country and to create opportunities for research which is of no mean consideration in a province which had the honour of contributing more than fifty papers to the recent sessions of the Indian Science Congress at Lucknow. Colleges at Madras and within a radius of ten miles of it are certainly at an advantageous position under the Act, but this should only spur the mofussil centres to concentrate their attention and build up a tradition not unworthy of themselves.

The very fact that the monopoly of control in education has passed from the hands of a microscopic minority that was very little in touch with the surging currents of Indian life is sufficient to convince any one that in future mass education would be kept in the forefront, which is essential if the percentage of literacy is to rise very high, as was the dream of the late Mr. Gokhale.

Association, in the governing bodies, of landowners, businessmen, financiers and representatives of all classes and communities would in our opinion, ultimately end in unifying their aim, and focussing their attention solely on the betterment of our province.

A Definite Programme for Experiment Stations.

The need of a definite programme of work to an Experiment Station is the subject of the Editorial of the Experiment Station Record for November 1922, which comments on the recommendations of the Committee on Experiment Station Organization and Policy appointed by the Federal Government. The Committee point out that "the plans of the stations in the past have to quite an extent been of short range, reflecting immediate demands or response to temporary conditions. Often too, the individual preference of investigators has played a considerable part in shaping the lines of the activity. The nature of the problems the

stations have now to meet with is, however, such as to require looking further ahead and making careful preparations, as well as assuring continuance of the work. Of course there must always be provision for meeting emergency questions as they arise, and the trend of investigations cannot be foreseen in detail; but this need not make the programme of a research institution fortuitous or fragmentary in its larger aspects or haphazard in its planning."

The Committee further suggest that "each station should consider carefully what it ought to attempt in order to contribute to the progress of agriculture in its State and in the Nation over a ten-year or a twenty-year period. Even though there can be no time limit placed on research projects, and the progress of investigation or the nature of general agricultural development cannot be prophesied, it may nevertheless be possible to set a goal and to shape permanent plans in accordance with the object in view. Furthermore, the time has come when no single station can hope to adequately attack all the many and difficult problems with which the agriculture of a given region is confronted, and the programme of any given station ought to take into account the activity of other stations in the region. This can be successfully done only if each of the several stations concerned has a fairly definite programme mapped out for its investigational work."

Such a long time programme, the Committee opine, "is advantageous from all points of view—from that of the director, of the individual research worker and of the general public. From the *standpoint of a director*, a definitely formulated programme enables him to determine on the needed equipment and personnel; and secondly a definite working plan and policy will be of great advantage, as it will secure stability and continuity of investigation in the face of frequent change of directors and working staff, for too often the work of the station is subjected to the personal opinions or wishes of each new director or employee. From the

standpoint of the *individual worker*, the Committee maintain that, while opportunity should be given for the exercise of individual initiative and a reasonably wide range of freedom in research, a fixed programme would be helpful and encouraging to the individual by contributing a larger measure of security for his investigation and would guard against his needs being overlooked in the annual budget and plans. It would also discourage the impulsive undertaking of new studies and check a diffusion of energies on his part. It would likewise widen the field of vision of the individual worker and correct his sense of proportion. And from the standpoint of the *general public*, an organised plan is the best possible basis for a convincing appeal for moral and financial support. It is a means of getting together with the constituency and enlisting its support in carrying out plans devised in its interest. A definite outline of work and development is the only possible basis for an intelligent understanding of the place of the station in the State and National system of publicly supported institutions. The submission of such a programme to the consideration of organised associations of farmers within the State affords an opportunity for constructive criticism of station work by intelligent and experienced farmers who are to be the users of the Station's investigations—which will be of the utmost advantage to both the people of the State, the legislature and the station officials."

From a perusal of the above observations, our readers will naturally question themselves as to whether such a fixed programme has been assigned for each of the District Farms in our country. Though in a vague sort of way, each station is gradually evolving a certain definite programme, yet we have reason to believe that this necessary process may be quickened by the deliberations of a committee formed of experienced District Officers for chalking out a definite programme, not only from the standpoint of the tract in question, but from that of the Province as a whole. In many cases a continuity of policy has not been possible by a constant

change of officers and the concomitant change of points of view and difference of personal opinions. Such changes of policy and programme have led in many cases to the abolition of various farms and in other cases to the station adopting a line of policy quite at variance with the purpose for which it was started at great cost: and it was but natural that some of these points should have been discussed in the Legislative Council. In the Journal above referred to the Editor in conclusion States "The Committee on Experiment Station Organization and Policy have rendered a useful service in calling attention to the desirability of such a programme at this time and its recommendations are entitled to the serious consideration of administrative officers"—and we would very much wish such a committee were appointed to outline in our Province a similar policy.

Budget Debate—1923.

Since the inauguration of the Reformed Councils, the month of March has begun to be associated with a certain spirit of vague, ill-defined uneasiness; for, is it not the month when the Budget estimates of the various departments of Government for the next financial year are discussed and sanctioned? The heads of the various departments are weighed down with anxiety as to how their schemes of development, on which future progress in the sections under their care depends, will fare in the Budget Sessions of the Legislative Council. Their plans are but like the dream-castles of Alnaschar liable to be swept away in a moment, unless they are backed up by the sanction of the elected representatives and furnished with the finance wherewith to carry them into effect. Sometimes indeed the departments have not merely to meet with a refusal of the grants but also to face the music of public criticism—at present, rather apt to be somewhat severe in the first flush of power and rather liable to be uncharitable and harsh owing to want of correct information.

The Agricultural Department passed rather an anxious period in the third week of March anticipating a tough fight for its existence, especially in view of the various schemes of retrenchment in the air; we are, however, happy to record that the motion by the Minister for Development for a grant of Rs. 14.54 lakhs for Agriculture was after some discussion carried in toto. It is rather pleasing to note that the criticisms passed during the discussion were not so severe or ill-considered as last year and we are inclined to attribute this circumstance to the publication of the "Popular Account of the Madras Agricultural Department" last year, which must have made clear to most of the members the quality and the amount of work turned out by the Research and District officers of the Department. The monthly digest giving a popular account of the working of the Department in various phases of activities should also be considered another factor contributing to the same effect. One of the members suggested that a reduction in Expenditure may be effected by a non-separation of teaching and research in the various sections, by a further Indianisation of the services, and by an abolition of some of the posts, while others pressed for the employment of a larger and larger number of demonstrators to carry knowledge to the doors of the ryot and advocated putting a stop to a multiplication of research work at the expense of demonstration. Some of the members insisted on the opening of more Farms, one of them suggesting a second paddy farm for Malabar and another a farm in Ganjam. There was a suggestion from one of the members as to the advisability of the amalgamative of the co-operative and agricultural Departments. A definite pronouncement was solicited from another quarter as to the policy of the Government as to providing facilities for Agricultural Education and as to the establishment of Agricultural High Schools and Middle Schools in the Presidency. A motion for a nominal reduction in the demand was moved by still another member on the plea that there was a lack of definite

policy in the carrying out of propaganda work. Farms, he said, were opened at great cost and then closed after a time and were moreover in most cases never self-supporting. Such farms he affirmed did not carry conviction to the ryot as to the profitable character of improved methods of agriculture.

On the whole the Agricultural Department may congratulate itself as having emerged almost unscathed from this ordeal of criticism. The members of the Agricultural Department are under an infinite debt of gratitude to the Hon'ble Rai Bahadur K. Venkata Reddi Nayudu Garu—Minister for Development—for the fostering care with which he has been protecting and defending the department throughout, both in the Council Hall and outside, and we trust they will remember this fact always and try to do their level best in their particular spheres of activities and thus to deserve the great trust reposed in them by the Minister.

We believe that, in spite of the schemes of retrenchment, the department will be able to maintain a high level of efficiency and carry on its accustomed activities, even though it cannot hope to expand, as it ought to, to make its usefulness more widely felt.

Departmental Notes.

Confirmation :—

1. Mr. O. J. George, Upper Subordinate, V grade, Science Section.
2. „ C. Vijayaraghava Achari, do. do.
3. „ M. Rajagopalayyar, do. do.
4. Messrs. S. Bhima Raju and P. R. Subrahmanya Ayyar, Lower Subordinates, V grade, Agricultural Section.

Transfer :—

1. Mr. S. Kuppuswami Ayyangar, Farm Manager, on expiry of leave, to IV Circle.
2. „ K. P. Sankanni Menon, on the expiry of the leave, to VII Circle.

Leave:—

1. Mrs. Dorothy Norris, Government Agricultural Bacteriologist, leave for a period of five months and 23 days from the date of relief.
2. Mr. Saadat-ul-lah Khan, Probationary Deputy Director of Agriculture, sixth circle, leave for 25 days in continuation of the ensuing Easter holidays.
3. Mr. B. Viswanath, Assistant Agricultural Chemist, leave on average pay for one month and 21 days from 5-3-1923.
4. Mr. P. A. Raghunathaswami Ayyangar, Assistant in Chemistry, leave on average pay for one month from 4-4-1923.
5. Mr. K. Venkataramayyar, Assistant in Economic Botany, leave on average pay for one month and thirteen days from 3-3-1923.
6. Mr. M. Anandan, Assistant in Economic Botany, leave on average pay for three months from 4-4-1923.
7. Mr. P. Susainathan, Assistant in Entomology, leave on average pay for 10 days from 19-3-1923.
8. Mr. K. Sankaranarayanayyar, Assistant in Agricultural Engineering, leave on average pay for two months from or after 16-4-1923.
9. Mr. T. V. Narayana Rao, Farm Office Manager, leave on average pay for two months from or after 16-4-1923.
10. Mr. R. Swami Rao, Agricultural Demonstrator, leave on average pay for 2½ months from or after 15-4-1923.
11. Mr. V. Ramachandrayyar, Agricultural Demonstrator, leave on average pay for one month from or after 10-3-1923 under Article 81(b) ii of the Fundamental Rules.
12. Mr. L. Sankarakumar, Agricultural Demonstrator, leave on half average pay for 4 months and 4 days from 9-4-1923 and extraordinary leave without pay for 17 months and 26 days in continuation thereof. The Director of Agriculture wishes him luck. [We hear he proceeds to Java. Ed..]
13. Mr. N. Srinivasa Rao, Agricultural Demonstrator, leave on average pay for two months from or after 15-3-1923.
14. Mr. A. M. Muttayya Nattan, Agricultural Demonstrator, extension of leave on average pay on medical certificate for one month and 29 days upto and inclusive of 25-4-1923.
15. Mr. M. Chinnaswami Nayudu, Assistant Farm Manager, Nandyal, leave on average pay for two months from or after 15-4-1923.
16. Mr. T. D. Easwarayyar, Assistant Farm Manager, Govt. Gardens and Parks, extension of leave on average pay for 4 days in continuation of one month already granted by the Curator.

17. Mr. K. K. Baghavan, Farm Manager, Taliparamba, leave on average pay for 3 weeks from 26-2-1923.
18. Mr. D. S. Subrahmanyam, Assistant Farm Manager, leave on average pay for two months from or after 25-3-1923.
19. Mr. G. L. Narasimha Rao, leave on average pay for 14 days from 22nd February 1923 under Article 81(b) ii of the Fundamental Rules.
20. Mr. K. Sitharamayyar, Assistant Agricultural Demonstrator, extension of leave on average pay for one month and 29 days.
21. Mr. P. Abdullah, Assistant Agricultural Demonstrator, leave on average pay for 15 days from 17th to 31st March 1923.
22. Mr. S. Muthuswami Ayyar, Sub Assistant in Economic Botany, leave on average pay for 3 months from or after 5-4-1923.
23. Mr. C. K. Subrahmanyam, Sub Assistant in Entomology, leave on average pay for 15 days from 14-3-1923.
24. Mr. B. Subbayya Goundan, Sub Assistant in Economic Botany, leave on average pay for one month from 4-4-1923.
25. Mr. K. Srinivasa Achariar, Agricultural Demonstrator, Tiruvalur, leave on average pay for 15 days from 4th to 15th April with permission to prefix three days of Easter Holidays.
26. Mr. K. M. Thomas, Assistant in Mycology, leave on average pay for three weeks from 4th April 1923 with permission to prefix the Easter holidays.
27. Mr. G. Krishnan Nayar, Assistant in Mycology, leave on average pay for one month from the 4th April 1923 with permission to prefix Easter holidays.
28. Mr. M. Chinnaswami Pillai, Artist to the Government Lecturing Botanist, leave on average pay for two weeks from 17-2-1923 to 2-3-23.
29. Mr. P. Doraiswami Mudaliar, 2nd Artist to the Government Mycologist, leave on average pay for 17 days from 12th March 1923 with permission to avail the Easter holidays.
30. Mr. L. K. Narayanayyar, Sub Assistant leave on average pay for one month from 4-4-1923 with permission to avail the Easter holidays.
31. Mr. C. S. Namasivayam Pillai, leave on average pay for one month from 24-3-1923.
32. Mr. A. Moses, Sub Assistant, leave on average pay for one month from 10-3-1923.

Retirement:—

1. Mr. E. Ballard, Govt. Entomologist—The Govt. with the sanction of the Secretary of State for India are pleased to permit the retirement of— with effect from the date of expiry of the leave granted to him.

Resignation:—

1. Mr. N. R. Rajagopalayyar, Assistant Agricultural Demonstrator.

(v)

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THE JOURNAL

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Vol. XI.

April 1923.

No. 4.

Some Varieties of 'Chikkudu' (Runner Bean).

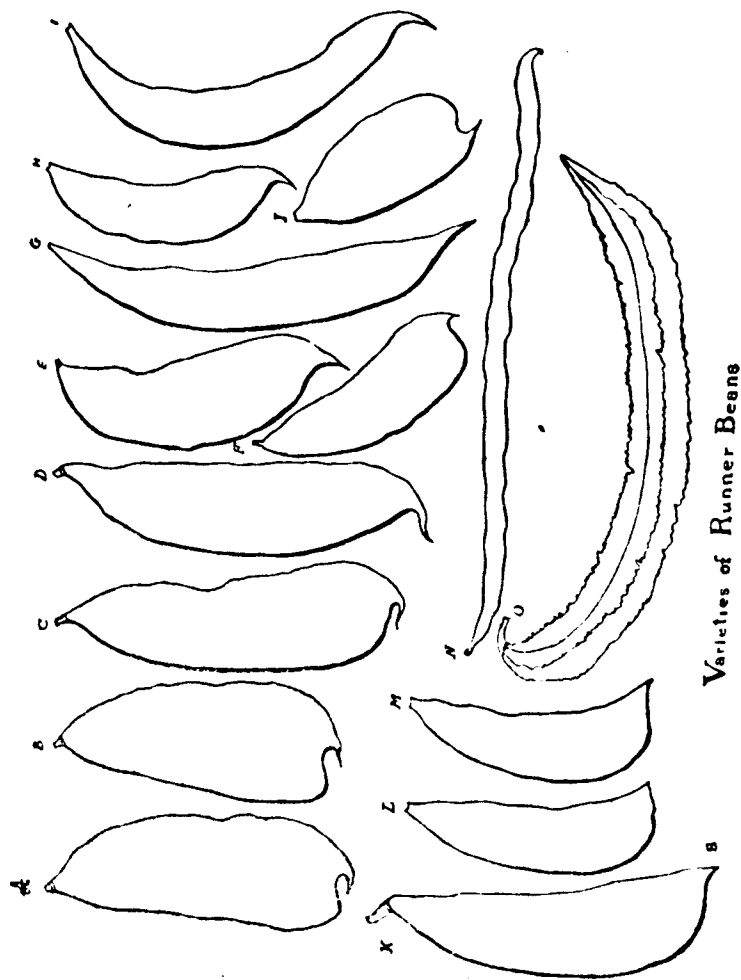
G. JOGIRAJU.

A collection of 15 varieties of 'Chikkudu' or Runner Bean was made and a few vines of each were grown on the Samalkota Agricultural Station during season 1921-22. Of the fifteen varieties one 'Golkonda Chikkudu' is not really a bean but a cowpea grown in the same manner as a runner bean. It yields a large pod measuring 6 inches to a foot or more and $\frac{1}{4}$ " to $\frac{3}{8}$ " in diameter (see figure N). This is picked for use when partly ripe. Of the remaining varieties the Goa bean (*Psophocarpus tetragonolobus*) is easily distinguished by its characteristic four-winged fruit (see figure O.) The other 13 varieties fall into two distinct groups. In one, the fruit has, when partly ripe, a more or less soft skin, which enables the whole fruit to be cooked, and in the other it has a tough skin and only the seeds are fit for the table. There is again a great variety in the colour, shape etc., of the pods and seeds in both the groups, especially in the former. A short description and outline drawings of the varieties which fall into these groups are given below:

Group I—Soft-skinned.

(A) A white broad pod of medium length, white flower, and white and rather flat seed. The tip of the pod has a characteristic curve. This goes by the name of 'Appalachikkudu.'

- (B) This is similar to (A) but green skinned.
 (C) A white pod like (A) but slightly differing from it in shape.
 (D) A white rather long, but moderately broad pod, differing in shape from (A) (B) or (C).
 (E) A green pod moderately long and broad, with a characteristic shape different from that of the above four.



(F) A white pod of medium length and breadth and white roundish seed.

(G) A long green pod with somewhat round white seed.

(H) A green short pod with white round seed. This goes by the name of 'Biyyapu Chikkudu.'

(I) A long purple bean, with purple skin and flowers and purplish black seed. This is called the 'Rathripagalu Chikkudu' or 'Night and day' bean as the skin of the pod is purple outside and green inside.

(J) A short purple pod similar to the above in other respects.

Of the above ten varieties (A) and (I) are much praised for the softness of their skin, while (G) and (H) are comparatively full-seeded.

Varieties of this group flower in November, and begin to yield from December, the usual time of sowing being June—July.

Group II—Tough (leathery)-skinned.

(K) A rather flat pod, greenish white in colour, with large flat white seed, mottled and streaked with red. This is called 'Rajula Chikkudu.'

(L) A red-seeded pod similar to the above but smaller and slightly differing in the shape of the tip.

(M) A black-seeded pod similar to the above.

The above three varieties have small inconspicuous greenish white flowers in clusters. The fruit of (K) is praised for the excellent quality of the seed when cooked partly ripe.

The varieties in Group II commence to bear about a month earlier than those of Group I, which have a ranker growth and require more space.

Goa beans also bear at the same time as varieties of Group II.

'Golkonda Chikkudu' commences to bear in about two months after sowing and yields fruit for about a month. Successive sowings of this may be made from the beginning of the rains.

Mullukiluvai (*Balsamodendron Berryi*) Fencing in Erode Taluq.

N R. RAJAGOPALA AYYAR, ASST. AGR. DEMONSTRATOR.

Kiluvai fencing is a marked feature of agricultural practice in the Kongu country. Fencing, whether with this plant or with the various species of Euphorbia and cactus, is a very valuable and commendable practice, whereby cattle trespass is very largely prevented. Cattle and crops are also thereby protected, boundaries respected, large quantities of fuel obtained and security given to growing trees. Its value is expressed in the Tamil proverb “அடைத்தவன் காட்டைப்பார் மேய்த்தவன் மாட்டைப்பார்.”—(For the best field go to one that has been fenced, and for the best animal go to one that has been grazed). Enclosure favours the free growth of pasture, which is in this district one of the most common objects of providing a live fence. The proper season for fencing is the Tamil months of Chitrai—Vaikasi corresponding to April—May. The other months are unsuitable since it is only the rains of the hottest part of summer (i. e., April—May) that favour the vegetative growth of the stems and enable them to strike root.

The process of raising the fence is very simple. A long furrow 6" to 9" deep is opened just after a smart shower in summer. The top branches of grown-up Kiluvai fence are cut and allowed to wither for two or three days till the leaves are shed by exposure to the sun. The stems are not planted with the green leaves on, as sheep and goats damage the planted stems otherwise and disturb the free development of roots. Planting is done by heaping up earth round the branches.

The ryots have quite an intimate knowledge of the peculiarities of this plant, which enables them to grow it successfully. The plant makes a sturdy growth once it becomes well-established and stands for a very long time after planting. In the course of the year, topping and trimming become necessary, and to keep the hedge in

good condition it must be cut back occasionally. Every year the tops are cut and are either sold or used in filling up gaps in the line of the fence. The fence is strengthened by the additional planting of prickly pear all along the border. The durability of the fence is improved thereby. The only drawback to utilising the prickly pear lies in the fact that it frequently encroaches on adjacent land, putting the owner to the necessity of incurring the further expense of removing the overgrowth. Proper attention is therefore needed to keep it always under control. The Kiluvai grows very tall if unchecked, but with proper topping and trimming a uniformly dense and bushy growth can be maintained all along the line of the fence.

Cost of fencing.

The Kiluvai branches are sold in bundles or *Kuvais* (Tamil) each consisting of 214 pairs of branches nearly 5 feet long. Twelve such bundles sell for a rupee, the planting charges being also included in the cost. Sixteen bundles may also be obtained for a rupee, but then fencing has to be attended to by the landowner himself. The cost of fencing a piece of ground an acre in extent may come to Rs. 4 or 5, which is not at all heavy, taking into account the great strength and utility of this fencing.

Agriculture is the basis of our whole social and economic structure.—
George Washington—Hero of American Independence.

The cultivation of land is the basis of national strength and prosperity.
Lloyd George—Coalition Premier.

Agriculture—the mother of all industries.

At the head of all science and arts, at the head of all civilization and progress, stands not militarism, the science that kills; nor commerce that accumulates wealth; but Agriculture, the mother of all industry and the maintainer of life.

President Garfield.

Presentation of Certificates, 1923.

On Saturday the 7th April 1923, at 2 P. M., the students and lecturers of the Agricultural College and the staff of the Research Institute and the Central Farm gathered in the big lecture hall to witness the presentation of certificates to the successful students of the short course by the Director of Agriculture. The Principal then gave the students a short address in which he passed in review the salient points in the progress of the year gone by, touching on the achievements of last year's students by way of games, the occurrence of plague on the Estate (though fortunately confined to the rat population,) and the unavoidable postponement of the College Day Celebrations. (The Principal's speech is given elsewhere in extenso).

The Director then, rising amidst applause, made a short speech, wherein he laid special stress on the importance of games in the formation of character. Referring to the difficulty (mentioned by the Principal) experienced last year in filling up blanks in the College team when one of the selected members fell ill or was incapacitated otherwise, he suggested the usefulness of organising tutorial teams and inter-tutorial matches, whereby such blanks could have been easily filled. He then dwelt on the difficult situation in which the Agricultural Department, like various other Government Departments, was then placed owing to the current financial stringency. Money not having been provided by the council, no further developments were possible. He was afraid there was no scope at present of further additions to the staff and he advised the students of the present batch not to entertain much hope of entering the department this year. In the department there were to be no efforts towards making any fresh advance or showing further progress. It was out merely to mark time and to carry on its present activities. (This frank pronouncement, we are afraid, may serve to damp the spirits of many a poor student of the present batch who might have hoped to enter Government service, but it need not debar him from entering the department when the financial conditions improve in the course of a year or two. We would, however, be gratified if the students

were thereby compelled to strike an independent path and utilise the knowledge they have gained at the College to their own benefit and ultimately to the benefit of their country.—*Editor*).

The Director then presented certificates to the successful candidates and announced the award of two medals—Clogstoun and Dewan Bahadur R. Raghunatha Rao Prize medals to the first student of the year, I. Kurma Rao of Vizagapatam.

Speech of Mr. Parnell—the Principal.

MR. ANSTEAD, GENTLEMEN,

I believe it is my duty on this occasion to give a short account of the work and other activities of the College for the past year.

Once again there are changes to record in the arrangements of classes. As usual we had two classes of the Certificate course. The 3rd year of the Diploma Course dropped out and the last 4th-year class finished their course in December, thus, bringing to an end the old Diploma Course. With this year's admissions to the Degree Course the full complement of 3 classes was made up for the first time.

We started the year with 127 students; of these two left as they had failed in Mycology in the Diploma Course, 13 others left for various other reasons and the 18 students who obtained the Diploma left the College in December at the end of their course.

Change is now the order of the day in most of man's activities and institutions in many parts of the world. Our department and this College have been affected already and there is little doubt that more is yet to come. What that will be, or is likely to be, is not for me to say, but perhaps the Director may have some remarks to make on this subject.

The Certificate Examination is just finished. The class as a whole is poor and not up to standard. One student Kurma Rao has done really well and he gets both the Clogstoun and Dewan Bahadur R. Raghunatha Rao Prizes; two or three have done moderately well

but many are very mediocre. Of 19 students 16 have passed and 3 failed. Two or three of the sixteen may, I think, consider themselves very fortunate in the result.

The University Examinations for the B. Sc. Degree in Agriculture are being held for the first time this year. Part I is just finished and Part II begins next week. As the results will not be out for sometime it is impossible to make any remarks at present except to express the hope that they will be very satisfactory.

This year, most unfortunately, it was impossible to hold the usual College Day Celebrations on account of plague. The sports were not held and the cups for various events could not be awarded, including the Parlakimidi Cup for the best allround sportsman. The inter-class tournament for the Victory Cup could not be finished owing to the number of classes and the fact that there were many draws. In the Cecil Wood Tennis tournament, the cup was won for the third time by P. Sudarsanam.

In game we have had quite a good season. Of 10 Cricket matches we won 7 and lost only one; that one however lost us the shield. In Football we lost no match and won 9 out of 10 games winning the Abraham Cup Tournament. We were beaten in the Hockey Tournament this year and had to give up the cup, though on the whole season we won 7 and lost only 2 out of 11 matches. These results are good but I should like to see greater interest shown by more players who are next in the teams.

The health of the students has been good on the whole, with the exception of one or two cases of fever, the other ailments being of a very minor character. Plague has given us considerable anxiety, since there was heavy infection among the rats on the Estate, but we have been most fortunate in escaping any human cases. All have co-operated in fighting the infection, especially the Sanitary Inspector who, as always, has been most energetic. Our thanks are also due to the Asst. Surgeon of the Lawley Road Dispensary who performed some hundreds of inoculations.

I should like before I close to put in a special word to students of the Degree Course. Doubts have been expressed as to whether you will make really practical men; whether you may not be inclined to feel that book-learning is better than and can replace, practical experience. I hope you realize, and will never forget, that you want both if you are to do anything really good. It is up to you to show what you are worth, not by putting the letters B. Sc., Ag. after your names but by showing yourselves to be good farmers. My advice to all those who are leaving the College is—go out to learn first; the teaching may come afterwards. Help where you can but don't parade your knowledge: that helps nobody. It may impress a fool, but most farmers are not fools. The more you learn from them, the more they will think of you and the more help you will be able to give them.

Extracts.

Rome fell when its Agriculture decayed. "It is the way of civilizations to become urbanised, and of city population to lose touch with Agriculture. The farm is where we climb up the scale of civilization, the city where we run down. Our nearest analogy is with Rome, an Imperial Republic that outgrew the older nations and centered the activities of the Mediterranean world. Liberty enlightens and energises, but with progress more rapid there is greater danger of running completely off the track. In their constructive phase of their civilization the Romans were devoted to farming, but agriculture decayed in the period of political and commercial expansion. "For many centuries war and the cultivation of the soil were regarded as the only occupations befitting a free born citizen." Yet a few centuries of urbanism wrought complete destruction. Roman agriculture had a family organization at first, that of slavery during the period of foreign conquest in the late republic, and of tenant-serfdom in the stage of imperial decline.

• Cato and other patriotic statesmen foresaw the ruin of the Roman system when agriculture began to decay. Augustus and Mæcenas

were at pains to enlist the talent of Virgil and Horace, to secure the most attractive expression of the rural traditions and ideals of the nation, and lead the currents of thought away from the city. Remedial legislation in many forms was attempted and especially to attract tenant farmers to public lands, but production and population continued to decline. A fever of speculation ravaged the Roman world in the last centuries of the republic, and added to the devastation of the civil wars. Feeding and amusing the urban proletariat became the chief tasks of the government, until the whole parasitic system broke down and was swept away by the northern barbarians.

The fact that our age is more scientific—more inclined to investigate and recognise facts—should give us better prospects of finding a safer course and of maintaining our civilization, unless we drift too far before beginning to take thought of agriculture. Painting “the man with the Hoe” inspired an eloquent protest in verse, but literary powers of projection need also to be used constructively. Not indignation over past “wrongs” or primitive limitations, but a spirit of clear intelligence and practical human interest needs to be inspired, if we are to find the way out.”

The Journal of Heredity, Vol XII, No. 4.
R. S. R.

Does Superphosphate use up the free Lime in the soil?

A correspondent asks the following question.—

If a sample of Superphosphate contains a certain amount of combined lime, can it be assumed that an equal amount be withdrawn from the reserves in the soil when the superphosphate reverts, as it is supposed to do directly it is put on the land?

The question is difficult to answer because the changes occurring when superphosphate is added to soil, again when it is taken up by plant, are very complex and cannot be set out in any simple way. Undoubtedly the superphosphate becomes insoluble and to this extent might be expected to combine with and therefore withdraw from the soil a certain proportion of its basic material including the free lime;

but the amount withdrawn is really small, even if one supposed that the whole burden falls on the lime. Only a fraction of the total lime is involved in any case: much of it is in the form of calcium sulphate which does not react with lime; the active part is the mono-calcium phosphate, and the lime with which this can react does not amount to more than 5 or 6 per cent of the weight of the superphosphate, according to as the sample is of 26 or 30 per cent strength; in other words, a dressing of $2\frac{1}{2}$ cwt., of superphosphate could withdraw from the soil less than 15 to 20 lbs., of lime per acre. It is improbable however that all the burden falls on the lime in the soil.

Sir John Russel D. Sc., F. R. S., Rothamsted Expt. Station,
Harpenden, Herts.

H. S. R.

Gleanings.

A mule with a foal. The mule is in almost all cases incapable of producing young. However, “the exception that proves the rule” is shown in the above illustration, (*not reproduced*) taken from an American paper. The owner of the mule is Mr. T. B. Nelly, Illinois, U. S. A.

Journal Dep. Agr. Victoria, Feb, 23.

Timber-seasoning invention. A process for seasoning timber by subjecting it to the action of a current of air containing a certain percentage of ozone has been invented by M. Otto, Professor at the Sorbonne, Paris. The process is said to give the same result in about 20 days as would be obtained by natural seasoning in the course of several years. A micrographic examination is reported to show that samples of oak and walnut which had been treated by the process show the same characteristic as seasoned wood. The Otto process is being worked by a French company which has constructed works at Seregno, near Milan, and will shortly build new works in the neighbourhood of Paris.

Journal of the Ministry of Agriculture.

H. S. R.

Availability of mineral plant-food. To overcome certain difficulties in the hypothesis that plants take up mineral matter only after its solution, new conceptions of the manner of plant feeding are introduced. The possibility of the absorption of colloidal matter is discussed. Further there may be a definite union of the root hair with a solid mineral particle which thus forms one system with the plant, and may be slowly broken down by the action of the organic matter of the root hair.

N. H. Comber—*Journal of Agric. Science* Dec. 1922, 363-9.
H. S. R.

Legumes and their nitrogen content. There is, unfortunately, an impression among farmers that if the leguminous crop is removed from land and the roots with their nodules remain, the soil is thereby enriched in nitrogen. It must be clearly understood, however, that the nitrogen taken from the air by the organisms does not exist in the nodules, but is made use of and distributed throughout the plant, and that the removal of the above-ground portion of the plant from the land means the removal of a large amount of nitrogen. An increase in the nitrogen content of the soil can result from the growing of leguminous crops only when they are either fed off, ploughed in, or siloed to stock and the resultant manure from the stock returned to the soil.

Agr. Gazette of New South Wales, December 1922.

Y. R. R.

Mosquitoes bite Birds and Bats. Attention is drawn to the value of domestic animals in protecting man from mosquitoes. Further observations made at Beirut show the value of sparrows and bats in this connection. In the district under consideration only Culicines were found, *Culex pipiens* and its allies and *Aedes argenteus* (*Stegomyia fasciata*) being the most abundant. An examination of the contents of the digestive tracts of 93 individuals of *C. pipiens* and related mosquitoes showed that 75 to 81 per cent had fed on sparrows (*Passer domesticus*)

and 18 to 19 per cent on mammals. The mammalian blood was most probably that of bats, which frequent the trees containing numerous sparrow nests. [J. Legendre.]

The Review of Applied Entomology, Vol. XI, Ser. B, Part I, Jan. '23

The Royal Society—A Munificent Gift. Sir Alfred Yarrow, a great leader of industry and a firm believer in the practical service of scientific investigation to mankind, makes a gift of £100,000 to the Royal Society to be utilised by the society in the best way it thinks fit. Without stipulating any conditions regarding the endowment, he suggests that the amount may not be utilised for building but rather used for adequate payments to Scientific workers or supply of scientific apparatus to them. In his own words 'a patriotic citizen cannot give money, or leave it at his death, to better advantage than towards the development of science, upon which the industrial success of the country so largely depends.'

Nature, 24th February 1923.

M. R. R.

Professor Wilhelm Konrad von Rontgen. It is given to few men of Science to make a contribution to knowledge which compels world-wide interest from its first announcement. The late Prof. Rontgen's discovery of the X-rays in 1895 was not only of the first importance, but also enjoyed the distinction of finding an immediate and immense field of investigation in surgery and medicine. Presently they were destined to play also a prominent part in the extraordinary development in Atomic and Molecular physics which have characterised the last twenty years—developments which make it safe to assert that at no period in its history has physical science been more effective and wide-reaching in its fundamental activities. Rontgen was happily spared to be a witness of all this, and although his contributions to X-ray research ceased some years ago, his satisfaction at the growth of the subject can have been in no way diminished

• He was born on 27th March 1845 at Lennep in Rhineland, was educated in Holland and took his Doctor's degree at Zurich in 1869. After serving in various capacities in different academies, he was

appointed to the chair of physics at Würzburg—where he made his famous discovery. Later on he accepted the chair of Experimental Physics at Munich. He received the Nobel Prize for Physics in 1901. He died at Munich on February 10, 1923 at the ripe age of seventy-eight years.

The goodly harvest that science has reaped from the epoch-making discovery of X-rays with which his name will be for ever associated is indeed remarkable. Hard on the heels of his discovery came that of the "electron" by J. J. Thomson and of radio-activity by Becquerel. The new chapter of Physics which was thus unfolded has already had the most profound effect on every day life.

Abstracted from *Nature* Feb. 24, 1923.

Y. R. R.

The Guide to Age in Cattle. The age of cattle in the first few years can be told by an examination of the front teeth. A calf has eight somewhat small teeth in the front of the lower jaw at birth. When from fifteen to eighteen months old, the middle two of these are replaced by two larger permanent teeth; at about two years and three months, the next tooth to those on each side will fall out and be replaced; the third pair will be replaced at about three years old; and when at about four years old, there will be eight permanent front teeth, the animal will be spoken of as being full-mouthed. With advancing age, and, to a considerable extent, according to the nature of the pasture, these front teeth will wear down, become loose, and spaces show between them. This makes it more difficult each year for the animal to keep up condition, even on good grazing, and necessitates more hand-feeding. These teeth may wear right down to the gum without falling out, but should any fall out or several become loose, the whole of them will be best drawn, and the animal kept altogether on hand-feeding until the gums harden sufficiently for her to graze again on good pasture. With good cows, this will occasionally be worth following; but otherwise, as soon as the animal's ability to graze properly becomes impaired, she should be fattened and sold for slaughter.

Journal of the Dept. Agre. Victoria—Feb. 1923.

The Germination of Coconuts.

1. For seeds dead ripe nuts are superior to nuts at any other stage of ripeness or development. In case of *absolute necessity* green-husk nuts may be used for seed. The water in the nuts must, however, shake readily.

2. Unless the nuts for germination are to be buried in the soil or are to be amply watered, partial or complete husking is undesirable. The shell cracks quite easily when the nut is husked, and is usually the cause of most failures of nuts to germinate or of later death of the seedlings.

3. The best portion for placing the nuts is *on the side*. This position is commonly followed in seed beds and also when germinated out as by the Hanging-Method.

4. The desirability of transplanting the seedlings when the latter have shoots not exceeding 15 centimeters, as recommended by Copeland, or 30 centimeters as found here possible, lies in the facts: (1) that the meat content of the nut at this time is plentiful, (2) the roots are short and (3) the shoot is also short.

N.B.—1 centimetre = .3937 inch or nearly $\frac{2}{5}$ of one inch.

The Philippine Agriculturist, Jan. 1923.

Sericulture in Czecho-slovakia. The Association for Silk-worm Culture recently formed in Czecho-Slovakia has done its best to extend sericulture in that country and has received the support of one of the great landed proprietors, who has had mulberry trees planted in his extensive gardens. From these trees, young plants have been distributed by the association to the cultivators. During the autumn of 1921, 10,000 plants were thus distributed, and in 1922 about 1,000,000.

There are at present in Czecho-Slovakia more than 3,000 silk-worm cultivators, and the number of silkworms is estimated at 20,000,000. The entire industry is in the hands of the association, which partly defrays expenses for the annual dues of 5 crowns per member and receives Government assistance through the Ministry of Agriculture in the following ways:—

1. The Government supplies the eggs, which are distributed free of charge to the members of the association.

2. It reimburses the association to the extent of 1 crown for each mulberry plant given gratis to schools or poor people. This is to encourage a broad distribution of young plants.

The Government pays to the association from 3,000 to 5,000 crowns per year to cover the expenses of correspondence.

The association, which has been operating for only two years, and is a non-profit body, has established a silk-spinning mill further to facilitate development of agriculture. The cocoons are bought from the cultivators (at 70 crowns per kilo), spun into yarn, and the yarn sold to the weaving mills, of which there are several in Czecho-Slovakia. The net profits of the association's spinning mill are divided among the cultivators as a premium. [N.B.—Crown= $\frac{1}{4}$ English Sovereign.]

Extracted from Journal of the Royal Society of Arts, Vol. XXI, No. 3663, 2nd Feb. 1923.

Y. R. R.

HOUSEHOLD HINTS.

What a housekeeper should not do.

Don't boil milk for coffee. Scald it.

Don't put a greasy spoon on the table. It leaves a stain which requires time to erase. Put it in a saucer.

Don't put tin dishes in greasy water. It deadens the brightness.

Don't pour boiling water over china. It will crack by the sudden contraction and expansion.

Don't blacken a stove while it is hot. It takes more blacking and less polish.

Don't put damp towels and napkins in the clothes basket. Dry them first, or they will mildew.

Don't pour boiling water and soap on grease spots on your kitchen table. Moisten the spots first with a cold saturated solution of sal soda, then scrub in the grain of the wood, using cold soapsuds.

Don't put egg dishes into hot water; it makes the egg adhere. Soak the dishes first in cold water.

Don't allow the soap to remain in a bucket or pan of hot water; it wastes. Have soapcups to fasten to the sides.

Don't put tin pans on the stove to dry. They become heated, the solder loosens and they soon leak.

Don't wash glass in clear water. Use a little soap.

Don't add lard, treacle, or sugar to bread if you wish it to keep well and be wholesome.

Don't moisten your food with the idea of saving your teeth. It spoils the teeth, and you will lose them.

Don't throw away pieces of bread. Save, dry, roll, and put them aside for bread-crumbs.

Don't salt cucumbers before cooking. It makes them indigestible and unpalatable.

Journ. Jamaica Agri. Socy. December 22—Jan. 23.

Students' Corner.

Certificate Course.

The examinations of the certificate course were over by the 6th and the results were announced at 12 noon on the 7th. Out of 19 students, 3 failed to get certificates. Our sympathies go out to the unsuccessful candidates in their dire disappointment.

Presentation of Certificates.

At 2 P. M. on the same day, the Director of Agriculture presented certificates to the successful students, (a fuller account appears elsewhere).

The Students' Annual Social Gathering.

At 4 P. M. on the 7th, the Students' Club was at home to the staff of the Agricultural College, the Research Institute and Central Farm. Prominent among the guests were Messrs. R. D. Anstead, F. Ware,

D. Ananda Rao, F. R. Parnell, C. Narayana Ayyar, G. R. Hilson, D. G. Munro, G. N. Rangaswami Ayyangar, C. Tadulingam, Rao Sahibs Ramaswami Sivan and T. S. Venkataraman, Mr. and Mrs. P. V. Ramiah, Messrs. Sundararaman, Sundaram etc. The guests were entertained at Tea in the open green in the Hostel area. After refreshments—which were served in European as well as Indian style,—the guests were treated to a bit of vocal music by student Ranga Rao of Short Course, Class I. The Secretary Suryanarayana then read his annual report, after which the Principal and several of the students made felicitous speeches, thanking the office bearers of the year under report and exhorting the Junior classes to keep up the activities and to maintain the prestige of the club whether in games or in debates. After *pansupari*, the social gathering came to a successful close. The Secretary's report will appear in extenso in our next number.

B. Sc., Agr. Part II.

Examinations commenced on the 9th and the theory papers were finished on the 12th. The Practical Examinations had a more extended course and were finished only on the 20th.

The University Examiners had their meeting on the 22nd instant. It is believed the results of the B. Sc. Ag., Parts I and II, will be issued very early. [Results were published on the 28th and are included in this issue. *Editor.*]

We trust most of the students have done well, but the lot of the first batch of B. Sc. Ag., students has undoubtedly been particularly hard, since they have had to undergo the strain and stress of examinations, protracted to an unusually long period, owing to obvious reasons.

The Board of studies appointed by the University for Agriculture met this time at Coimbatore on the 21st to consider the question of instituting an Intermediate in Agriculture as a preliminary to the B. Sc., Ag., course. We understand Mr. G. R. Hilson and Rao Sahib Ramaswami Sivan were co-opted for purposes of this meeting.

Examination Papers.

For the convenience of students we propose to publish the question papers of B. Sc. Agr. Parts I and II in full in our Journal and we trust this will be acceptable to our student readers. Part I will appear in this issue and Part II in our next.

List of Successful Students—Short Course 1923. (Arranged in the order of Merit.)

No.	Name of Student.	No.	Name of student.
1.	I Kurma Rao* (N)	9.	P. Kannan Nambiar (N)
2.	V. D. Kenchia Gouder (N)	10.	Neelamani Baktha (B)
3.	S. Aaron Christian (C)	11.	C. Chenchayya (N)
4.	P. M. Chengappa (N)	12.	M V Narasimha Sastri (B)
5.	B. Madhava Rao Patnaik (N)	13.	G. J. Balaraj (C)
6.	P. K. Krishnan Nambiar (N)	14.	K Suryanarayana (N)
7.	K. Govindan Nambiar (N)	15.	R. Vandalur (N)
8.	P. V. Subba Rao (B)	16.	P. Kesava Reddi (N)

*Won the Ologstoun and Dewan Bahadur B. Raghunatha Rao Prize medals.

List of Bachelors of Science in Agriculture. *Madras University—April 1923.*

1.	Balasubrahmanian R.	5.	Parthasarathi N.
2.	Kalyanaraman S. M.	6.	Rangabrahma Rao T.
3.	Manavaludu B.	7.	Venkatsubba Rao G.
4.	Narayana G. V.	8.	Venkatraman S. N.

Estate News.

Mr. D. Ananda Rao, B. Sc., Deputy Director of Agriculture, IV Circle, visited Coimbatore as an outside examiner for the Short Course final examination. He stayed on the Estate from the 3rd to the 7th instant and was entertained at Tea by his friends on more than one evening.

Mr. F. Ware, Superintendent, Civil Veterinary Department, Rai Bahadur K. Rangachariar, Drs. Sampathkumaran and Kunhikannan of Bangalore also visited the estate in connection with the University examinations for B. Sc., Ag.

Mr. P. H. Rama Reddi, M. A., B. Sc., Deputy Director of Agriculture, III Circle, (on leave) visited Coimbatore for a day on the 21st in order to attend the meeting of the University Board of Studies held here.

Mr. R. D. Anstead, Director of Agriculture, visited the estate on the 7th for presenting certificates to the Short Course students.

The Officers' Club. At a General Body meeting held in February 1923, the Office Bearers of the current year were elected. We are glad to announce Mr. C. Tadulingam was again unanimously re-elected President for the fourth time. Mr. M. U. Vellodi was elected Secretary, Mr. C. M. John, Treasurer, and Messrs. Venkatakrishna Mudaliar and Ramasubramaniam, Committee Members.

The Officers' Club held several general body meetings during the latter half of March and the first week of April in connection with a recasting of the rules of the club and with reference to a proposal to make further extensions to the building. The consideration of both the questions was postponed to a future meeting, and in the case of the first question only propositions, of which due notice is given and on which the opinion of the special Committee appointed is obtained, will be considered.

Conversazione.

On the 7th instant at 6-30 P. M. there was a *conversazione* at the club when Mr. Sundararaja Ayyangar of the Cow Protection Society of Calcutta gave a short talk on the aims and purposes of his society. There was a free discussion on the subject and Mr. Ayyangar replied to all the points brought up by the audience.

Departmental News.

Mr. F. R. Parnell left Coimbatore for Kotagiri on the 13th availing himself of the usual Hill Recess.

Mr. Hilson and Rao Sahib M. R. Ramaswami Sivan, it is believed, will avail themselves of Hill Recess from May 1st week.

Mr. D. Balakrishnamurti will avail himself of four months' leave from May 2nd and it is believed Mr. P. H. Rama Reddi will act as Professor of Agriculture and Superintendent till Mr. Balakrishnamurti returns from leave.

Mr. T. V. Rajagopalachari is acting as Assistant Principal in addition to his duties of Assistant Professor of Agriculture, till definite orders are received on the subject.

The following is a list of cows sold in auction at the Central Farm last month. Bull-and heifer-calves were also disposed of in addition, but are not included for want of space.

List of Cows sold in auction

S. No.	Reg. No.	Name of animal.	No. of animal.	Date of birth.	Breed.	No. of D. in Milk.	Milk yield.	Date of service and bull.	Amount.
1	82	Ammi	72	2-1911	Country.	285	2563	Pusa 9-2-22	Rs. 43
2	105	Mulli	34	6-1913	Crossbred	230	1586		71 24-3-23
3	185	Ammal	39	28-8-1916	do.	364	2414	22-8-22 Kumaran	67
4	197	Bebecca	51	1911	H. B. Kerry				25
5	198	Vemba	13	1911	Nellore.	409	2728	8-10-22 Pusa	94
5	224	Rami	58	1914	do.	150	2396	6-6-22 Pusa	61
7	234	Peggi	37	1917	† Jerry	252	1954	30-8-22 Pusa	125

B. Sc. Ag.*Part I.***ENGINEERING.**

Monday, 19th March 1923—7 to 10 A. M.

[Only Six questions to be answered. Candidates must attempt Five out of the first Seven questions and one of the Two remaining questions.]

I. Two bullocks pull a farm cart which weighs 12 hundredweight and is loaded with one ton of grain at a uniform speed of $2\frac{1}{2}$ miles per hour. If the resistance is 50 pounds per ton, what force do the bullocks exert on the level in hauling the cart, and how much work do they do in 35 minutes?

II. In a four stroke crude oil engine trial the following observations were made:—

Duration of trial 40 minutes. Revolutions per minute 203. Cylinder diameter 12 inches. Length of stroke 18 inches. Mean effective pressure in cylinder 95.7 pounds per square inch. Diameter of brake wheel 9 feet. Brake load 173 pounds. Quantity of oil used during trial 12 pounds. Calorific value of oil 18,000 British Thermal Units per pound.

Calculate the Brake Horse Power and the Indicated Horse Power of the engine. Work out the Mechanical and Thermal efficiencies. Do you consider the Thermal efficiency good or bad?

III. Prove Simpson's Rule for the determination of areas. The following perpendicular offsets were taken at 50 feet intervals from a chain line to an irregular boundary:—12.9, 17.6, 20.2, 23.5, 18.7, 15.3, 20.8, 26.6, 32.4, 24.3 and 20.5 feet. Calculate the area in square yards enclosed between the chain line, the irregular boundary and the first and last offsets.

IV. Explain in full the temporary and permanent adjustments of a Dumpy level.

V. A King Post roof truss of a thrashing shed is supported at the ends. The principals make 30° with the tie beam which is 30 feet long. The truss is loaded as follows starting from the left hand end and measuring along the principal:—

Distance in feet.	Load in tons.
0	$\frac{1}{2}$
4	1
8	$1\frac{1}{2}$
12	2
17.33	2

On the other principal there is no load, except where the principal joins the tie beam and there it is $\frac{1}{2}$ ton. Calculate the reactions or upward forces at the supports.

(Note.—Cos 30° is 0.866.)

VI. A roof truss for a ginning shed is loaded as shewn in the figure. Draw the stress diagram and determine the forces acting in each member, stating whether it is in tension or compression.

VII. Describe with sketches one of the following farm machines: A thrashing machine, a winnowing machine, a ginning machine, a harvesting machine.

VIII. An ordinary earth channel has a width at its bottom of 20 feet, and a slope of 1 in 3,000. The depth of water in the channel is 6 feet. If the side slopes are 1 in 1 and the channel irrigates 35,000 acres what is its Duty?

(Note.—The constant in Chezy's formula is to be taken as 75.)

IX. A three inch pipe two miles long is installed to supply water to an agricultural estate. The height of the water reservoir is 80 feet above the pumping station. The quantity flowing through the pipe is 4,500 gallons per hour. The water is pumped through the pipe by a centrifugal pump, the efficiency of which is 48 per cent. Calculate the horse power which must be applied to the pump shaft.

(Note.—The constant in the formula for head lost by friction in the pipe is to be taken as 0.013.)

B Sc Ag.*Part I.***ANIMAL HYGIENE.**

Monday, 19th March 1923—1 to 4 P. M.

[Only four questions are to be answered. All candidates must attempt question I.]

I. a. Describe in detail the process of Respiration.

b. Describe briefly how an acute attack of Pneumonia interferes with this process and how you would therefore treat such a case.

II. a. Describe the anatomical position and the use of the diaphragm.

b. Name the other organs in contact with it and those which pass through it in the ox, illustrating the latter with a diagram.

III. a. What is meant by Orchitis?

b. Give the causes of it and describe how you would treat both an acute and a chronic case in a buffalo.

IV. a. What is the period of gestation in a cow and an ewe?

b. Name the commonest forms of abnormal presentation in these animals and describe in detail how you would deliver a case presenting the head only.

V. a. What are the first signs of an outbreak of foot and mouth disease among a herd of cattle?

b. How would you treat individual cases?

c. How would you prevent its spread?

B.Sc. Ag.
Part I.

CHEMISTRY.

Tuesday, 20th March 1923—7 to 10 A. M.

[Only six questions are to be attempted two of which must be selected from questions VI, VII and VIII.]

I. An organic substance possesses a molecular weight of 119 and contains Carbon 79.6%, Hydrogen 4.2%, Nitrogen 11.8% and Oxygen 13.4%. What is its formula?

II. What is meant by a constitutional formula? How would you verify by chemical means the constitution of Acetic Acid?

III. What are oils and fats? Give a detailed account of their general chemical and physical properties.

IV. Describe clearly the meaning to be attached to the term optical isomerides. Illustrate your answer by reference to the several Tartaric Acids.

V. Review in a general manner the chemistry of the sugars.

VI. Give an account of the agencies concerned in the breaking down of rocks and the formation of soil.

VII. What is meant by the mechanical analysis of a soil? How would you perform such an analysis?

VIII. What are alkaline soils? How are they formed and what steps would you take for their improvement?

B.Sc. Ag.

Part I.

ZOOLOGY.

Tuesday, 20th March 1923—1 to 4 P. M.

[Only Six questions are to be answered. All candidates must attempt questions I, II and III.]

I. Draw diagrams of the cross sections of the bodies of a vertebrate and of an insect so as to show the relative positions of the heart, the nervous system, the alimentary canal and the skeleton.

II. Describe the more important features of the several groups of Arthropoda so as to bring out clearly the fact that insects occupy the highest position in the phylum.

III. Illustrate the principle of adaptation of structure to function by a review of the modifications met with in the legs of insects.

IV. Explain the principles involved in (1) the use of light traps, (2) crop rotation, (3) parasites in the control of pests and (4) trenching.

V. Briefly describe four of the most important pests of paddy and state what measures you would recommend against each.

VI. Can spraying be recommended as a general entomological practice in this country? What are the lines on which remedial measures should proceed in India? Give full reasons for your answer.

VII. a. How would you recommend from an entomological standpoint the practice of keeping crops clear of weeds?

b. Give a short account of sericulture as it exists in the Madras Presidency.

B.Sc. Ag.
Part I.

BOTANY (I).

Wednesday, 21st March 1923—7 to 10 A. M.

[Only Five questions are to be answered. You are expected to give examples and sketches whenever necessary.]

- I. Describe the modifications met with in aerial stems.
- II. What is androecium? Give an account of its modifications.
- III. How would you recognise plants of the Family *Euphorbiaceae*? Mention some plants of this family that are of economic importance.
- IV. How do the vegetative organs of a plant respond to gravity? Describe some experiments to demonstrate this.
- V. Describe the structure of a dicotyledonous root before and after the formation of cambium.
- VI. What conditions are necessary for germination? Describe the various stages of germination in castor and cholam.

B.Sc. Ag.
Part I.

BOTANY (II).

Wednesday, 21st March 1923—1 to 4 P. M.

[Only Five questions are to be answered. You are expected to give examples and sketches whenever necessary.]

- I. Give a detailed account of the preparation of a pure culture of any fungus to inoculate a healthy plant.
- II. How would you identify the smuts in the field and what methods would you adopt to prevent their recurrence?
- III. Describe in detail the life history of *Phytophthora* on Areca palm. What steps are usually taken to prevent its spread?
- IV. How does a liverwort differ from a fern?
- V. Describe the prothallus of a fern and show how a young sporophyte arises from it.
- VI. Explain what is meant by alternation of generations, taking a liverwort as an example.

B.Sc. Ag.
Part I.

AGRICULTURE (I).

Thursday, 22nd March 1923—7 to 10 A. M.

[Only Six questions are to be answered. All candidates must attempt questions I and II.]

- I. Write a brief essay on 'The relation of climate to the kinds of crops cultivated.'
- II. Describe with diagrams the operations of any mechanical seed-drill with which you are acquainted.
- III. Different kinds of soil may be found overlying rocks of similar composition. Explain this.
- IV. Practical farmers have discovered that crops will not grow unless the land is properly tilled. Enumerate but do not discuss the reasons which you believe to underlie this experience.
- V. Define in a few words:—
 - a. Sedimentary rock.
 - b. Crystal.
 - c. Conglomerate.
 - d. Porphyritic structure.
- VI. Explain the part which organic matter plays in manuring.
- VII. What manures are available in the Madras Presidency? What points would you consider in deciding which to buy?
- VIII. It is usual to manure irrigated crops more heavily than dry crops. Do you consider it right to do so, and if so why?

B.Sc. Ag.
Part I.

AGRICULTURE (II).

Thursday, 22nd March 1923—1 to 4 P. M.

[Only Six questions to be answered. All candidates must attempt questions I and II.]

I. What are the possible uses of the following:—

1. The plough.
2. The cultivator.
3. The harrow.
4. The drill.
5. The roller.

Describe in each case the effect produced by the implement and explain how the effect is of value.

II. What are the factors which determine the amount of moisture required to mature a crop? Illustrate your answer whenever possible.

III. a. Explain the terms "heavy" and "light" as applied to soil. Illustrate your answer by reference to soils in the vicinity of Central Farm.

b. Show how the differences between these soils affect the manner of cultivation of each.

IV. How would you manure a field of—

1. Cotton (irrigated).
2. Cotton (unirrigated).
3. Chulam (unirrigated).

Give reasons for your choice in each case.

V. Criticize the term "dry-farming."

VI. a. What are the differences between a "rotation" and "mixed-cropping"? Give illustrations.

b. What are the advantages and disadvantages of mixed cropping? Illustrate your answer.

VII. a. What is green-manuring?

b. What are the advantages and disadvantages of this kind of manuring?

c. Compare the money value of green-manure in respect of the three main ingredients, when applied to paddy, with

1. green-leaf manure.
2. artificial manures.
3. cakes.

VIII. a. What are the objects of a ploughed fallow?

b. On a ploughed fallow of red clay loam 13 inches of rain fell in 29 rainy days between the 2nd October 1922 and the 15th November 1922. Thereafter bright weather prevailed. On the 22nd November 1922 a cereal was sown in the field behind the country plough and on the 23rd and 24th November 1922 the field was laid out in beds for irrigation. Describe the condition of the soil on the 26th November 1922 and explain in detail how it was brought about.

c. What action, if any, should be taken to alter the condition of the soil? Give reasons.

University of Madras—March 1923.

B.Sc. Ag.

Part I.

PRACTICAL BOTANY.

Time—3 hours. 10 A. M. to 1 P. M. 24-3-23.

I. Examine and make preparation of the specimen *A* (*Cystopus* on leaf) so as to illustrate its structure.

Identify the diseases in *B* (Potato ring disease), *C* (*Piricularia* on paddy), *D* (*Tikka* on groundnut leaf) and *E* (*Aecidium*).

II. Describe fully the specimen *F* (*Trichodesma indica*).

Write morphological notes on *G* (*Asparagus* stem & thorn), *H* (*Terminalia* inflorescence), *I* (*Cruciferae* fruits) and *J* (*Bignonia* tendril).

III. Identify the slides *K* (*Mucor*), *L* (Transverse section of anther), *M* (Transverse section of grass leaf) and *N* (Transverse section of a Dicotyledonous root), giving reasons.

IV. Refer to the family the specimen *O* (*Phyllanthus maderaspatensis*).

B. Sc. Ag.*Part I.***PRACTICAL CHEMISTRY.**

Wednesday, 28th March 1923—Time 4 hours.

I. Estimate the percentage of *iron* in sample A (1 weighing bottle), preparing your own standard solutions for which the necessary chemicals are provided. Write details of the procedure adopted, with equations.

II. Examine substance B (test-tube) for not more than *one base* and *one acid*, both by dry and wet reactions, and tabulate your results in the usual systematic manner.

Note:—1. Marks will be deducted for bad manipulation and want of neatness.

2. Each candidate will be called up for a few minutes' *viva voce* examination during the practical.

Editorial Notes.**College Day and Conference 1923.**

The Working Committee of the Union at a meeting held on the 27th April considered the question as to the best time of holding the College Day and Conference that had been postponed *sine die* last year, and resolved, for various reasons, to recommend the 14th July as the most suitable date for holding it this year. Formal invitations will be duly issued to our members when the exact date is fixed by the Director of Agriculture, but we take this opportunity of warning the members beforehand and requesting them, on behalf of the Committee, to help it in making the function a success not only by presenting papers for the conference but also by attending the celebrations personally.

Members of our Union are further requested to peruse the remarks made by us regarding "the functions of the Union" in the October issue of last year, and take note once again of a notice of certain amendments in the rules of the Union proposed by some of the members, printed in pp. 341 and 342 of that issue, and also to devote some thought on the suggestions of the Working Committee (p. 343) regarding a revision of subscriptions and the future policy of the Union.

British Association for the Advancement of Science.

We find from *Nature* that the British Association for the Advancement of Science, which is the body on which the organization of the Indian Science Congress has been modelled, is to meet this year at Liverpool in September and will hold its sessions from the 12th to the 19th. We have reason to believe that this body, which has in the recent past held its sessions in the Colonies, is likely to be invited to Ceylon in the near future and some of us in India may therefore have opportunities of attending its sessions then.

The Agricultural Middle School, Alwaye.

From the administration report of the Travancore Agricultural Department we find that the Agricultural Middle School, opened last year at Alwaye, has completed a successful year of existence. The school had a farm and a workshop attached to it for teaching purposes and we hear 10 students were trained during the year, each of whom was given a scholarship of Rs 10 per mensem.

Indian B. Sc's in Agriculture, Edinburgh.

We are glad to learn that three young men from Madras took the Degree of B Sc., in Agriculture, at Edinburgh on the 22nd March 1923. They are Messrs. Munisami Narayana, K. Parameswaran Pillai and C. M. Ranga Reddi, the last of whom had taken the Diploma in Agriculture in our College in 1920.

Veterinary Conference at Coimbatore.

The Veterinary graduates of the districts of Salem, Coimbatore, the Nilgiris, Malabar and South Kanara met in conference at Coimbatore on the morning of Sunday, the 8th April 1923 at the Y. M. C. A. Hall. Mr. Castalino, Veterinary Inspector, Coimbatore in welcoming the delegates said that they had assembled there for the first time to form a "Branch of the Veterinary Association, Vellore," and that the objects of the Association were to be as in the case of the parent body, (1) to improve the knowledge of the profession, (2) to create an *esprit-de-corps* and (3) to improve the status of the members generally. Rai Bahadur T. A. Ramalingam Chettiar, the Chairman, in declaring the Conference open made a short speech in the course of which he remarked that "Cattle Breeding should be looked after by Veterinary officers rather than by others, because they were best qualified to do so by study and training" and he hoped that ere long it would be made over to the proper department and that the vested interests in the Agricultural department would not stand in the way of this being accomplished. Dealing with the activities of the Veterinary Department, he said he knew that good and useful work was being done and now that an association had been formed he was confident its activities would be brought more prominently to the notice of the public. Mr. Kylasamayyar, Deputy Superintendent, Civil Veterinary Department, Coimbatore, who was then formally elected President, addressed the gathering in a short speech. He said it was an admitted fact that organised effort was necessary for progress in any field of human activities and it was a healthy sign that the members of the Veterinary profession in this presidency had made a beginning however humble. The success of the association, he said, depended not only on proper organization and a spirit of mutual co-operation but also on the keenness and sincerity of purpose of the members on its behalf. He concluded by saying that the Veterinary profession was of vital

importance to the economic well-being of an essentially agricultural country like India and that the day was not far off when it would take its right place among the nation-building activities of the new age.

The rules of the new association were then passed. In the afternoon practical demonstrations of Veterinary surgery were given and a few papers were read. The conference then came to an end with an "At home" given to the delegates by Mr. Kylasamier.

We are very glad to see that Branch associations have begun to be formed among the veterinarians and we welcome it as a true symptom of vitality of the parent association, and we should very much wish to read such signs among the numerous members of the Agricultural Department.

As to the remark made by the Chairman of the meeting, Rai Bahadur T. A. Ramalingam Chettiar it may perhaps be more proper that Cattle Breeding should rather be under Veterinary direction, but it should also be recognised that no useful purpose would be served by dissociating the Agricultural aspect of the problem from the Veterinary and that the best results would accrue not from a mutual distrust or jealousy, but rather from a close, sympathetic and sincere co-operation between the two departments.

Agricultural Calendars for 1923.

We are in receipt of the Villagers' Calendar, Madras, and the Mysore Agricultural Calendar; both of them have a family likeness not only in size and shape but also in the arrangement of the contents. Both are excellent in their own way and contain very useful information presented in a popular fashion: and both are therefore equally commendable.

The Mysore calendar has trodden, we believe, in certain respects rather quite fresh ground. The recommendation of the use of Casein as an adhesive in Bordeaux mixture, and the method of trapping the sugarcane borer by trashtraps are examples of such advances of knowledge made. The short note on "the work of the Mysore Agricultural and Experimental Union" is worth reading and indicates a line of popularising improvements which may be tried in Madras. Some entirely new articles have appeared in the Madras publication as well; "Turmeric boiling" "Coconut Jaggery" and "Sindewahi Furnace" are instances of such new articles of practical value to be found in the Villagers' Calendar of the current year. As these publications are intended for the people one would wish they were more plentifully illustrated, as pictures are more likely to appeal to the man in the street than lengthy descriptions.

Special Officer for Sugarcane Enquiry.

We understand that the Madras Government have taken seriously on hand the question of stimulating increased production of sugar in this Presidency, since owing to its favourable position within the tropical region the tonnage of canes is not far below that of the much advertised yields of Java and Hawaii. We learn that Mr. S. Sitharama Patrudu, Farm Manager, Anakapalle has been appointed as a special officer for this purpose and is to investigate the possibilities of increasing cane areas and building up factories in the Agency tracts, in the uplands of Godavari, and in the Tanjore district. We wish him success and shall eagerly await his report. We hope this investigation will lead to proposals which can materialise and afford opportunities to put into effect the generous provisions of the State-Aid to Industries Act recently passed

B.Sc. Ag. Results 1923.

Pass in Parts I & II.

1. Balasubrahmanian R.
2. Kalyanaraman S. M.
3. Manavaludu B.
4. Narayana G. V.
5. Parthasarathi N.
6. Rangabrahma Rao T.
7. Venkatasubba Rao G.
8. Venkataraman S. N.

Pass in Part I only.

1. Krishnaswami C. S. (B.Sc. III)
2. Narayana Nayar P. (B.Sc. II)
3. Sarvayya Chetty C. V. (do.)
4. Satyanarayana M. (do.)
5. Srinivasa Rao L. (do.)
6. Tirumala Rao V. (do.)
7. Venkata Narasinga Rao M. (do.)
8. Viswanatham K. B. (do.)

Pass in Part II only.

1. Balakrishnan M. R.
2. Gomathi Nayagam.
3. Kamaraju B.

Obituary.

We regret to have to record the untimely death at Dhone of Mr. S. Subbiah, Agricultural Demonstrator Kurnool on the 21st instant. He belonged to the Tanjore District and was a diplomate of the Saidapet College. A man of unruffled temperament and of extremely modest and pleasing manners, he attracted the early attention of Mr. M. E. Couchman, the Director of Agriculture at the time, who sent him to Pusa for training in Poultry Rearing. On his return he was sent out into the districts where he ceaselessly worked without noise or stir. The immediate cause of his death was diabetic carbuncle which has carried him away at the comparatively early age of forty-one. The late Mr. Subbiah was a good and sincere friend of many members of the department who will sorely miss him.

Departmental Notes.

Confirmation :—

1. Mr. K. Venkataraman, IV grade Science Section, with effect from 22nd February 1923, but to continue in III grade *sub pro tem*.
2. Mr. C. M. John, V grade, Science section, with effect from 10-4-1922.

Transfer :—

1. Mr. A. Ramaswami Ayyar, on return from leave for cattle work in the Central Farm.
2. Mr. O. Subba Rao, Assistant Agricultural Demonstrator to III Circle.
3. Mr. M. Chinnaaswami Nayudu, Assistant Farm Manager, to the Cotton Breeding Station, Coimbatore, leave for 2 months granted being hereby cancelled.

Leave :—

1. Mr. D. Ananda Rao, Dy. Director of Agriculture, one month and 15 days from or after 16-5-1923.
2. Mr. S. N. Chandrasekhara Ayyar, Assistant to the Government Lecturing Botanist, leave on average pay for one month from 23-4-1923.
3. Mr. Samuel Jobitha Raj, Assistant to the Govt. Economic Botanist, leave on average pay for 15 days from 4-4-1923.
4. Mr. Ramaswami Ayyar, Farm Manager, Cotton Breeding Station, leave on average pay on medical certificate for 2 months from 4-4-1923.
5. Mr. N. Ramadoss, Farm Manager, leave on average pay for 14 days in continuation of leave already granted.
6. Mr. M. A. Balakrishnayyar, Farm Manager, Cane Breeding Station, leave on average pay for one month from 14-5-1923.
7. Mr. S. Subbayya, Agricultural Demonstrator, Kurnool, leave on average pay on medical certificate for 6 months from 8-3-1923.
8. Mr. M. P. Saakaran Nambiar, Agricultural Demonstrator under study leave on average pay for 15 days from 16-4-1923.
9. Mr. K. S. Ramaiah Rai, Agricultural Demonstrator, leave on average pay for one month from 25-4-1923.
10. Assistant Agricultural Demonstrator, Kallakurichi, leave on average pay for one month from 23-4-1923.
11. Mr. P. Nagadhara Nayudu, Assistant Agricultural Demonstrator, Anantapur, leave on average pay for one month from or after 15-4-1923.
12. Mr. G. Jogi Raju, Farm Manager, leave on average pay for one month from 26-4-1923.
13. Mr. M. U. Vellodi, leave on average pay for 15 days from 16-4-1923.
14. Mr. K. T. Bhandari, leave on average pay for 13 days from 16-4-1923.
15. Mr. M. Krishnaswami Ayyangar, Sub-Assistant to the Cotton Specialist, leave on average pay for 2 months and 15 days from 27-3-1923.

Dismissal :—

P. S. Srinivasayyar, Assistant Agricultural Demonstrator, Chingleput.

Death :—

Mr. S. Subbayya, Agricultural Demonstrator, Kurnool, on 21-4-1923, on his way home.

Is the Journal properly addressed to you?
If not, send in your correct address.

THE JOURNAL

OF

The Madras Agricultural Students' Union.

Vol. XI.

May 1923.

No. 5.

Small Holdings.

D. ANANDA RAO, B. SC., (EDIN). DY. DIRECTOR OF AGRE.

Those of us who are employed in the Agricultural Department are often asked to state how many acres of land would be necessary to make farming a business concern. People generally are inclined to think that to run a farm on business lines they should possess large areas of land. To such an enquiry the reply is generally indefinite, as it depends upon various factors like the kind of farming they wish to adopt, the nature of soil, possibilities for irrigation, fertility of land and so on. In the case of wet lands we generally think in acres, while in the case of dry lands perhaps in tens or scores of acres.

The generality of cultivators that we daily meet have lands which are not often economic holdings. By an economic holding we mean a sufficient area of land that would keep the owner and his family in reasonable comfort. "Reasonable comfort" does not include the possession of a motor car or a palatial building. Many cultivators make their living by farming not because they find it makes them

financially affluent, but because they have inherited land, and so must somehow or other cultivate it.

Yet one sometimes comes across certain classes of cultivators who make their living from small holdings. It is interesting to see how such people can make them economic and appear for all intents and purposes to be above want.

Not long ago I came across such small holdings near Madanapalli in Chittoor District. There is a certain class of people locally called "Koorakulavandis" who correspond to the florists in other parts of the world. These are able to make 20—25 cents of lands produce much more than 10 or 15 acres of dry lands generally do. These people take possession of fairly good lands in and round the town in which there are a number of "Doruvu" wells. They cultivate various kinds of flowers, like Jasmine, Chrysanthemums and Marigolds and sweet scented leaves like Davanam and Maruvam, and vegetables like radish, brinjals and a dozen varieties of greens; this last branch of their occupation seems to give them the name of their profession, for in Telugu "Koorakulu" means greens.

I took the opportunity of going into the economics of their profession and for this reason I enquired of some of these people and visited several houses in which they live. I was agreeably surprised to find that there were indications of comfortable living. I could see pictures on the walls of their little rooms, silver ornaments of their women scattered and even a few articles of modern furniture could be seen; in fact it was beyond doubt that their standard of living appeared to be very much better than that of the average cultivators that were in the village. I was very glad to learn that they have no debts, although some of the men do indulge themselves in an occasional drink. Some of the men are able to read and write. The reason for this state of things is not far to seek. I saw both men and women at work and I found that they all had hard work to do. Nature in turn recompensed them by giving them strong and healthy bodies. While women were engaged in pot watering, men were busy in digging with mattocks and crowbars. A rake, a few hand-hoes and mud-pots completed their inventory of dead stock.

One possessing 20 cents distributed his holding as follows and obtained an annual income as noted against each.

Variety.	Area in cents.	Value in Rupees.
A. Jasmines (2 varieties)	4	60
B. Chrysanthemums (2 varieties)	4	30
Davanam and Maruvam	4	50
Greens (12 varieties)	4	35
Vegetables	4	65

Cents 20 Rs. 240 or Rs. 1,200 ₹ acre.

Bartering of grain was usually resorted to, so that it not only satisfied their immediate wants, but fetched better prices. This gave him Rs. 20 a month for his family which included his wife and 2 children. This particular individual said he could save some money from this for festival occasions.

This is only one instance of how people can make even very small areas of land pay by personal work and supervision.

I learnt afterwards that a similar practice is found in a village near Vellore, but unlike Madanapalli the women of Vellore do not seem to take part in lifting water. A similar practice exists, I believe, in many other places. For example, the Roman Catholic Christians in Mangalore are another instance, but I believe their drink to which they are very badly addicted is their curse, which keeps them in continual poverty.

My object in writing this short article is to impress upon my young readers that if simple village folk can make economic holdings of a few cents of land, what endless opportunity there is for educated young men possessing technical training to make small holdings bring them reasonable returns, instead of attempting to sink a large outlay in the purchase of extensive areas, and of live and dead stock. In this latter case any mistake due to inexperience will result in enormous loss besides being a bad example for others who follow. Plain living, practical knowledge and personal supervision are the 3 'R's' that an agriculturist should learn to make his farming pay.

If these are learnt I am sure many a young man would find a useful and lucrative occupation even in such small holdings instead of being led away by the present craze for appointments either in Government or Private service.

Reminiscences of a recent Tour in the West Coast.

K. G. NAMBIAR, L. AG., FARM MANAGER, KASERGODE.

The following stray notes made during a recent tour in the coconut tracts of the West Coast are written in the hope that they will be of use to readers of this journal and will add to our present knowledge of coconut cultivation.

1. *What costs little is generally little esteemed*:—Stem bleeding disease of coconut trees:—The practice of driving iron nails right into the stem of coconut trees attacked by bleeding disease is said to be a preventive. How far this practice will assist its prevention is worth investigating by the Mycologist.

2. *Custom is the guide of the ignorant*:—White ants attacking coconut seeds:—For dread of white ant attack in coconut nurseries, some ryots keep teak (*Tectona grandis*) leaves over and above the nuts in the nursery. While constructing storeyed houses in Malabar, the usual custom is to spread teak leaves thickly above the timber ceiling before spreading earth to make the upper floor. The object is to prevent the timber from being attacked by white ants. How far the teak leaf is a repellent of white ants is worth investigating by the Entomologist.

3. *A man must plough with such oxen as he hath*:—Heaping up of earth in small mounds in coconut gardens: This practice is in vogue in all the coconut gardens bordering the backwaters of Cochin and Travancore. There are hardly any cattle maintained by the coconut garden owners of these places. The advantages obtained by this operation are briefly these. (1) A greater area of the soil is exposed to weathering action. (2) The weeds are turned over and incorporated with the soil. (3) Surface wash is prevented and the retention of silt in times of annual flooding favoured. (4) Thorough drainage of the soil is effected. (5) The activity of soil bacteria is encouraged.

4. *Necessity is the mother of invention*:—Damage done by rats to coconuts: At times in some gardens the damage done by rats to coconut trees is incalculable. An efficient method of preventing rats from climbing the trees is to coil barbed wire for 6 to 9 inches round the stem at a height of about 10 feet from the ground.

5. *Practice bears out theory*:—The benefits of a systematic cultivation of coconut gardens: One coconut garden about 10 acres in area in sandy soil near 'Kootay' about 8 miles north of Ponnani belonging to a rich landlord was found kept completely clean. Merely by a frequent stirring of the soil and a removal of weeds the general appearance of trees was improved and also the yield. This confirms the experience of Kasargode Farm and the value of cultivation in coconut gardens and keeping them free from weeds is well substantiated.

6. *No rose without a thorn*:—The Herculean nut of Mr. Thomas: The girth of this nut was found varying from 24 to 32 inches and the weight of the whole nut with the husk from 4 to 6 lbs. One lb. of copra is obtained from each nut. Its oil percentage is 68. But the yield is not at all high. Seed nuts of this and several other varieties can be had from Mr. Thomas, Pallicai, Kayankulam, Travancore.

7. *People are blind followers*:—The Chentengu: It is seen that a high medicinal value is attributed to one particular variety of coconut called Chentengu. (Chen=Red; tengu=coconut). At present everywhere red or light-red coloured nuts and even brown coloured nuts are largely used for medicinal purposes according to their local availability, but the special variety of Chentengu, with the recognised medicinal properties is the one which has a red colour inside the husk. The epicarp or the outside portion will be dark green in colour. This is a very rare variety found in parts of Travancore. Collection of seed nuts and the planting of the variety in different places is desirable.

8. *Practice makes perfect*:—Lowering old coconut trees:—The ryots of Travancore take considerable pains to secure a heavy yield

even from old and aged trees. Old coconut trees are lowered very carefully *in situ* without difficulty. They say that this encourages a vigorous growth subsequently and is conducive of longevity and unintermittent fruitfulness, although there will be a retardation in growth for the first one or two years. In Malabar and South Canara, this practice is never noticed. It is a pity that most of our ryots do not bring up the coconut tree with the amount of care commensurate with the benefits they derive from it.

9. *The coconut tree:—the Kalpaka Vriksha of Kerala:* It well deserves this appellation only in Cochin and Travancore. Every part of it is turned to good account. Of these the fibre industry deserves special mention. That the husk of the coconuts is not its least valuable product will be evident when one travels along the backwaters of Cochin and Travancore. The fibre is found suited for the production of a great variety of articles not only of utility but even allowing of elegance of workmanship. It is found sufficiently fine even for the loom; and mattings of different textures and with coloured figures and shapes are made of it at Alleppey and Mattanchery.

10. *A thing of beauty is a joy for ever:*—The dwarf variety of coconuts planted in rows on both sides of the main road in Trichur Town (Cochin State) was found coming up well. Some of them were found bearing fruits abundantly and the bunches were so huge as to reach the ground. Two kinds of trees were observed, one bright yellow and the other dark green.

Conclusion. In Cochin and Travancore a family of four members owning about 50 trees can in an ideal condition maintain themselves in a fairly decent way. The coconut trees of these States excel those of Malabar and South Kanara not only in the vigorousness of their growth and in their yielding capacity, but also in the quality and quantity of oil yielded, which is in great demand and highly valued in foreign markets.

Plantain Cultivation in the Cauvery Valley.

T. P. SUBRAMANIA KANDER.

Plantain stands foremost among the "Muppazhams" or "the trio of the three Great Fruits of South India" viz., the Plantain, the Mango and the Jack. It is an important staple fruit obtainable in all seasons, at all places—whether in town or village—and by all people, whether rich or poor. It was well-known to the ancients and the use of "Pancha-Sakham" (or its five-fold form viz: the raw-fruit, the ripe fruit, the flower spike, the leaves and the inner stem) and the names of varieties grown at that time (such as, Mocha, Rambha, Kathali and Vamana (short) Kathali) were known in times so far back as the Vedic age.

Soils. Lands with good drainage facilities are selected, loams and clay loams being considered to be very well suited. Loams overlying a bed of kankar produce fully developed crops, while on sandy loams the trees grow tall but the bunches are small. Alkaline lands are improved by growing plantains. Fields which have been under betelvine are preferred as they are already enriched by copious manuring and do not therefore need a further application of manure for 2 years more.

Varieties. The chief varieties are Puvan and Rastali. Puvan is more largely grown than Rastali owing to its bearing bigger bunches and giving a heavier yield, but its chief defect lies in that it is not able to stand strong winds, as its stem is slender. A Puvan bunch generally contains 250 fruits, while a Rastali, which is a thin skinned sweet variety, bears smaller bunches with 100—150 fruits. Other common varieties are Bontha (*Monthan* or curry plantain), Pachai Nadan, Mada Vazhai, Sevvazhai and Thén-Kathali and Kuzhi Vazhai (Mauritius Plantain) and Puvillachindu. *Kuzhi vazhai* is planted between rows of Puvan or Rastali and is removed at the end of the first year. The last is a variety which is characterised by the absence of the infertile tip of the inflorescence when the fruits have formed and the flower bracts have fallen off.

Seasons. There are two main seasons—Margali pattam, (December—January) and Ani pattam (June—July). The former is preferred as the crop obtained during this period fetches a higher price: but this necessitates propping up of stems during the windy months of April and May, if the variety is *Puvan*. Rastali has a thicker stem and needs no propping.

The suckers are also planted during September—October,—the Arpasi pattam, but not much planting is attempted during this season as the market becomes glutted and the prices are low at this time.

Cultivation. Suckers from a plantain 2—3 years old are selected and planted 8' apart both ways. Trenches are dug later on and are deepened in the 3rd month. Later, from the 4th month onwards leaf sheaths are tied and side suckers removed, and trenches cleaned. The bunches if they appear in the hot weather are covered over with the shot blade leaf. They become fully ripe in 3 months. The plantain crop receives well rotted farmyard manure at 6 Madras measures per tree. *Ratoons* get a root-pruning and a second application of manure.

Village earth and sand are mixed together and applied if the soil is stiff clay. To enrich plantain land it is not uncommon to apply large quantities of wild indigo to the previous paddy crop. Ground-nut cake at 1500 lbs. an acre is a favourite manure in Erode, Karur and Namakal Taluks. Other cakes in use are Margosa cake, and Castor cake. Tannery refuse is common in Trichy, while pig dung is also favoured. According to the general rotation plantain follows 2 crops of paddy and occupies the ground for 2 years.

For one month after planting, the field is watered once a week, and later on once in 20 days. It is better to have heavy waterings at long intervals rather than frequent irrigation. The crop is sold to local merchants who transport them to different markets. The market price is dependent on the season. It is moderate from January to May and rises thence till September—October after which prices go down.

Diseases:

Surai (Bud rot) Disease.

This is a common disease and the following are the signs of the presence of the disease: (1) Profuse suckering (2) Stem, leaf, petioles and leafsheaths get roughened and 'hard' to the sickle (3) Stunted growth: and abnormally crowded leaf-sheaths (4) The leaves put forth are short and occasionally brown. The central leaf then rots and disappears and a hollow is formed.

This disease does great damage in rich soils; heavy manuring is supposed to aggravate it. Rastali and Kuzhi Vazhai are more liable to it than Puvan.

Vithai-kai disease. Confined to Puvan: symptoms are that fruits become slender and malformed and seeds are developed inside to a greater or less extent and the produce is worthless for purposes of sale. The attack is greater in ratoons.

Chodai disease. Confined to Pachai Nadan. Symptoms—affected fruits do not develop, are thin and flat and the inside is hollow.

Other minor diseases are tip rot of Bonthan, cracking of fruits in Rastali and Kuli Vazhai. "Kallakai" is a disease whereby the fruits in a bunch mature at irregular periods.

Improvements.

The Plantain industry can be improved along the following lines:

1. Introduction of better varieties and improved methods of cultivation.
2. Methods of preservation of fruits.
3. The utilisation of the Plantain fibre.
4. Methods of preparation of plantain flour.
5. A study of the diseases of the Plantain with special reference to remedies.

[This crop occupies about 1,00,000 acres in this Presidency and vies with sugarcane for close attention on the part of the ryot. It would therefore be a matter of no small concern if it is neglected. Sugarcane area was 1,39,000 acres in 1921—22. *Editor.*]

A B C of Agriculture.

A is Agriculture, foremost occupation
The breath of my life, the backbone of the nation.
A directs it well and B teaches his portion
But our M L Cs have a different notion.
B is Botany, by right senior to C,
Nott may deny ; but will not others see ?
C is Chemistry, organic and inorganic
Soils, manures, and things you do not like.
D is Dairying, milk, butter and curd they make,
Farm may overflow ; but you are ever at stake.
E is Engineering, you the students hate,
Entomologist may fury, but let him wait.
F is Farm, an ideal one you must maintain
Emporium of animals, stores, implements it'll remain.
G is Grass, which you must learn to look,
Or one day surely you'll be brought to book.
H is Horticulture, flowers, fruits and vegetables to grow
Principles of propagation, pruning and grafting you must know.
I is Irrigation which none can ever ignore
Grant enough water, the ryot naught will deplore.
J is Me, my name you can identify,
But prosaic minds it will not satisfy.
K is knowledge so complement'ry to success,
Less of theory, the more of practical you are said to possess.
L is Livestock of which I know little
It means, I suppose, the care and improvement of cattle.

M is Mycology, gives advice for any disease
Cut and burn and spray or do as you please.
N is Nature, pious, fruitful and bounteous
Importance of Nature Study in schools is obvious.
O is Orchard a subject I've often taught
A paying proposition it can be, if well sought.
P is Poultry your farm may truly adorn
Or the cock will not crow and there will be no morn.
Q is question, do not argue but enquire
For it is that your work will inspire.
R is Reading, books, bulletins, memoirs all
But you will never do without the STUDENTS' JOURNAL.
S is Soil not all the Chemist's forte
It is the Physicist's, the Bacteriologist's and others' mote.
T is Time which you must choose aright
Rise early for your fields to appear bright.
U is Umbrella you must try to throw
An officer suffered for misuse, don't you know ?
V is Veterinary, no veteran with all your might
For it is animal life you are to read aright.
W is Weed grows where not wanted
Kill it if you can, for it is not planted.
X is 'xploitation not unworthy of man
Utilise your resources, grow rich any way you can.
Y is yield a matter of littl'e concern
If to agriculture you, graduates, do turn.
Z is Zeal, O! the joy of the specialist
Zoology is agricultural, be pleased Entomologist.

Extracts.

Coconuts and Salt. That common salt applied at the roots of coconut palms is beneficial to the trees is a statement very often made. This, however, is the opinion of old planters. In addition to its being a good manure for the palms, the salt applied at the top around the growing point or bud was also supposed to be beneficial in keeping away "bud rot." Scientists said that salt was of no particular use to the coconut. A young and brilliant scientist of the United States Department of Agriculture contends that the coconut is not a seaside nor a seashore-loving plant at all: that it did not originate in the islands of the Malayan Archipelago as was formerly believed, but belonged to the American continent and was originally a desert plant.

Be that as it may, plain facts show, however, that coconuts yield most on rich soils with copious rainfall where the sea breeze reaches them.

The fact that the coconut grows most readily and naturally on almost pure sand impregnated with salt shows that the coconut must appreciate the salt, for other plants would die under such conditions.

In support of this, experiments conducted in Porto Rico are of interest. In 1915, on coconut palms two years old, experiments to determine the effect of fertilizers on the growth and production of young coconut palms were started, plots of 10 trees each receiving semi-annual applications of complete and incomplete mixtures of chemical fertilizers as well as tobacco stems and stable manure in combination with chemical mixtures.

During the first 18 months of production the best yield was made by the plot on which common salt only had been applied. Nine trees in this plot matured nuts in this period while only two did so in the check plot. From four to five trees fruited in each plot which received incomplete fertilizer. In the year 1921 the yield from the check plot averaged 11 nuts per palm, while the

salted trees averaged 45 nuts per palm. Salt has been found to be so beneficial in this test that it is being tested on a much larger scale in an old coconut grove where records have been kept of the individual yields of several hundred trees for over eight years. 3 to 4 lbs. of salt per palm applied every 6 months distributing it well throughout the range of the roots is suggested.—"*Porto Rico Agricultural Extension Notes*" 15-12-1922.

Abstracted from the Journal of Jamaica Agri. Socy. February '23.

N. B. It is worth while to try this on our trees at the Central Farm as records of performance of individual palms have been maintained now for nearly 10 years.

S. N.

Formaldehyde.—Fixation and polymerisation of—in the dark, by green plants. CO_2 assimilation by plants. T. Sabalitschka.

Experiments on the Nasturtium and the water weed, *Elodea canadensis* showed that these plants are capable of fixing Formaldehyde and polymerising it to sugars and starch in darkness. The plants were placed in an enclosed space and deprived of CO_2 . The sugar and starch content of the green leaves was determined after some decrease below the normal had occurred by reason of the exclusion of CO_2 , and some of the plants were then exposed to formaldehyde either in vapour or in solution, whilst others were kept for comparison. After some days sugar and starch were again determined and the examples of the results 162 mg., of sugar and 1048 mg., of starch per 100 grms. of leaf were found after treatment with formaldehyde, compared with 144 mg. of sugar and 495 mg., of starch in the blank experiment. The quantities of sugar and starch in the formaldehyde experiment were actually higher than at the commencement, whereas in the control experiment the carbohydrates had continued to decrease. This shows that the plants were able to restore their stock of carbohydrate depleted by the absence of CO_2 by making use of formaldehyde, and that the polymerisation can take place in the absence of sunlight. Further it provides

additional evidence for the hypothesis that formaldehyde is an intermediate product of the photosynthesis of carbohydrates from CO_2 and H_2O .

H. S. R.

Dietetic Value of Cheese. Official experiments have settled the question of the digestibility of cheese. The chemists have concluded that both raw and cooked cheese are equally easy of digestion when eaten under right conditions. As cheese is a very compact or concentrated food, it is not acted on in the stomach but passed on to the intestines, where it is finally absorbed. It is this very quality of prolonged digestion that has made cheese noted for its "staying" powers, and so valued by both athlete and workman as a mid-day food.

In cheese we find proteid constituents, corresponding to eggs, meat and fish, which must be supplied with the bulk in which it is lacking in order to overcome a tendency to cause constipation. It should be used as a meat substitute rather than as an adjunct to a heavy meal,—savories, cheese custards, soups, Welsh rarebits, soufflés or fondus—offering almost unlimited combinations to the imaginative housewife. A green salad and graham or entire wheat meal bread, with a tart dessert and simple cakes are suitable accompaniments to a cheese dish.

In buying cheese as a meat substitute, food value should be considered rather than flavour.

There are certain times when cheese adds perfection to a meal—in fact, there are many who think that no matter how limited the dinner, cheese must never be omitted. Brillat-Savarin says that "a dinner without cheese is like a beautiful woman with but one eye."

Journal of Agriculture, Victoria, March 1923.

K. U. M.

Gleanings.

The greater the need for brains, the higher the wages..... In general we may note that those industries which have absorbed most brains in their development, notably engineering, also pay the highest wages. Agriculture, which has up to the present remained most primitive, pays the lowest.....

Nature, 24-3-1923.

Denmark's Best Cow. It will interest dairymen to learn that Denmark's best cow for last season yielded, during the year, 20,768 lbs. of milk, making 968 lbs. of butter. She is a big, well-developed cow of the Danish race of milkers, and weighed nearly 1,800 lbs. before her last calving.—South African Dairyman, January, 1922.

Fordson Tractor. "Owing to variation in the rate of feed into a mill, there is fluctuation in the demand for power. If this fluctuation is not met by some form of automatic control on the engine the danger of damage to the mill, or of inefficient separation of the grain, is increased.

A governor may therefore be fitted to this tractor at an additional charge, and they naturally concluded that, in the event of the tractor being used for driving stationary machinery, a governor was regarded by the makers as being necessary."

The short note extracted above from the Scottish Farmer (No, 1577), shows how necessary it is to provide the tractor with a governor to make it an all-round motive power of the Farm.

K. U. M.

Effect of Root Excretion of Paddy Weeds on Crop Production of Rice. In the Philippine Agriculturist of February 1923, Messrs. De Peralta and Estioko record work carried out by them on this subject at the College of Agriculture, Los Banos, during the year 1922. They observe that crop rotation does not always insure a

better return than what could be obtained by growing the same crop continuously. The observations of various workers have shown that roots of plants excrete a substance which is injurious to other crops; and root excretion would appear therefore an important factor in crop production. Experiments conducted by them as to the effect of a few of the commonest paddy weeds on paddy have shown that *Cyperus* spp. and water-lily (*Monochoria hastata* L) excrete substances beneficial to Rice production, while *Leersia hexandra* Sw. (local name *Zacate*) a common forage crop in the Philippines gives off substances detrimental to rice production. Rice itself produces an excretion harmful to its own kind causing a 9% reduction in yield. The authors suggest that a thorough ploughing and harrowing of the field should be done before planting rice, so as to have the toxic substances destroyed and rendered harmless to the succeeding crop.

Y. R. R.

The Cultivation of Pyrethrum in Switzerland.—Faes, H.—The insecticide powder obtained from *Pyrethrum* (*P. cinerariaefolium*) is very effective against *Cochylis* and is obtained by pounding the dried inflorescence of the plant. It is found in a wild state and cultivated in Montenegro, Dalmatia, Herzegovina and in the Quarnero Islands (Istria) up to an altitude of about 1000 m.

The powder obtained is specially active if it comes from half-closed or withered flowers. Unfortunately it is difficult to recognise under the microscope whether the powder is that of flowers picked green or withered. The writer undertook the cultivation of the plant in Switzerland having regard to the difficulties of procuring authentic powder of good quality. When collecting the seed it must be remembered that it is situated below the "florets" which look like a floral receptacle.

Internat. Rev. Agriculture, Rome, 1922.

Coffee Spraying Experiments. In Coorg, Coffee is subject to the Leaf-disease or Red-rust (*Hemileia*) and the Black Rot (*Kole*

roga) which cause a very great amount of Leaf-fall so that most of the bushes become absolutely bare and several of the twigs moreover show a "die-back." Experiments with different fungicides were undertaken at Purchikad Estate, Sidapur, Coorg, and observations on the results of these experiments form the subject of a joint report, published in the Planters' Chronicle of 2nd April 1922 by Mr. D. G. Munro, Deputy Director of Agriculture for Planting Districts and Mr. S. Sundararaman, Govt. Mycologist. Of various mixtures tried at different strengths, Bordeaux mixture at $\frac{1}{4}$ strength (i. e., $\frac{1}{2}\%$ or 2½-2½-50 gallons) mixed with 1 lb. casein as an adhesive was found the most economical as well as effective. Casein adhesive is said to have stood the test of the heavy monsoon rains. The sprayed leaves (May 1922) are reported to have been standing on the bushes in good condition in February 1923, while the flushes which appeared in September 1922 but were left unsprayed had lost all their leaves. In control plots left unsprayed the bushes had lost all leaves. At Sidapur Experiment Station, Coffee was sprayed twice—May and October—and both flushes are still on the trees. The cost of spraying works at about three pies per plant or @ about Rs. 20 per acre, but the difficulty of procuring water and supplying labour stands in the way of a general adoption of spraying. The experiments are proposed to be continued for a number of years in order to get more definite results.

Y. R. R.

Pennisetum purpureum as a Forage crop. Australian Farmers have recently proved the value of Elephant grass or Napier grass (*Pennisetum purpureum*) as a forage crop. This plant is a native of Africa which crops heavily, and is very resistant to drought and has apparently an excellent nutritive value at all stages of development.

In order to confirm this reputation the author examined a number of samples collected in various districts and at different seasons. The results of the analyses indicate clearly that only the

young plants should be considered as fairly good quality forage, and that the feeding value decreases with age and is very low when finally mature.

With Pennisetum as with the larger proportion of Australian forage plants, the protein content is low, and as the proteins constitute the essential elements in meat production, it is advisable to supplement this feed with a certain quality of concentrated foods, such as bran, cotton seed cake etc.

All the samples examined were tested for hydrocyanic acid, but the results were invariably negative. As regards this question, attention is called to the fact that other forage plants (*Sorghum* Spp.) possess a hydrocyanic content at certain stages of growth and that generally the toxicity decreases to a considerable extent with age.

International Review of Agriculture, Rome, July 1922, page 830.

T. S. V.

This has been cultivated on the Central Farm for the last 2 years with success. [Ed].

Calcium cyanamide; practical conditions for the use of—as a fertiliser.

In order to overcome the caustic and toxic properties of crude calcium cyanamide it was finely powdered and mixed with peat, other fertilisers being added to the mixture so as to obtain a complete plant food. The whole was inoculated with bacteria (of the group *B. lactis aerogenes* and *B. clausii*) capable of transforming the cyanamide. The function of peat consists in neutralising any lime that may be present and acting as an absorbent in fresh solution of nitrogenous substances formed by bacterial action. The complete fertiliser was used in comparison with a similar mixture made up with ammonium sulphate. On both sandy and clay soils it proved superior to the latter, for equivalent quantities, when used in restricted amounts. In larger supply, however, the acidifying action of the peat by retarding hydrolysis of the cyanamide results in inferior yields as compared with ammonium sulphate mixture.

H. S. R.

American Association for the Advancement of the Science. The 76th meeting of the American Association for the Advancement of Science was held at Boston U. S. A., on December 26—30, 1922. The following were some of the subjects of Presidential addresses in the various sections: "Allurements in Physics," "Gas Ionisation and Resonance potentials," "Geology's Debt to the mineral Industry," "Structure and origin of the Plant-cell," "The mining Industry of Canada" etc.

Analysis of complete Plantain tree from Samalkota Farm.

Dry weight of the entire tree ... 10.98 kilos.

Analysis.—

Nitrogen	111.47 grammes.
Lime (CaO)	140.96 "
Magnesia (MgO)	77.58 "
Phosphoric Acid (P ₂ O ₅)	46.91 "
Potash (K ₂ O)	436.97 "

The chief mineral requirements of the tree, therefore, appear to be Potash and Lime.

Dr. R. V. Norris, Monthly Report for March 1923.

A Biochemical Discovery of the Ancient Babylonians. "The Babylonians used to cook eggs in an emergency and when no fire was available, by rapidly whirling them in slings" is a statement of *Suidan* quoted by *Sarsi*—an Italian of the 16th century. The accuracy of this statement was challenged by Galileo who recorded his opinion that it was absolutely improbable as the same was not capable of being demonstrated in his time. Commenting on the above, Mr. Leslie J. Harris, of the Emmanuel College, Cambridge, writes to "Nature" of 10th March 1923 to the effect that "within the last few years, it has been discovered the egg white under mechanical strain, such as vigorous shaking, or very high hydrostatic pressure, undergoes coagulation (vide Robertson—"Physical Chemistry of the Proteins"—1918), and that if Galileo had tried the

experiment he could have verified Sarsi's statement." And in conclusion he writes. "The myths and anecdotes of the ancients are almost invariably built on some foundation of fact; and it seems highly probable that the Babylonians were aware that eggs could be coagulated by vigorous movement (such as swinging in slings). If this be so, the phenomenon of mechanical coagulation proves to be another example of a former observation re-discovered—in this case after the lapse of thousands of years!"

Re-discoveries of the sort described above are not at all likely to be unique, if the writings of the ancients or certain apparently curious beliefs of people of the present day inherited from the remote past be viewed with the requisite degree of sympathy. In proof of this may be quoted the case where the power of a few drops of mercury in checking the increase of the pulse beetles in stored pulses—a fact known to the ryots of Mysore for centuries—was tested by Dr. Kunhikannan of Bangalore and found absolutely correct. He found by experiment that mercury vapour has the effect of inhibiting the development of the embryos of eggs laid by the Pulse beetles. The result was tested recently in America and confirmed.

Y. R. R.

Data on American Dairy Industry.

Figures from the U. S. Department of Agriculture & Census.

Number of Dairy cows	25,061,000
Number of Dairy cattle (Estimated)	32,800,000
Number of Registered pure Breeds	916,602
Valuation of Dairy cattle (Estimated)	\$ 2,000,000,000
Farms reporting Dairy cattle (1919)	4,565,753
Percentage of total number of Farms	(6,448,366) 70.8%
Acreage of these Farms (Estimated)	678,500,000
Valuation of land and building (Estimated)	\$ 48,000,000,000
Population of these farms (Estimated)	23,000,000

Milk Production and uses in 1921.

Production	98,862,276,000 Lbs.
Value of Milk products on the Farms	
(Estimated)	\$ 2,500,000,000
Whole milk used for Household purposes	45,143,000,000 Lbs.
Per capita consumption of whole milk	49 Gals or 421.4 "
Increase consumption for the year per capita	6 Gals or 51.6 "
Whole milk used for manufacturing purposes	46,493,000,000 "
Value when manufactured (Estimated)	\$ 3,500,000,000
Whole milk used for butter	35,800,000,000 Lbs.
Whole milk used for cheese	3,550,000,000 "
Whole milk used for concentrated milk	3,660,400,000 "
Whole milk used for ice cream	3,555,000,000 "
Whole milk fed to calves	4,260,000,000 "
Whole milk used for unspecified purposes	2,965,868,000 "

HOUSEHOLD HINTS.

What a housekeeper should not do.

Don't save cold coffee in the pot in which it was made. Draw it off and put it in a jar; cover and re-heat it quickly at serving time.

Don't use dairy butter for frying purposes. It decomposes and is unwholesome. This does not apply to coconut or other vegetable butter.

Don't use table cloths for breakfast or supper. Small d'oyleys are much prettier and more easily laundered.

Don't fill the tea kettle the night before. Fill it with fresh water in the morning, bring it to the boiling point, and then use it at once.

Don't put tablecloths and napkins that are fruit-stained into hot soapsuds; it sets or fixes the stains. Remove the stains first with dilute oxalic acid, washing quickly in clear water.

Don't salt meat before cooking. Add it after the meat is cooked or when nearly done.

Don't put vinegar in metal dishes.

Don't boil meat at a gallop. Boil five minutes, then cook it at a temperature of 160 deg. Fahr.

Don't make bread into large loaves. The centre is apt to be underdone, and spoil easily.

Don't keep custards in an open vessel. They are liable to become poisonous.

Journ. Jamaica Agri. Society, Dec. 22—Jan. 23.

Correspondence.

May I request friends or any of the readers of the Journal to let me have, loose or bound, the following numbers of the Journal? As one of the oldest members of the Union and, for some years, its General Secretary or Editor, I wish to make up a complete set for reference. Price and Postage will be paid by me.

1911—Yellow year book.

1913—Volume I (whole).

1915— „ III (whole).

1916— „ IV (whole).

1918— „ VI (February only).

M. R. Ramaswami Sivan,
Agricultural College, Coimbatore.

5th May 1923.

Students' Corner.

Annual Report of the Students' Club, Agricultural College, Coimbatore, for the year 1922-23.

The working Committee of the Students' Club begs to submit the following report for the year 1922-23.

Strength. There were 119 members on the rolls this year as against 101 of last year. The increase in strength was due to the increase in the number of classes consequent on the affiliation of our College to the University of Madras.

Meetings. Six meetings were held during the year of which two were General Body Meetings; there were besides four Committee Meetings to transact the business of the Club. Some radical changes were brought about in the rules of the Club which brought into existence Team Captains for all the games instead of a single Games Captain as hitherto.

Activities. (a) *Literary:* Plague scare was responsible for retarding our activities during the second term but we more than made up by a particularly busy third term when there were as many as 8 meetings. There were a series of lectures on child Training by Professor Kulkarni of the Victoria College, Indore. A feature of most of this year's meetings was the use of Magic Lantern slides to illustrate the lectures which were all well attended and appreciated.

Subject.	Lecturer.	President.
<i>20th October, 1922.</i>		
1. Sugarcane problem in India.	Rao Saheb T. S. Venkataraman.	Mr. F. R. Parnell.
<i>5th December, 1922.</i>		
2. Chemistry in relation to Agriculture.	Dr. R. V. Norris.	Mr. G. R. Hilson.
<i>22nd February, 1923.</i>		
3. Rothamsted Experiments.	Rao Saheb M. R. Ramaswami Sivan.	Mr. F. R. Parnell.
<i>26th February, 1923.</i>		
4. Agricultural Experiments.	Mr. F. R. Parnell.	Dr. R. V. Norris.
<i>4th March, 1923.</i>		
5. Impressions of the Ceded Districts.	M. Balakrishnan.	Mr. G. N. Ranga-swamy Ayyangar.
<i>9th March 1923.</i>		
6. Cyanamide Experiments.	Mr. B. Viswanath.	Rao Saheb M. R. Ramaswamy Sivan.
<i>14th March, 1923.</i>		
7. Plantain cultivation in South India.	Mr. D. Balakrishnamurthi.	Rao Saheb T. S. Venkataraman.
<i>17th March, 1923.</i>		
8. Cotton improvements.	Mr. G. R. Hilson.	Mr. D. Balakrishnamurthi.

(b) *Games*. Now passing on to the other side of our activities—the athletic side—we had an equally interesting year. (1) *Cricket*. We had bad luck at Cricket this year. Although of the ten matches played we lost only one, it was rather unfortunate that the one we lost—due mainly to the absence of Mr. Anstead from our midst—happened to be the deciding match of the tournament. (2) *Hockey*. Similar misfortune greeted us at Hockey, where after winning the Stanes' in the first round we lost to our old rivals and neighbours the Foresters. (3) *Football*. We are glad, however, that we have been able to maintain our record at Football and keep the Cup which we won even last year.

The Cecil Wood Tennis Tournament attracted nearly as many entries as last year and the standard of game exhibited was of a very high order. For the third time Student P. Sudarsanam won the Cup. We had an interesting and exciting Final match to witness when student Ratnavelu the runner-up put up a decent fight. Another interesting encounter was the semi-final between Ratnavelu and C. S. Anantanarayana Ayyar, a match which had to be played twice before a decision could be arrived at.

The inter-class Tournament could not be played to a finish this year since most matches ended in draws.

The following are awarded colours for the games noted against their names:—

1. N. Pattathan	...	Cricket.
2. T. Rangabrahma Rao	...	Do.
3. C. V. Bhasyam	...	Hockey.
4. M. Ratnavelu	...	Hockey & Football.
5. R. Balasubramaniam	...	Hockey.
6. C. V. Thangavelu	...	Football.
7. Rajam Ayyangar	...	Do.
8. S. V. Duraiswamy	...	Do.
9. P. Sudarsanam	...	Do.

Our thanks:—We beg to offer our heartfelt thanks to our President F. R. Parnell Esquire, M. A. to our donors and to all those

gentlemen who lectured and presided at our meetings and to Dr. Norris, Messrs. Anstead, Shiva Rao, U. Vittal Rao, and K. T. Bhandari, M. R. R. Rao Saheb M. R. Ramaswami Sivan, Messrs. T. S. Ramasubramaniam and K. Krishnamurti Rao, Rao Saheb Y. Ramachandria Rao and Mr. C. Tadulinga Mudaliar for their kind and very sympathetic help in several ways.

Our thanks are specially due to Mrs. Parnell for kindly giving away the prizes.

We hope that the above well-wishers of our Club will continue to evince the same keen interest in future and be a source of guidance and inspiration in the affairs of our Club.

Conclusion. In conclusion we believe that we had quite a successful and a busy year notwithstanding the prevalence of plague. It is our earnest wish that the Club will continue to infuse the same spirit of sportsmanliness and cordiality among its members as hitherto and we close with the firm belief that under the inspiring guidance of our President and the staff, the Club will be ever increasing and widening its activities. We wish the Club better and continued success in the coming years.

The outgoing Students. You, we are sure, will carry with you pleasant recollections of the College and Club and it is our earnest desire that you should always have a niche in the corner of your heart for the Maidan and the small building in its corner where you have spent many a useful and joyous evening.

V. Suryanarayana,
Secretary.

Applicants for B. Sc. Ag. Course.

Candidates for admission to the B. Sc. Degree Course will be required to appear for an interview at one of the following centres on the dates noted against each:—

Centre.	Place at which candidates should assemble.	Date.
Coimbatore.	Agricultural College.	June 19—20.
Madras.	Office of the Director of Agriculture Madras.	June 21—22.
Samalkot.	Agricultural Station.	June 23—24.

II. How are plant organs affected by variations in the amount of available water?

III. Describe the methods adopted in rearing plants by water or sand culture. What conclusions can be drawn from these experiments?

IV. Give an account of starch formation in plants.

V. What characteristics of plants have to be considered in selecting them for rotation or mixtures of crops? State your reasons?

VI. What methods are generally adopted in the improvement of crop plants?

B.Sc. Ag.

Part II.

CHEMISTRY (I).

Thursday, 10th April 1923--7 to 10 A. M.

[Only Six questions are to be answered. All candidates must attempt question VI.]

I. Define the term manure and state clearly how their employment benefits the soil and crop. From this point of view how would you classify manures? Give concrete examples.

II. What are the chief phosphatic manures employed in agriculture? Describe their chief chemical and physical properties and contrast the modes of action of superphosphate, basic super, bone meal and basic slag.

III. Give a detailed account of the changes involved in the making and storing of farmyard manure. Why is it advantageous to employ well rotted manure in preference to fresh manure?

IV. Write an essay on the chemical changes occurring during germination and growth of the crop.

V. What do you understand by the terms nitrification and denitrification? Describe in detail the chemical and biological changes involved.

VI. Compare the conditions existing in a paddy soil with those of a dry soil, and discuss the effect of these different conditions on the soil and manure.

VII. What are enzymes? Give an account of their general characteristics and properties.

VIII. Explain clearly the manner in which the retention of water by soils is affected by differences in their physical constitution.

B. Sc. Ag.

Part II.

CHEMISTRY (II).

Thursday, 10th April 1923--1 to 4 P. M.

[Only Six questions are to be answered of which one must be No. VIII].

I. Define the term nutrient when applied to feeding stuffs and fodders. Review briefly the different classes of nutrients found in these substances and state how you would estimate them.

II. What is meant by the term Nutritive Ratio, Starch Equivalent, Digestion Coefficient and Calorific Value? How would you employ these values for the classification and valuation of different types of feeding stuffs and fodders?

III. Discuss the chemical, physical, and biological changes involved during the process of digestion of food by farm animals.

IV. Describe the methods you would employ in order to determine the digestibility of a fodder.

V. What is meant by the term feeding standard? How would you employ such a standard for the calculation of a mixed feed suitable for working oxen?

VI. Give a brief account of the composition and properties of the chief constituents of milk. Describe the methods you would adopt for the estimation of the more important ones.

VII. What is the composition of the normal milk from Indian cows and buffaloes? What variations would you expect to observe between the milks obtained from individual animals? How would you detect the several forms of adulteration to which milk is subjected?

VIII. Describe in detail the chemical, physical, and biological changes involved in the production of butter and cheese.

B.Sc. Ag.

Part II.

AGRICULTURE (I).

Wednesday, 11th April 1923—7 to 10 A. M.

[Only Six questions are to be answered. All candidates must attempt questions I and II.]

I. A plant requires from the soil a proper supply of water and nutrient salts. Need the soil fulfil any other conditions to guarantee good growth? Discuss your answer.

II. Criticise cattle breeding as conducted in your home village from the points of view of—

(a) producing good cattle,

(b) a business undertaking.

III. Would you expect an oil cake which is the best of several as a fertiliser to yield the best wheat? Explain your answer.

IV. What do you consider to be the commonest defects of black cotton soil?

V. What is a ledger? Explain the term "Depreciation" and how would you account for it in your farm books?

VI. You are a landowner possessing 200 acres of dry crop land. The only business you are in the habit of doing in connection with your land is to arrange for its lease. Discuss the possibility of improving the property of your tenants and of increasing your own income from your land.

VII. Describe with diagram the action of a cream separator and the principles on which it works. What would be the result of passing separated milk through the separator?

VIII. Describe two methods of laying out fields for watering garden crops. Discuss their relative merits.

B.Sc. Ag.

Part II.

AGRICULTURE (II).

Wednesday, 11th April 1923—1 to 4 P. M.

[Only Six questions to be answered. All candidates must attempt questions I and II.]

I. What factors determine the quantity of seed used per acre in putting in a crop? Give illustrations.

II. In a red soil tract with an annual rainfall of 20 inches most of which falls during the S. W. monsoon period, the cost of irrigating an acre of ragi from a well with a double bullock wheel is Rs. 25. What water rate should the cultivator of this tract be prepared to pay for water from a Government channel closed only in May for

(1) Paddy.

(2) Garden crops.

(3) Irrigated dry crops.

Give reasons for your answer and in the case of (2) and (3) name the crops which could be grown. The soil is a medium loam.

III. What are the points of a good dairy cow? What treatment should she be given before, during and after calving?

IV. Name ten of the most important pasture plants of this Presidency. Field 26 of the Central Farm has to be laid down to pasture. Select a suitable mixture for the purpose from your list and state how you would do it. How would you manage the pasture after it is established?

V. What is the chief defect of the main systems of Agriculture of this Presidency? Can it be remedied? If not, why? If so, how?

VI. Reproduce the cultivation sheet of a field of Karanganni cotton (drilled). Show how you arrive at the rate charged for a pair of bullocks.

VII. What equipment is required for the following holdings:—

- (1) 20 acres of black cotton soil, unirrigable.
- (2) 15 acres of red garden soil with one well.
- (3) 3 acres of wet land.

What factors determine the amount of equipment required?
Show how they operate in each of these cases.

VIII. A field of paddy was divided into small plots and the produce of each harvested separately. The figures shown below represent the grain yields of the plots. How many plots must be put down to test whether the application of 1 cwt. of bone meal per acre to the paddy crop is profitable?

Plot yields.				
9	8	8	7	8
11	9	8	8	7
9	13	10	8	8
12	10	13	9	11
11	11	10	7	10
7	11	11	8	7
11	12	12	9	7
12	9	11	9	10
10	11	8	10	11
11	13	12	11	12
7	8	11	13	9
9	9	10	10	9
11	13	9	7	9
10	11	11	11	9
11	12	12	7	9
8	10	10	9	11
14	13	11	8	12
12	12	12	13	11
13	10	12	10	13
13	12	10	12	13

B.Sc. Ag.

Part II.

AGRICULTURE (ESSAY.)

Thursday, 21st April 1923—7 to 10 A. M.

Write an essay on—“*The formation, maintenance and commercial possibilities of a supply of pure cotton seed.*”

B.Sc. Ag.

Part II.

PRACTICAL CHEMISTRY (FIRST PAPER.)

Monday, 16th April 1923. 3 Hours.

I. The Solution A contains sucrose and a reducing sugar. Identify the latter and estimate the concentration of each carbohydrate in the solution.

II. Gennine milk may be taken to contain not less than 4.2% of fat and 8.80% of solids—not fat. Examine the given sample and report on the extent of adulteration, if any.

B.Sc. Ag.

Part II.

PRACTICAL CHEMISTRY (SECOND PAPER.)

Monday, 16th April 1923. 3 Hours.

I. Determine the pore space and calculate the specific gravity of the given sample of soil.

II. Determine the percentage of water-soluble phosphoric acid in the manure supplied.

B.Sc. Ag. **Part II.**

Practical Examination in Agriculture.

The following details of work on the Samalhati Farm on 10th July 1922 are given.

Prepare the D. R. Sheet for the Day.

Proper wages, areas and prices are to be assumed.

F. No.		Men.	Boys.	Women.
1.	Hand watering vegetables ...	0	1	0
2.	Hoeing coconut ...	0	3	0
3.	Removing side shoots and ... in plantains ...	4	0	0
4.	Weeding paddy seed beds ...	0	0	6
5.	Puddling for paddy (second time) 4 pairs ...	4	0	0
6.	Do. (third time) 3 pairs ...	3	0	0
7.	Do. (first time) 2 pairs ...	2	0	0
10.	Trimming bunds ...	4	0	0
11.	Passing levelling board 1 pair ...	1	0	0
12.	Passing levelling board and trimming bunds 1 pair ...	5 1/2	0	0
13 to 16.	Guiding water ...	1	0	0
17.	Transplanting (Rasangi) singles 4' apart ...	1	0	12
18.	Do. (Konamani) do 6' apart ...	1	0	10
21.	Applying castor cake 820 lbs. ...	16	0	16
22.	Wrapping canes (second time) fixing bamboos (800) and removing rubbish ...	16	8	0
23.	Pulling out paddy seedlings ...	6	0	0
	Measuring experimental plots ...	0	2	0
	Removing flowering plants on bunds ...	0	0	4
	Cleaning irrigation channels ...	4	0	0
	Drying and clearing grains ...	0	0	3
	Impounding stray cattle ...	0	2	0
	Watering flower plants in Rest House compound ...	0	1	0
	Stores ...	1	0	0

Watchmen ...	3	0	0
Boat ...	1	1	0
Looking after cattle ...	2	1	0

Sold plantains 352 lbs. @ 6 pies per pound. 64 lbs. daincha seeds; 160 lbs. wild indigo seeds; 1084 lbs. paddy seeds, 2 monsoon ploughs, 3 spare shares, 4 share points, were sold. Paid wages Rs. as. ps. to coolies cashed cont bill for Rs. 257-1-0. D. B. I Circle, 3 ryots from Kirabipudi visited the farm.

B.Sc. Ag.

Part II.

PRACTICAL BOTANY I.

Time—Three hours. 1 to 4 p.m. 19-4-23.

1. Describe with necessary sketches A (*Panicum miliaceum*) and B (*Cajanus indicus*). Refer them to their families, giving reasons.
2. Write biological notes on C (*Fraxus rammosus*), D (Rootsucker of *Millingtonia hortensis*), E (*Portulaca quadrifida*), F (*Indigofera trita*) and G (*Acacia nilotica*).
3. Sort out and identify the seeds in H (Paddy, Chillies, Gingelly, Gogu, Red gram, *Phaseolus mungo*, Tenai, Chodam, Kattu cumbu, Panivaragu and *Phaseolus* sp.)
4. *Viva voce*.

B.Sc. Ag.

Part II.

PRACTICAL BOTANY II.

Time—Three hours. 8 A.M. to 11 A.M. 20-4-23.

1. Cut transverse and longitudinal sections of A (Stem of *Cambodia cotton*) and leave your preparations for inspection. Explain with sketches the various parts.
2. Demonstrate the nature of the reserve material in B (Castor seed), C (Coconut endosperm) D (Ragi grains) and E (Onion bulbs).
3. Identify the weeds F (*Trianthema portulacastrum*), G (*Arista, lochia bracteata*) and H (*Corchorus trilocularis*) and explain briefly their life-history and the way they multiply.
4. *Viva voce*.

Editorial Notes.

The Relation of Administration to Research.

The importance of administration in research is the theme of the Editorial of the February number of the Experiment Station Record of U. S. A. for 1923. Its comments are based on the remarks made by Dr. R. S. Woodward in the course of an address on "the Varied Aspects of Research." The comments made therein refer to conditions obtaining in Experiment stations of the United States of America, but the same remarks will apply with equal force to all Scientific Institutions and probably to the Scientific Departments in India as well. Generally the work of the Administrator is identified with the fiscal and clerical side of the institution. This, according to Dr. Woodward is erroneous; "such a view overlooks the importance of the development of a wise research policy, the outlining of the field, the selection of men, and the intelligent provision of conditions essential to their highest success; and it fails to grasp the relationship and influence which a broad-minded, sympathetic man of technical knowledge may maintain in connection with the furthering of inquiry." A mere business man cannot make a successful scientific administrator.

Sometimes the investigators themselves reveal a failure to appreciate the place of administration in a Research Institution. "In contending for freedom and opportunity for the individual in following out the ideas which come to him in connection with his studies, administration has been scouted as having small place in connection with research and as being even inimical to it if carried beyond the office details." In reality "the part which administration plays does not interfere with the proper functions of the technical workers. It may serve as a stimulus, and at times it may impose restraint, but it exercises a steady hand and it

preserves the idea of a station as a whole. The purpose of organization and administration is to secure the most effective employment of the various forces and resources of the Station, some of which are shared with other branches, in lines of efforts which have been determined upon after careful consideration."

It is the business of administration to preserve the objects and aims of the station, to keep matters moving in an orderly and active way, to stimulate and encourage, to sustain and protect, and to counsel and suggest where these are necessary. "Where attention from a responsible administrative head is lacking, the course of the station is likely to be haphazard, inadequately considered, not directed by any well developed policy. There may be vacillation, a marking of time and wasted effort. There is often a tendency to undertake more things than can be carried out with the means at hand, for the enthusiasm of individual workers is prone to under-estimate difficulties and the necessary expense is likely to lead far beyond that anticipated. There is danger also of an accumulation of undertakings which have fallen into the routine stage and have ceased to be productive towards conclusion. The Director of the Station cannot be expected to be an expert in all lines of work, but he can know something about them and the elements essential to their success, and eventually he can form a judgment as to how far these are being met. He can of course be familiar with the problems and their relative importance, even though he must rely on experts to devise the means and carry them out. He may perhaps be able to stop some leaks, or by eliminating expensive overhead in connection with operations that have become largely routine he may conserve resources and give larger opportunity where it is needed. Again, the remedy for inadequate funds is not always more money. It may lie in the direction of concentration and conservation, a more effective employment of the existing resources."

Publicity Bureau.

We are sorry to note that the Publicity Bureau which was established in 1921 and had been performing the very useful function of broadcasting desirable information to all corners of the Presidency has been abolished this year by the Legislative Council owing to financial reasons.

The publication of the Monthly Digest of the Madras Agricultural Department was undertaken by the Bureau in the earlier days, but since July 1922, the work was taken up by the Department itself, so that the publication of the Digest has not been thereby affected. We trust the work of broad-casting useful information will similarly be undertaken by various other Govt. Departments such as the Medical and the Sanitary, and the useful work of the Publicity Bureau continued.

College Day.

The celebration of the College Day and the holding of the Conference have now been definitely fixed for the 14th, 15th and 16th July next, and the Hon'ble the Minister for Development has kindly consented to preside. We trust that a large number of landed proprietors and other gentlemen interested in agriculture will, in response to invitation, grace the conference with their presence. We fervently hope that members of the Union will recognise the importance of the occasion and give the Committee their enthusiastic support both by way of donations and of contributions of papers.

Departmental News.

Allotments for Agriculture in 1923. Under Agriculture the following allotments have been sanctioned by the Council:

Rs. 55,000 for the establishment of a Central Millet-Breeding Station, Coimbatore, Rs. 5,500 for improvements of dairy cattle, Rs. 8,000 for special demonstrations of improved methods in agriculture and Rs. 21,000 for the opening of a sugarcane station at Anakapalle.

Mr. Edward Ballard. Mr. Edward Ballard, B. A., retired Govt. Entomologist, has been appointed to the Advisory Service of the Ministry in Entomology and attached to the Agricultural and Horticultural Research Station at Long Ashton, Bristol.

Journal of the Ministry of Agriculture, April 1923.

Cattle Fair at Tirupur. The Municipal Council has resolved to purchase a big plot of waste land for Rs. 10,001 to hold the annual cattle fair.

(The Hindu, May 5, 1923.)

The Union Building.

With reference to the much-felt need of a building to house the Union, our members may recollect that plans and estimates (cost Rs. 2,000/-) for the building were prepared and submitted last year to the Director of Agriculture. We are glad to report that the Govt. have now been pleased, in response to the D. A's letter on the subject, to sanction the lease of a site measuring about 37 cents, between the Post office and A type No. 5, on a rent of Rs. 8/- per year. They also sanction the grant of Rs. 670/- towards the cost of the construction of the building, but have, however, ordered that the Union should first be registered under *Indian Registration of Societies Act 1860, (XXI of 1860.)* As the question of registration is a very important matter, it will have to be decided at the annual meeting of the General Body during the coming College Day celebration.

The Working Committee.

Estate News.

The Officers' Club. At a meeting held on the 1st May the general body of the club resolved to make certain alterations in the building to provide additional accommodation for the members.

Volley Ball. This is a new game that has been introduced into the Club recently and has proved very popular with the younger members and for the present it bids fair to eclipse all other activities of the Club in the enthusiasm displayed by the participants.

Bhajana Committee Accounts 1922-23.

Receipts.

BALANCE SHEET.

	Rs.	A.	P.
1921 Balance from 1921 Accounts ...	3	12	6
1922 By donations for Radhakalyanam ...	115	8	0
By street collections on the above occasion ...	26	0	0
By donations for Sree Jayanti ...	27	9	0
By Vinayaka Chathurthi collections ...	21	1	9
By collections for Kalakshepam ...	5	0	0
1923 By donations for Radhakalyanam ...	123	1	0
By collections during procession ...	28	3	1
By Sri Rama Navami collections ...	14	0	0
Total	364	3	8

Expenditure.

1922 To Radhakalyanam day ...	102	5	6
To Sivarathri Kalakshepam ...	21	8	0
To Vinayaka Chathurthi and Sree Jayanti celebrations ...	39	8	0
To Bhagavatham Exposition ...	12	0	0
1923 To Radhakalyanam day ...	109	11	0
To Sri Rama Navami ...	11	0	0
Total	296	0	6
To Balance on hand ...	68	3	2
Total	364	3	8

(Sd). D. Srinivasa Rao,
 " S. R. Venkatakrishna Mudaliar,
 " T. V. Ramakrishna Aiyar,
Members of the Bhajana Committee.

Coimbatore, }
 May 1923. }

Departmental Notes.

Appointments and Transfers :—

1. Mr. D. Balakrishnamurti, Acting Professor of Agriculture to act as Professor of Agriculture and Superintendent Central Farm.
2. Mr. T. V. Rajagopalacharyar, Assistant Professor of Agriculture, to be Assistant Professor of Agriculture and Assistant Principal.
3. Mr. K. Unnikrishna Menon, Officiating Assistant Director, now in charge of the office of the Superintendent, Central Farm, to do the duties of Assistant Superintendent, Central Farm.
4. Mr. P. Madhava Rao Patnaik, lower subordinate, V grade on probation in Agency tracts.
5. Mr. K. Suryanarayana do. do.
6. Mr. N. Bhukta do. do.
7. Mr. A. Ramaswami Ayyar, Farm Manager, Cotton Breeding Station, on the expiry of leave to IV circle.
8. Mr. G. R. Venkatachalapathi, Assistant Agricultural Demonstrator, Vellore, to Central Farm as Assistant Farm Manager.
9. Mr. T. G. Anantaramayyar, Farm Manager, Central Farm, to VII circle.
10. Mr. V. S. Ramaswami Ayyar, Agricultural Demonstrator, on the expiry of 4 months' leave granted to him from 24-1-23 to VIII Circle.
11. Mr. A. Gopalakrishnayya, Farm Manager, Chintaldevi, transfer to III Circle for district work.
12. Mr. B. Viswanath, Assistant Agricultural Chemist, to act as Agricultural Chemist (I. A. S.) vice Dr. R. V. Norris, granted leave.
13. Mr. P. H. Rama Reddi, Deputy Director, III Circle, on return from leave, to act as Professor of Agriculture and Superintendent of the Central Farm vice M. R. Ry. D. Balakrishnamurti Garu, granted leave.
14. A. V. Thirumuruganatham Pillai, Assistant Director, VI Circle, to act as Deputy Director, III Circle, vice No. 13.
15. Mr. K. Raghavachariar, officiating Assistant Director, IV Circle, to continue to act as Assistant Director, IV Circle.
16. Mr. O. B. Srinivasayyengar, Upper Subordinate, third grade, (Scientific Section) and Assistant to the Government Economic Botanist to act as Assistant Economic Botanist in the Madras Agricultural Service, vice Mr. K. Ramiah granted leave.
17. Mr. M. P. Sankaran Nambiar, Upper Subordinate, Agricultural Section, to be Agricultural Teacher, Agricultural Middle School, Taliparamba.
18. Mr. M. Krishnaswami Ayyangar, Sub-Assistant to the Cotton Specialist transfer to the III Circle.
19. Mr. Y. G. Krishna Rao Nayudu, appointed Assistant Director of Agriculture on probation and posted to I Circle.

Leave:—

1. Mr. Saadat Ullah Khan, Deputy Director of Agriculture, on probation, extension of leave on half average pay for 17 days.
2. Mr. S. Dharmalinga Mudaliar, Assistant in Economic Botany, leave on average pay for 24 days from 8-5-1923.
3. Mr. M. Subrahmanya Pillai, Agricultural Demonstrator, Trichinopoly leave on average pay for one month and a half from the 5th May 1923.
4. Mr. N. Subrahmanya Aiyar, Agricultural Demonstrator, Karur, leave on average pay for one month from first week of May.
5. Mr. V. Ramachandra Ayyar, Agricultural Demonstrator, Nandyal leave on average pay for 10 weeks from 25-4-1923.
6. Mr. N. Ramadoss, Manager, Samalketa, extension of leave on medical certificate on average pay for 17 days in continuation of the 2 months and 14 days leave granted in the first and second orders.
8. Mr. Jaganatha Rao, Agricultural Demonstrator, Atur, leave on average pay for one month from 7-5-1923.
9. Assistant Agricultural Demonstrator, Bhavani, leave on average pay for 20 days from 7-5-1923.
10. Mr. P. Abdulla, Assistant Agricultural Demonstrator, Calicut, extension of leave on average pay for one day.
11. Mr. K. Sitharamayya, Assistant Agricultural Demonstrator, Kumbakonam, extension of leave on average pay for one month.
12. Mr. G. Rangayya, Assistant Farm Manager, extension of leave on half average pay for 6 months and 16 days and on loan of pay for 6 months and 14 days.
13. Mr. V. Narasimhamurti, Assistant Farm Manager, Hagari, leave on average pay on medical certificate for one month from 1st May.
14. Mr. K. Krishna Rao, Assistant Farm Manager, Ohintaldavi, leave on average pay for 10 days from 7-5-1923.
15. Mr. T. Lakshminpathi Rao, I Circle extension of leave on average pay on medical certificate for 3 months.
16. Mr. S. Rajaratna Mudaliar, Sub Assistant in Mycology, leave on average pay for 10 days from 8-5-1923.
17. Mr. K. Ramiah, Assistant Economic Botanist, Aduturai Paddy Breeding Station leave on average pay for two months from or after the 16th April 1923.
18. Dr. R. V. Nossis, Government Agricultural Chemist, leave on average pay for four months and leave on half average pay for fifteen months and ten days in continuation with effect from or after 1st July 1923.
19. Mr. T. G. Anantaramayya, Assistant Farm Manager, leave on average pay for one month from 5-5-1923.
20. Mr. A. Muttayya Nattan, Agricultural Demonstrator, extension of leave for 27 days on medical certificate.
21. Mr. C. S. Gopalaswami Rao, Assistant in Mycology, leave on average pay for three months from or after 11th June 1923.

Resignation:—

1. Mr. K. Prasadha Rao, Assistant Farm Manager resigned from 15-5-1923.

Amendments and alterations.

To

The Secretary,

Madras Agricultural Students' Union.

Sir,

We give notice of the following amendments, alterations and additions to the Rules of the Union for discussion at the Business meeting in December next and request their publication in the Journal.

Rule 1. After Coimbatore add "Lawley Road and Code-word shall be 'Union'."

Rule 3-iv. To the words 'Union' add 'which shall be entitled The Madras Agriculturist, the official organ of the Madras Agricultural Students' Union.'

Rule 4. Delete the words 'and all members shall be life-members.'

Rule 5. For 'three classes' read 'one class.' Omit words 'Ordinary members, First class members and Benefactors,'

For 'a life' read 'an annual' for 'Rs. Five' read 'Rs. Three' and omit words 'Rs. Ten and Rs. Fifty respectively.'

Rule 6. 'of an annual subscription of one rupee in advance and the balance' read 'two-thirds the above rate'

Omit the words 'according to the class.....when leaving the college.'

Rule 8. For the 'Committee' read 'the Council.'

" 9. For 'life' read 'annual' for 'Rs. ten' read 'Rs. three.'

" 10. " '14 members' read '20 members'

" 7 do do 10 do.

" 11. " 7 do do 10 do.

" 12. " 7 do do 10 do.

" 13. " 5 do do 7 do.

"two other members" read "four other members."

After 'four other members' and 'one copy of the journal will be given free to Patrons, associates and members other than Honorary members

and an annual subscription of Rupees Four shall be collected from subscribers for less than five copies and of Rs. Three from those subscribing for five copies or more.

Rule 14. For the last word 'Committee' read 'resident members of the Union in a meeting which will be called by the Working Committee.'

Rule 16. After the words 'concerning the College' and before the words 'will be published' insert the words 'a quarterly' account of the work of the committee and the council including a statement of receipts and expenditure.'

Rule 17 (a). Omit 'and benefactors.' After the words 'after associates' and before 'and shall be utilised' insert 'and of a sinking fund at 5% on the total net receipts of the Union year.'

Add a note:—'The sinking fund account shall commence from the first quarter after the completion of any building sanctioned.'

Rule 17 (d). After the words 'banks' add 'and shall prepare and publish a draft budget in the issue of the journal of the month missing the one immediately preceding the College day, for discussion and sanction at the Business meeting.'

Rule 15 and 17 (e). To the words 'on the 31st May' add 'or the last day of the month missing the one preceding the college day.'

Rule 12. After the last word 'rest' add 'one third the members shall form the quorum.'

Transitory rule.—Members, benefactors, and associates admitted prior to 1-1-1923 will exercise all the rights and privileges under the old rules, but may be allowed to come under the new rules provided no concession is claimed for their paid-up subscriptions for the membership in whole or in part.

Yours sincerely,

Sd. T. V. Rajagopalacharya (proposer)

" K. T. Bhandary (seconder)

" V. Muthuswami Ayyar, P. Abhishekanatham, Y. Ramachandra Rao, M. U. Vellodi and S. Narayaniah (supporters).

Coimbatore, }
October 1922. }

(Reprinted from Vol. X No. 10, October 1922.)

The Rules of the Madras Agricultural Students' Union, Coimbatore.

Revised up to date.

1. *Name of the Association and its Head Quarters*:—The Association shall be called "The Madras Agricultural Students' Union," with head-quarters at the Agricultural College, Coimbatore.

2. *Objects*:—The objects of the Union shall be:—

- (i) to encourage an *esprit de corps* among its members.
- (ii) to exchange opinions and experiences in matters agricultural and to make a record of the same.
- (iii) to act, as far as possible, as a bureau for procuring employment to members of the Union.

(iv) to protect and promote the interests of members.

3. *Objects; how attained*:—The above objects shall be attained by:—

(i) The annual celebration of a College Day. The date for the celebration shall ordinarily be the 14th of July, which is the date on which the Coimbatore College was opened by His Excellency, the Governor of Madras, in 1909.

(ii) The holding of a Conference in continuation of the College Day at which papers will be read and discussions held on Agricultural subjects.

(iii) The maintenance of a corrected list of addresses of all members of the Union.

(iv) The conducting of a Journal as an organ of the Union.

4. *Membership; eligibility*:—The following shall be eligible for membership and all members shall be Life members.

(a) *Student Members*:—

- (i) The Students of the late Madras College of Agriculture, Saidapet.
- (ii) The past students of the Agricultural College, Coimbatore.
- (iii) The present students of the Agricultural College, Coimbatore.

(b) *Officer Members*:—

- (iv) The officers, past and present, of the Agricultural Department.

5. *Classes of Members and Subscription*:—There shall be three classes of members namely, *Ordinary Members*, *First class Members* and *Benefactors*, who shall pay a life subscription of Rs. Five, Rs. Ten, and Rs. Fifty respectively.

6. *Special subscription for students under training*:—Students under training will, in order to become members of the Union, pay an annual subscription of one Rupee in advance and the balance, according to the class of membership they choose to join, when leaving College.

7. *Patrons*:—Gentlemen who are interested in the welfare of the Union and contribute a sum of not less than Rs. 100 to the permanent Fund of the Union shall be styled Patrons.

8. *Honorary Members*:—Gentlemen interested in the welfare of the Union may be invited by the Committee to become Honorary Members. Donations will be thankfully received from them.

9. *Associates*:—Gentlemen interested in Agriculture may be admitted as Associates on payment of a Life Subscription of Rupees Ten.

10. *The Council.*—The affairs of the Union shall be managed by a Council consisting of a President who shall be the Principal ex-officio and four Vice-Presidents and 14 Members of whom one Vice-President and 7 members shall be resident members. From amongst the last, the General Secretary, the Treasurer and Editor shall be elected.

11. *Election of Council.*—All Members of Council shall be elected at the General meeting on the occasion of the College Day. The resident Vice-President and the 7 resident members of Council including the General Secretary, Editor and the Treasurer shall be elected by all the Members of the Union including student members. The non-resident members of the Council including the three students, the votes of non-resident members being also obtained.

12. *The Working Committee.*—The resident Vice-President and 7 resident members of the Council shall form a Working Committee with as many student members as there are classes, elected by the student members. The Working Committee so formed shall elect a Treasurer from the student members of the Committee and a Secretary and a Manager from amongst the rest.

13. *The Journal.*—The conduct of the Journal shall be in the hands of an Editorial Board of 5 members consisting of (1) Editor & Publisher (2) Sub-Editor (3) Manager and two other members.

14. *Vacancies.*—Vacancies occurring in the Committee in the interval may be filled by the other members of the Committee.

15. All proposals of amendments to the rules shall be communicated to the General Secretary before the 31st of May every year for being published in that issue of the Journal previous to the Annual General Meeting. All amendments should bear the name of the proposer and the seconder who should both be members of the Union.

16. The annual report of the College Day and the conference, the statement of the financial condition of the Union, the corrected list of addresses of the members of the Union and a list summary of all other matters of general interest concerning the College will be published in the Journal.

17. The finances of the Union shall consist of the Permanent Fund, College Day and Journal Accounts.

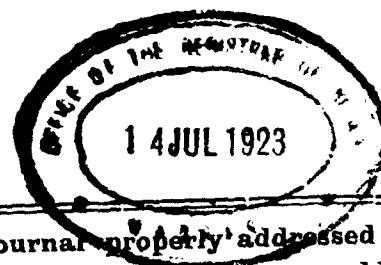
1. The Permanent Fund shall consist of donations from Honorary Members and the Life subscriptions from Patrons and Benefactors, First class and Ordinary members and Associates and shall be utilised for meeting charges of a permanent nature.

2. The College Day Fund shall consist of donations and entrance fees for sports collected on the occasion of the College Day and shall be devoted to meeting the charges consequent on the celebration of the College Day, the running of sports, the holding of the Conference and the meeting of the past and present students.

3. The Journal Fund shall consist of subscriptions for the journal which shall, as far as possible, be self-supporting.

4. The Working Committee of the Union shall arrange to invest the several funds of the Union in fixed or current deposits in suitable banks.

5. The Accounts of the Union shall be audited by two members of the Union who are not members of the Working Committee and the financial statement, together with the balance sheets under each fund as they stand on 31st May every year shall form an essential feature of the Annual Report, the auditors for the purpose being selected by the General Body.



Is the Journal properly addressed to you?
If not, send in your correct address.

THE JOURNAL OF The Madras Agricultural Students' Union.

Vol. XI.

June 1923.

No. 6.

Grape-vine Cultivation in Madura District.

C. RANGASAMI AYYANGAR.

Previous history. The grape-vine was first introduced some thirty years ago by a French Jesuit clergyman in villages near Kodaikanal Road and Dindigal in Madura District. At first this crop occupied only a very small area, but gradually the Christian ryots realised the value of this crop and extended its cultivation to lands which before the introduction of this crop were utilised for growing paddy, cholam and cumbu.

Soil. This crop flourishes on protected hill slopes, on red loams with an admixture of sand and gravel favouring free drainage.

Preparatory cultivation. The land is ploughed twice and the weeds are removed, after which the land is levelled. Pits 3' x 3' x 3' are dug, 12' apart in rows 15' distant. Channels are dug at regular intervals.

Planting. The vines are planted in two different ways:—

(1) Small bits of the vine 1' to 1½' long with two to three healthy buds in each are cut, and planted in small pots or in a loose bed of soil specially prepared for the purpose. Generally 240 to 250 vine cuttings are planted per acre. The cuttings are allowed to remain in the pots or beds for two months. Within this period the pits dug in the field are ¾ths filled with leaves which are allowed to decompose well. After two months the cuttings which are growing in the pots or beds are transplanted into pits. A small thin stake is also planted in each pit to serve as a prop. The pits are then watered, as necessity arises.

(2) Planting is done in another way too. Bamboo baskets or earthen vessels filled with good soil are placed under the vines from which the cuttings are to be taken. A portion of a branch of a healthy vine having three or four buds is layered in each such basket or earthen vessel, which is occasionally watered thereafter. When the pits are ready for planting the vine is cut very near the soil in the basket and the branch severed from the mother plant. The remaining portion which is buried in the soil is then transplanted with the soil into the square pits and treated as in the former case.

Eight months after planting, pandals 6'x6' are put up. For this purpose live Mullu kiluvai or Mullu murungai (*Erythrina indica*, L.) branches are used. Every year before pruning, the old and the unserviceable posts are replaced by new ones.

Manuring. During the first year no manure is applied except leaf mould which is supplied to the pits before planting.

2. In the second year and the years succeeding cattle manure is applied at the rate of 70 cart-loads per acre once a year.

3. Every year fish manure is applied at the rate of 6 bags per acre just a few days before the vines are pruned.

After cultivation. This crop requires copious irrigation. 5 irrigations per week in summer and two irrigations per week in winter are the rule. Care should be taken to keep the soil always free from

weeds and for this purpose the land is weeded once a month. It is always necessary that there should be proper drainage of the land and to secure this, careful and close personal supervision is quite essential.

Harvesting. There are two seasons for this crop.

Summer. The vines are pruned at the end of December and the crop harvested in April. Then the vines are allowed to rest for two months.

Winter. For winter cropping the vines are pruned at the end of June or the middle of July and the crop harvested in October or early in November. In the majority of cases the produce is given on contract and the owner rarely takes the trouble to dispose of it himself.

Cultivation charges.

First year—Preparatory cultivation.

Ploughing, levelling and digging of pits	Rs.	80	0	0
Pandals	„	280	0	0
Manuring (leaf-mould)	„	130	0	0

After-cultivation.

Manuring 70 cart-loads per acre cattle manure	„	70	0	0
Weeding	„	30	0	0
Irrigation	„	270	0	0

• Total „ 860 0 0

2nd year.

Renewing old and unserviceable posts	„	90	0	0
Manuring, weeding and irrigation	„	370	0	0
Pruning	„	40	0	0
Spraying (4 times)	„	100	0	0
Harvesting and carrying charges	„	130	0	0
	„	730	0	0

Average yield per vine 2 maunds @ Rs. 4

per maund „ 8 0 0

Average yield per acre of 500 maunds „ 2000 0 0

Expenses for 1st and 2nd year „ 1590 0 0

Gain per acre „ 410 0 0

3rd year.

Renewal of old sticks, pruning, manuring, weeding, irrigation, spraying, harvesting and carrying charges

Cost of produce per acre

Total expense do

Rs. 730 0 0

„ 2,000 0 0

„ 730 0 0

Gain per acre

„ 1,270 0 0

No. of vines per acre 250

No. of bunches per vine 80

do. acre 20,000

do. viss (if small) 4

do. „ (if big) 3

The yield of the vines increases proportionately with age.

Disease. For the first 5 or 6 years after the introduction of this crop, it was free from disease. Gradually "Mildew" began to appear and to spread from one garden to another. Owing to its attack there was a slow and steady decrease in the produce. In 1920, one of the ryots from Michaelpatti, came all the way to Coimbatore with a basket-ful of diseased bunches and requested the Mycologist to help him in checking this disease.

Accordingly spraying was taken up in the above village and after two years of free demonstration, the ryots of the above village understood the good effects of spraying and now almost all the vine growers in Madura District regularly spray their gardens to check the appearance of this disease.

Of late in some of the villages the ryots prune their vines at all times of the year. This kind of pruning not only affects the quality of the grapes, but also weakens the vines, resulting in the end in a complete failure of the crop itself.

It is quite necessary that vine growers should always bear in mind the above facts and prune their vines twice a year i. e., in the right season viz. December and June.

By doing so they can be sure of getting not only a better yield but also a better quality of grapes and at the same time ensure longer life to their vines.

Fodder Problem.*

K. UNNIKRIISHNA MENON.

Honoured Sir, Ladies and Gentlemen,

Pardon me if I presume to rise and speak to you on a question which has the outstanding merit of being the life study of our friend Mr. Pattagar and his family for generations past. It is an ever recurring problem,—one that presents manifold aspects for being dealt with. In my official duties, I was partly bound up with the cattle problem both from a feeding and a breeding point of view: of course more from the former aspect than from the latter. I chose this as my subject to-day as being more appropriate to the audience here and propose to place before you a few of my experiences.

Grazing areas have become more and more restricted with the increase of the area under cultivation. The present system of cultivation has been tending to be more and more intensive, and the labour requirements of the ryot, therefore, can hardly be met without improving the cattle both physically and numerically. The Coimbatore ryot bestows great care on cattle. He has his cattle kept under the same roof as it were as himself. Their feeding troughs and fodder stacks are always kept open to his view. He is accustomed to raising fodder crops and values them even more than his grain crops. This sort of attention is now getting more and more confined to his mhoite and cart bullocks as the scope of his work increases and his cattle-maintaining resources get curtailed. As circumstances stand at present, it is impossible to reduce the area under non-fodder-yielding industrial crops. This, with the insufficiency of pasture, calls for the adoption of stall feeding to a greater extent than heretofore. Stall feeding with exercise is found as good for the animals as feeding them on a pasture. The healthy condition of the Central Farm animals numbering 340 in all with but 30 acres of grazing area proves this statement to the hilt.

* Paper read at the Tirupur Cattle and Pony Show, 31st May 1923.

In addition to growing occasional fodder crops in any garden I would appeal to the ryots here to put down a permanent fodder area under Elephant grass, Guinea grass and Lucerne. The first two do not require much attention to grow. The Elephant grass yields over 150 cartloads of green fodder per acre in a year, while Guinea grass, which is a softer grass, yields over 120 cartloads. If the crops are manured well and given occasional irrigations with intercultivation after each cutting, they will be found to stand well in the same field for over three years. As the stubbles grow big, they can be quartered and given a heavy dose of manure. This will put fresh vigour into the crop, which will maintain a vigorous growth for another three years. I have got ten-year old Guinea grass areas doing well on the Central Farm.

Lucerne, however, requires a little more attention on the part of the grower, but yields a much richer fodder. Small daily rations of it per animal will enable a ryot to do away with more costly concentrated feed, thus making the maintenance of the herd cheaper.

There is a good deal of waste when the ryots plough in or throw away the thinnings of a young cholam crop because animals get poisoned when fed on them. It has been proved that such plants, when made into silage, lose their poisonous properties and can be preserved for a long time and kept in a state as good as green fodder. For making silage of them the thinnings have to be exposed to the sun for a day and placed well packed in a pit dug in the ground. After putting the stuff in, the pit must be closed tight in order to exclude rain water and air.

In some parts, I have seen ryots feeding the cattle especially the cart bullocks on a journey with unbroken cotton seed. It is all a waste in my opinion and I would suggest to them to crush the dry feed in an ordinary mortar and pestle.

Before I close, I wish to speak a word about the milk herd also. The demand for milk is ever on the increase. The increasing number of coffee restaurants and the popularity of the beverage are evidences in proof of my statement and it is high time for the ryot as the producer of food for the millions to think of increasing

his output of milk. Very little is being done in this direction at present. Neither the religion of the ryot nor his sentiment sanctions his present neglect of the cow. He seems to look upon the cow as but a machine to produce his future work animals and also to give him his store of manure. The cow stands for much more than that. She should be fed and looked after well if she is to give him good calves that will make strong work cattle. Moreover her maintenance can be made a profitable business if some trouble is taken to increase her milk flow by judicious feeding. The cow requires a certain amount of concentrated food and green stuff mixed with dry fodder to maintain her yielding capacity, and our cows are generally poor yielders, because we have been for generations feeding them indifferently on materials that are too poor to be fed even to work-bullocks. I, therefore, appeal to you one and all to seek advice on this subject from the Deputy Director of Agriculture, Livestock, who is ever working at the improvement of the milking and the working capacity of the animals.

I may further add, by the way, that the scope of business in milk and other dairy products can be considerably expanded, if the producers aim at transporting them to distant places. Very few people are now aware of the great demand there is for unadulterated butter from various parts of the presidency. If you charge the full price of milk and the manufacturing charges with a small profit on butter alone, the curd and the butter milk will be a direct gain in the business. It will not be very difficult to realise anything near Rs. 2 for a pound of good butter. The business can very well be organised and conducted on a co-operative basis under the guidance of a Co-operative Society.

I thank the Committee for the opportunity they have given me of speaking to the ryots direct on a subject which is dear to them as well as to me and I should here acknowledge my obligation to Mr. C. Narayana Ayyar to whose kind suggestion the present paper on the fodder problem is due.

And finally, I thank you, ladies and gentlemen, for the kind and patient hearing you have been good enough to give me.

Extracts.

The Song of the Plough.

It was I who raised from famine all the hordes and tribes of man;
I have never ceased nor faltered since the tilth of fields began,
Since the first poor crooked stick was drawn across the wondering
earth

While upon the man who used it all his tribesmen grazed in mirth—
But the wild seeds sprang in blossom more abundant than before,
And the fool who toiled all summer had the wise man's winter store!
It was I who built Chaldea and the cities on the plain;
It was Greece and Rome and Carthage and the opulence of Spain.
When their courtiers walked in scarlet and their queens wore

chains of gold
And forgot 'twas I that made them, growing godless folk and bold,
I went over them in judgment and again my cornfields stood
Where their empty courts bowed homage in obsequious multitude...
For the nation that forgets me, in that hour her doom is sealed
By a judgment as from heaven that can never be repealed.

Harry Kemp. [*Great Thoughts*, March '23.]

Prospects of Agricultural Students in Scotland. The Agricultural students and their prospects was the subject of an interesting letter published last week. Naturally, men have asked the question—What is to be come of all these hundreds of agricultural students who pass through our colleges every year? All of them cannot become lecturers, or instructresses, and not many of them appear to be farmers or to have come from farm houses. The likelihood is that some, if not a majority of them, will eventually drift into agricultural life-work at present. Should agricultural life in one form or other prove to be the sphere of labour of a majority of these young people much will be gained. In the past it can hardly be said to have been so. The plums of the profession overseas have in not a few cases gone to students of the Scottish

colleges. That is a tribute to the thoroughness of the tuition given here; but the plums are relatively few, and there must be many disappointments. Still, the colleges are doing splendid work when they impart instruction to the future farmers and dairymaids of the country. As they do that they increasingly fulfil the main end of their being, and justify their existence. More power to them!—R. N.

Scottish Farmer. February 17—1923, page 197.
V. M. A.

*Agricultural Development of Czecho-Slovakia.** This is a republic which evolved out of the world war in 1918 and consists of the Provinces of Bohemia, Moravia, Silesia, Slovakia and Carpathia, which all formed part of the old Austria-Hungary. It covers an area little known before the world war. Its evolution into a republic is said to be due to the fact of the mighty "come back" latent in the land of the original agricultural, political and religious liberty that has been quietly seeping into the consciousness of the inhabitants. Her agricultural leadership has been the very frame work of her aggressiveness, the backbone of which has been her beet sugar industry. John R. Mott who has travelled round the earth 5 times, says that there is no land of Europe where nearly every phase of life is so heartening as that of Czecho-Slovakia and that she will be the most important exporting factor in sugar circles for at least a decade. The Slavs have a mental bent, an adaptable international spirit and a tremendous selling point. It is worthwhile to consider the whole system of agricultural education, now in vogue, in this republic which is said to outstrip every other land in Europe in the location of schools per square mile. The illiterates in the country amount to only 2.1%. Education is compulsory from the age of 6 to 12 and continuation classes are open to children from 12 to 15 years of age. The educational budget in 1922 was £ 35,000,000.

The following ideals are actually pursued in every country School.

- (i) A study of the mother tongue, teaching domestic history and civics,
- (ii) Practical sciences, especially those needed in industry and agriculture, with practical work in workshops, laboratories and fields,
- (iii) Manual work and domestic science,

(iv) In addition to common schools, there are schools for specialties.

There are 4 universities, 4 higher technical schools, 1 higher Veterinary school, 1 higher agricultural school, 1 school of mines and 1 sugar institute. There are schools for forestry, fish-culture, pomology, viticulture, dairying, flax, hops, bees, sugar beets, etc. The first farmer's school was founded in 1850. There are now 86 schools. Agricultural instruction is also given in many primary schools. Children are taught very early the rudiments of the soil, what can be raised, and how treated, keeping the matter of diversified crop as an important aim. In the higher agricultural school the course is 2 years and in the university, 4 years. In secondary agricultural schools, pupils of 14 years of age who have finished higher elementary course are admitted. There are now 166 such schools. The records for 1921 show that there were 161,366 pupils attending industrial and agricultural schools, a good proportion of whom were studying chemistry and practical sciences.

If this republic is now a land of power, push and plenty, it is said to be due to the system of education prevailing in the country; and this forms the background of her rise as an exporting nation, of which sugar has been foremost in the past 4 years. The moral power and confidence of this country will be seen from the fact that when she floated a 50,000,000 dollar bond, it was gobbled up in 24 hours. It was the first to pay interest on the American war debt. The founders of the Government have done what so many other Governments failed to do. They are instituting reforms along agrarian lines that will give the whole agricultural line economic stability. Prague is completing, for instance,

the largest scientific sugar laboratory on the European continent, to which are attached farms, plant breeding stations, pest breeding places and what not, all to subdue the soil.

The republic seems determined to keep right up-to date with every agricultural advance and every scientific improvement that appears on the horizon and she hopes to compete the world's market.—Extracted from *Louisiana Planter*, April 21—1923.

M. R. R.

[From a perusal of the above account, we are sure, the readers will not fail to be struck as to how far backward we in Madras are as regards many of the items of progress this State—which was deeply involved in the world war and which has just emerged from the smouldering ruins of that conflagration—has shown. After years of hesitation, only two Agricultural Middle Schools have been started and we are still inclined to be sceptical as to their usefulness. In spite of the fact that the percentage of literates in our country is disgracefully low, and notwithstanding the general conviction that the ultimate cure to various social and economic evils lies in the spread of education among the masses, we are no nearer to the introduction of compulsory primary education. In fact, even independent bodies like District Boards and Municipalities are still hesitating to introduce such a measure even as an experiment. We trust, in the near future, our reformed councils will take up this most important question and make it an accomplished fact.

[Editor.],

Gleanings.

Advice to Engine owners. Do not forget that oil is cheaper than machinery and that the use of a spanner saves the bill for repairs.

Jour. of Agri. Dep., S. Australia, March 1923.

Insects and senses. Insects possibly have less sense than the higher animals, but probably more senses.

Nov. Zool. XXX 1923 p. 158. Y. R. R.

Insect Census. According to a very recent calculation made as to the number of known species of living insects, it is computed that there are in the world about 470,000, which fall into 327 families and 33 orders. (According to the old fashioned view there are only 8 orders of insects. e. g., Lepidoptera, Coleoptera etc.) [The number of the species may easily be trebled when the insect fauna is more thoroughly worked out.]

Entom. News., April 1923. Y. R. R.

Abnormalities in Plantains. Mr. Subrahmanya Kander of Velure (Salem Dt.) gives the following cases of abnormal formation in Plantains:—

1. In a field, he noticed quite recently an instance of a sucker three months old bunching. The plant in question bore a tiny bunch which consisted of only a single hand made up of five fruits.

2. Last year he further observed at Tirumalanamasamudram (near Velur, Salem District) a plantain tree producing two flower-buds from the same stalk, a phenomenon very unusual in the Plantain. It was expected to produce two bunches and was carefully looked after. It was specially manured and securely propped with bamboos, but unfortunately became a victim to a heavy gale in Chitrai (April).

He records, however, that he had heard of a report of a similar instance—actually seen by one of his friends—of two bunches being borne by a plantain tree near Thottiyam (Trichinopoly District).

On the eradication of certain weeds and specially Lavalava (Cyperus rotundus). "In this research there has been much progress. We have now proved that the plant can and does propagate itself

from seeds as well as tubers. Tubers germinate best when planted 9 to 18 inches below the surface. Below 2 feet there is little germination but some extraordinary cases were found of individual tubers being able to send shoots to the surface from a depth of 3 feet. Constant removal of the aerial parts indicates that in from 7 to 12 weeks the tuber producing these shoots is exhausted and dies. Exposure to the sun for ten days in May has also been proved to be fatal to the tuber. Spraying with chemicals has not yet given definite results and is being continued."

Annual Rept. Bombay Dept. of Agre. 1921—22, p. 95.

T. S. V.

Agricultural Research. Agriculture is subject to special hazards resulting from weather and climatic conditions, animal and plant diseases, and insect pests. These hazards reduce farming to a gigantic gamble. But methods of production can be adapted to the end of reducing losses from climatic and weather conditions to a minimum. Plant and animal diseases and insect pests can to a certain degree be controlled, but the means and method of reducing or controlling these hazards cannot be worked out on the farm by the individual farmer. The investment, even of the largest, is not sufficient to permit of the organization necessary for the study and formulation of these means and methods. A programme of agricultural development must, therefore, include provisions for an expanded and co-ordinated programme of practical and scientific investigation through State and National departments of Agriculture, and through Agricultural colleges and universities, directed toward reducing the hazards of climatic and weather conditions, and of plant and animal diseases and insect pests.—Report of the Congressional Joint Commission of Agricultural Inquiry, U. S. A. December, 1921.

Agricultural Gazette of N. S. W. Nov. 1, 1922.

K. U. M.

Is Research a re-search? We believe the organisation of research under the aegis of a responsible body of scientific advisors is a valuable national asset. Will such organisation interfere with the individual freedom of the research worker? Is there a danger that the extension of the team-principle and the laying down by a higher authority of precise research programmes may stifle what originality the worker may possess? The answer is, we believe, that there are men who work best in a team and men who prefer to work alone, and that there is ample room for both types. There are periods both in war and in peace when stocktaking of knowledge is essential if we are again to make advance into the unknown. The present is one of those times of national stocktaking in medical science. The very fundamentals of many departments of medical science require revision. A doyen of the chemical world recently referred to certain developments and proposals in biological chemistry as being simply re-search, with the accent and insistence on the first syllable.

The statement is both true and false. Simple reconstruction must inevitably form an integral part of modern research. Possibly the biological sciences, on which advance in scientific medicine mainly hangs, contain a greater proportion of inexact, un-coordinated, and incomplete statements than the so-called exact physical sciences. Every advance in the latter reacts on biology, necessitating re-search in some form or other. Co-ordinated investigations by teams is necessary in peace as in war, and the fruit will duly appear. The scientific investigation of deficiency diseases—a war-time necessity—has developed into something like a science of its own. The organised investigations on anaerobic bacteria—another war-time necessity—which was perhaps a very typical example of a re-search, has already borne abundant fruit in recent exact studies of such diseases as botulism and braxy.

WHAT OF THE NIGHT? THE MORNING COMETH.

J. C. G. L. Nature 31, III '23.

Fleas and Plague in India. It was believed sometime ago that the prevalent rat flea all over India was *Xenopsylla cheopis*. Rothschild, however, afterwards found that under that identification three very closely allied species—*X. cheopis*, *X. astia* and *X. brasiliensis*—had been confused, and Hirst pointed out that the distribution of plague in India and Ceylon corresponded well with the hypothesis that the real *X. cheopis* was alone an effective transmitter of the disease. He now reports (Indian Journal of Medical Research, Vol. X, 1923, p. 789) a full series of experiments confirming his earlier work, and showing that *X. astia*, the prevalent rat flea in Madras, will carry plague from one animal to another only with much more difficulty than *X. cheopis*, the rat flea of Bombay. Details of plague epidemics in Colombo, where plague has never become widely spread and where the fleas are mostly *X. astia*, with a few *X. cheopis*, bear out his thesis in a striking manner. It seems as if a considerable advance has been made in the epidemiology of plague which illustrates the fundamental importance of systematic zoology in these problems.

Nature, dated March 3, 1923.

"Cure-alls" for Live-Stock. It is remarkable how gullible many persons are when approached by agents or canvassers of some preparation reputed to be a cure for almost any ill that animal flesh may be heir to. So called "cure-alls" are constantly on the market, and are too often found on the shelf of the farmer, who, unfortunately, looks upon the purchase as a guarantee or insurance against any of the troubles to which his stock may become afflicted, and in time of trouble relies on such preparations—often to his future sorrow. Numerous cases have come under the Department's notice of very serious loss having occurred through too great reliance being placed upon such preparations, and it is hoped that this note may serve as a warning to stockowners to look with suspicion on any preparation reputed by the canvassers to be a cure for this, that, and the other ill. A little thought should brand any such assertion as ridiculous, seeing that each trouble has its own peculiarity, and therefore its own particular treatment.

New Zealand Journal of Agriculture, March 23.

The Dairy Cow's Nervous system. Another quality we are looking for in a dairy cow is a strong, highly developed nervous system, as such an animal is able to perform more labour beyond what would be expected from appearances. Such a cow will have a large, intelligent eye and a broad forehead, showing well developed brains controlling the nerves, and a strong, straight spinal cord. The spinal cord runs through the vertebrae from the head to the tail, and sends out from each vertebra branches that connect with the various organs of the body. Now, when the vertebrae are well apart and the back is straight, it shows that the animal has a strong spinal cord and is an indication of strong nerves.—C. Van Foreest, Journal Dept. of Agriculture, South Africa.

K. U. M.

Molasses mixture used in combating boll weevil. The use of a mixture of calcium arsenate, water and molasses has been proposed for the control of the boll weevil in several districts of the cotton belt. A press Bulletin of the Georgia Experiment Station, Department of Agronomy, in speaking of the method, states that there has not been very much work done with the molasses mixture and method. In some sections farmers have been successful with late applications, but generally speaking the Experiment Stations have not succeeded with this method except when applied early. The exact proportions used in the mixture seem to vary, a good mixture being approximately one gallon of water, one gallon of molasses, and one pound of calcium arsenate. The mixture is prepared by mixing the calcium arsenate with the water first and then adding the molasses. This amount will cover about two acres. The mixture is applied by dropping a few drops from a long-neck bottle with a hole in the cork into the bud of the cotton plants. These applications should be made just before the first squares appear. Repeat the application five or six times at intervals of about one week. If rain washes the mixture off, the application should be repeated at once. The advantage claimed for this method is the ease with which it can be applied. This brings us a new use of molasses and one that is meeting with more or less favor in sections of the cotton belt.

T. S. V.

Current Events.

The Tirupur Cattle and Pony Show and Exhibition: The Fourteenth Cattle and Pony Show and Industrial and Agricultural Exhibition was opened at 11 A. M. on Thursday, the 31st May 1923. Sir Charles Todhunter, the Hon'ble Finance Member, in opening the show, enlarged upon the importance of holding such Shows and Exhibitions. He said that the holding of Shows and Exhibitions was a means of education to the ryots in cattle breeding, practical farming and scientific agriculture. Cattle breeding in Coimbatore District was of a higher standard than in other districts and it was the duty of all to make the best use of their cattle by improving the breeds on up-to-date lines; for, the improvement of agriculture, which was the main-stay of the people, depended very much on the livestock. Mr. K. Unnikrishna Menon then read a paper on the "Fodder problem in South India" and exhibited specimens of Guinea grass and Elephant grass which he said were very profitably cultivated in the Central Farm, Coimbatore. He also showed specimens of young cholam preserved in silo pits which he said were eagerly devoured by cattle. His paper is printed elsewhere in full. Among those present were Lady Todhunter, Mr. Braidwood,—the Collector and President of the Association, Mr. R. D. Anstead, the Director of Agriculture, Mr. C. Narayana Ayyar, Deputy Director of Agriculture, Mr. Littlewood D. D. Livestock, Mr. Ware, Supt. Civil Veter. Department, Mr. S. Sundararaman, the Government Mycologist and the Offg. Government Entomologist. The show was, on the whole, rather poor this year and many of the stalls were empty and one would wish that the Agricultural Association would bestir itself to greater effort in future years and try to attract more exhibits. The Agricultural Department as usual put up a fairly good show wherein agricultural implements, improved seeds, improved manure pits and pictures and specimens of pests and diseases of crops were exhibited. At night on the 31st May and 1st June 1923, magic lantern slides on various Agricultural subjects such as improved methods of agri-

culture and remedies for pests and diseases were shown to a large and interested audience. The lantern show was much enlivened by the comic performances of one of the senior Artists of the Agricultural College. In the Fisheries section the exhibition of fish meal, which was reported to be very nutritive as food for cattle, horses and poultry, was particularly noteworthy. In the cattle section, the cattle exhibited by the Pattagar of Palayakottah, the famous breeder of Kangayam Cattle, were as usual very conspicuous. On the 2nd inst. at 10 in the morning, Sir Charles Todhunter, gave away the prizes, after which he delivered a short speech in which he expatiated on the importance of improving the breeds of cattle in this country. He condemned the usual system of maintaining thousands of miserable half-starved creatures which had to find what living they could on communal grazing grounds and which were left to themselves, without check of any sort, to breed indiscriminately. The function came to an end by the proposal of thanks by Mr. Braidwood, to all responsible for making the cattle show and exhibition a success.

Presentation of Diplomas—Hebbal Agricultural School, Bangalore. On Wednesday the 6th inst. at 5-30 P. M. there was a large gathering consisting of Officers and staff of the Mysore Agricultural Department, and gentlemen interested in Agriculture. Dr. Michael Forster, Director, Tata Research Institute, presided. After the distribution of Diplomas and prizes, on which occasion the President shook hands with the successful candidates, he delivered a speech, in which he dilated upon the importance of Scientific Agriculture.

Scientific Agriculture, he said, was amongst the noblest of occupations. It was an industry which aimed at providing the maximum of wholesome nourishment to mankind so as to enable it to accomplish the necessary tasks of civilization. Moreover, for no other industry could it be claimed that its complete and efficient practice involved almost every branch of science. It was to supply the elements of a knowledge of these things that the Hebbal School of Agriculture was established and one of its great advantages was to be found in the circumstance that there the student

was confronted with the experimental method and was thus brought face to face with facts and indeed for the first time, in his experience learnt what was meant by a fact and gained some insight into the process of making knowledge.

The experimental method had the further advantage of inculcating pride in craftsmanship. It taught the joy and the dignity of being able to use one's hands and it established the virtue of self-reliance. He further said that Agriculture was the one industry of which it might be said with confidence that it would endure so long as the human race survived. Looking ahead some two or three thousand years when all the coal and petroleum in the world would have been consumed, the human race would probably revert to the condition of an agricultural community. Speaking of the utility of the Hebbal School, he said that it should be the ambition of every land-holder to improve his property and to enable his son to hand it on to his descendants in a better and more fruitful condition than that in which it came. Thus he could turn his personal advantages to the general welfare of the State.

The Day's proceedings terminated with the singing of the Mysore National Anthem followed by three cheers to H. H. the Maharaja of Mysore.

Government Agricultural Middle School, Taliparamba. The first "School Day" of the above institution was celebrated on the 1st June 1923 with great *eclat* under the presidency of W. B. Brierly, Esq., Principal, Government College, Tellichery.

The programme of the day included several items, the chief of which was Sports including the following events:—Cross country race, 100 yards race, obstacle race, quarter mile race, high jump, long jump, blind man's buff, throwing the cricket ball and the tug of war. The guests as they arrived were first entertained with light refreshments and then conducted to a spacious and beautifully decorated pandal put up in the court-yard in front of the students' quarters. The President was, on arrival, welcomed at the entrance and garlanded by the Head Master who took him to the

ground where the sports were being held. What attracted the attention of the spectators most was the lively enthusiasm displayed by the students in competing for the prizes in every one of the various events; and the sustained energy and dogged determination exhibited by every one of the competitors was really remarkable.

The sports being over, the President took his seat on a raised dais in the pandal in the midst of a large audience. The Head Master, then, in a few well chosen words gave a brief history of the founding of the institution as well as a short account of the work turned out during the year under review. He was glad to have been able to present a clean bill of health in regard to all students so far. The prizes which consisted of a choice selection of a variety of articles in daily use were then distributed by the President and the announcement was then made of the award of the championship medal of the year to Kunhappa Nambiar of Kalliat house, who won the first prize in five of the events.

Thereupon the President in the course of a very interesting speech emphasised the importance of agricultural education. He drew sharp lines of distinction between a literary and an industrial education as also between the kind of education that was being imparted in England and other European countries and the system of education that was being adopted in India. He very much deplored the fact that everybody aspired for literary eminence irrespective of a question of their aptitude for it or of their satisfying certain conditions needed to make literary education a success. He likewise regretted the needless, nay injurious, persistence of many in the said directions, whereby in the long run most of them had to acknowledge their failure and were driven to the necessity of entering life as clerks with a bare hand to mouth living. The President's speech, in fine, was illuminating and instructive and very much suited to the occasion and the teachers, the students and the guardians all alike owe a deep debt of gratitude to the President for his valuable advice calculated to help the up-lift of the students in general and consequently of their homes and the country at large.

Short scenes from the popular Hindu Drama "Harischandra charitam" were then enacted by the students and were followed in quick succession by other items of a variety entertainment such as English recitations and a Malayalam farce.

The celebration of the School Day was a distinct success and the day's proceedings were brought to a happy close at about 9-30 p. m. with the proposal of very hearty cheers to the President and the singing of the National Anthem.

M. K. Nambiar.

Students' Corner.

Reopening of the College. The College was reopened on Friday the 16th June; and B. Sc., II, B. Sc., III, and short course II classes have been formed, but the full complement will be made up when the selections for the short course I and the B. Sc., I, are completed. The date fixed up for the celebration of the College Day this year viz., July 14th, is not very happy so far as the students are concerned, as it does not give many of them sufficient time to prepare themselves to take part in the College Day entertainments. We hope the newly joined students will not mind the inconvenience so caused.

Selections for Certificate course and B. Sc., classes 1923. The Principal, Mr. Parnell, examined the applicants for the short course, on June 1st at Coimbatore and also visited Anakapalle and Bellary in this connection for the selection of students from the Northern Districts. Under a recent G. O. admission for the short course is, we understand, confined to S. S. L. C. eligibles. We also hear that applications for admission into the short course will be received till 30th June in view of the lateness in the publication of S. S. L. C. results.

Applicants for admission to the B. Sc., Ag., course were examined by a committee formed of the Minister for Development—Rai Bahadur Sir K. Venkata Reddi Nayudu Garu,—the Director of Agriculture and the Principal, on Tuesday, the 19th June, at Coimbatore. They proceeded to Madras on the 20th and to Samalkota on the 22nd in connection with the selection of students from the central and the northern districts.

Estate News.

Distinguished visitors.—M. R. Ry., C. V. Narasimha Raju Garu, B. A., B. L., M. L. C., of Vizagapatam, visited the Agricultural College and Research Institute and the Central Farm on the 31st May 1923.

Rao Bahadur Dr. C. Natesa Mudaliar, M. L. C., alighted at Coimbatore on his way back from Ootacamund on the 2nd instant and stayed two days on the Estate with his brother Mr. C. Tadulinga Mudaliar. He visited the College and Research Institute on the 4th.

The Hon'ble Sir K. Venkata Reddi Nayudu, our Development Minister—visited Coimbatore on the 19th instant for the selection of the B. Sc., Ag., students when the Director of Agriculture, Mr. R. D. Anstead, was also present.

Mr. P. H. Rama Reddi, M. A., B. Sc., arrived at Coimbatore on the 17th and took over charge of his duties as Professor of Agriculture, and Superintendent, Central Farm, on the 18th.

Messrs. G. R. Hilson, and Rao Sahib M. R. Ramaswami Sivan returned to Coimbatore from Hill recess by about the middle of the month. Dr. R. V. Norris went on Hill recess to Ootacamund from June 1st.

Mr. C. M. Ranga Reddi B. Sc. (Edin) L. Ag. (Coi) who returned recently from his studies in Scotland visited Coimbatore and stayed 2 days on the Estate.

Prospective visitors to Coimbatore for the College Day and Conference may be interested in learning that entrances to the Estate from

the Lawley Road into Keess Road (near Farm Buildings) and at the end of Robinson Road (Road to Coimbatore) have now been provided with gates, the former will be shut at 6 P. M. but will be opened by a watchman when needed, and the latter will remain closed from 10 P. M. to 6 A. M.

The office of the Deputy Director of Agriculture for Live Stock has now been transferred to the Agricultural College and Research Institute, Coimbatore.

Departmental News.

Nominations to Indian Central Cotton Committee.

Mr. B. C. Burt, B. Sc., M. B. E., is appointed Secretary of the Indian Central Cotton Committee constituted under Section 4 of the Indian Cotton Cess Act, 1923 (XIV of 1923.)

The following persons have been duly nominated as members of the Indian Central Cotton Committee by the Govt. of Madras.

Mr. G. R. Hilson, B. Sc., (Edin), Cotton Specialist, Coimbatore, representative of the Agricultural Department of the Government of Madras.

Mr. F. H. Goffe, of the Bombay Company Ltd, Madras, representative of the cotton manufacturing or cotton ginning industry.

M. R. Ry., R. Appaswamy Nayudu Garu, representing the cotton growing industry in Madras.

M. R. Ry., B. P. Sessa Reddi Garu, of Bethancherla, Kurnool District, representing the cotton growing industry in Madras.

Fort St. George Gazette, Dated 5th June 1923.

Beri-beri Investigation.

Beri-beri is a serious disease of mankind which has come into great prominence of late—chiefly in some of the great rice-growing tracts of India. In the Madras Presidency, it has been found in greatest evidence in the Kistna and Guntur Districts, and the general

opinion held as to its nature is that it is one of the deficiency diseases caused by the loss of a certain important constituent—probably of the nature of a vitamin—of the nutritious seed-coat of the rice grain which is removed by the high polishing the grains are subjected to in the rice-mills. The affected districts of Guntur and Kistna also happen to have the largest number of rice-mills in the Presidency.

The investigation of this disease has been undertaken by Col. McCarrison, I. M. S., at the Pasteur Institute, Coonoor and we understand Dr. R. V. Norris, Government Agricultural Chemist, is collaborating with him by an investigation on the chemical side. We hear, highly interesting results have already been obtained. We are sorry, however, to notice that this is one of the subjects on which the Inchcape axe has descended and that this work is to be stopped soon on grounds of retrenchment—a very sorry commentary on the degree of importance which is attached to research work in general in this country—and a circumstance which is extremely regrettable indeed in the case of a piece of original research concerning the welfare of thousands of suffering humanity.

Activities of the Union.

At a meeting held towards the end of May, the Working Committee elected the various committees for Games, Reception, Entertainment and Subscription in connection with the celebration of the ensuing College Day and Conference. Mr. H. Shiva Rao is to be the Captain of the volunteers. At another meeting held on the 13th June, allotments for the various items of expenditure in connection with the College Day were made and a rough programme for the conference was arranged. We are glad to announce that a fairly large number of papers have been promised for the conference.

Departmental Notes.

Appointment:—

1. Mr. K. S. Ramana Rai, Lower Subordinate IV Grade, to officiate as Upper Subordinate V Grade, *vice* Mr. K. Unnikrishna Menon officiating in the Madras Agricultural Service, with effect from 1-5-1923.

2. Mr. T. G. Anantarama Ayyar, Lower Subordinate IV Grade, to officiate as Upper Subordinate V Grade *vice* Mr. C. V. Sessa Acharya officiating in the Madras Agricultural Service with effect from 1-5-1923.

3. Mr. M. Chinnaaswami Noyadu, Lower Subordinate IV Grade, to officiate as Upper Subordinate V Grade, *vice* Mr. T. Budhavidheya Rao Nayudu officiating in the Madras Agricultural Service with effect from 1-5-1923.

4. Mr. V. Achyutan Pantulu, Assistant Agricultural Demonstrator, transfer from III Circle to II Circle.

Leave:—

1. Rai Bahadur K. Ranga Achariyar, Government Lecturing Botanist, a further extension of leave on average pay on medical certificate for four months in continuation of the leave already granted.

2. Mr. V. N. Viswanatha Rao, Deputy Collector and Statistical Assistant to the Director of Agriculture, leave on average pay for one month from 18-6-1923.

3. Mr. J. Srinivasa Ayyar, Assistant in Mycology, leave on average pay for 8 days from the 15th June with permission to avail the holidays on the 23rd and 24th.

4. Mr. T. K. Balaji Rao, Assistant in Economic Botany, Aduturai, leave on average pay for three weeks from 25-6-1923.

5. Mr. K. L. Ramakrishna Rao, Assistant on Cotton Work leave on average pay for one month from the 3rd June 1923.

6. Mr. T. V. Narayana Rao, Farm Office Manager, Central Farm, extension of leave on average pay for 13 days.

7. Mr. L. S. Natesa Ayyar, Farm Manager, Central Farm, leave on average pay for two months from or after 20-6-1923.

8. Mr. A. Chinnathambi Pillai, Farm Manager, leave on average pay from 3-5-1923 to 23-5-1923 (both days inclusive) in continuation of the leave already granted to him by the Sierra Leone Government.

9. Mr. T. S. Venkataramiyyar, Agricultural Demonstrator, Kadambur, leave on average pay from 10th to 24th June 1923 (both days inclusive.)

10. Mr. Bhairya Siva Rao, Agricultural Demonstrator, IV Circle, extension of leave for one month.

11. Mr. T. R. Venkaswami Rao, Agricultural Demonstrator, Tiruvalur, leave on average pay for one month from 15-5-1923.

12. Mr. A. Chidambaram Pillai, Farm Manager, Paddy Breeding Station, leave on average pay from 11th June 1923 to 20th June 1923 (both days inclusive).

13. Mr. C. V. Sankaranarayanayyar, Sub Assistant in Economic Botany, leave on average pay for 20 days from 4th June 1923.

14. Mr. G. R. Venkatachalapathi Raju, Asst. Agricultural Demonstrator, IV Circle, leave on average pay for four months and half average pay for two months in continuation thereof from the date of relief.

15. Mr. V. Achyutam Pantulu, Assistant Agricultural Demonstrator, Nandyal, leave on average pay for 12 days from 8th May 1923.

16. Mr. A. S. Nithyakalyana Reddi, Assistant Farm Manager, Palur, leave on average pay for one month from 10th June 1923.

17. Mr. R. Subrahmanya Ayyar, Assistant Agricultural Demonstrator, Tanjore, leave on average pay for 12 days from 20th May 1923.

18. Mr. H. Narahari Rao, Assistant Agricultural Demonstrator, Bhavani, leave on average pay for 20 days from 13th June 1923.

19. Mr. N. Narayana Ayyar, Assistant Farm Manager, Central Farm extension of leave on average pay for one week.

20. Mr. M. Singara Boyan, Head Artist to the Government Lecturing Botanist leave on average pay for 20 days from 4th June 1923.

21. Mr. J. Sundara Rao Bhutgoswami Artist, Govt. Entomologist's office, an extension of leave of one month and six days.

22. Mr. P. H. Rama Reddi, Deputy Director of Agriculture, an extension of leave on average pay for four weeks in continuation of the leave already granted to him.

Editorial Notes.

Birthday Honours—Sir K. V. Reddi Nayudu.

On behalf of our Union and on behalf of our department, we beg to convey our heartfelt congratulations to the Hon'ble Rai Bahadur Sir K. Venkata Reddi Nayudu, Kt.—our Development Minister—on the richly deserved honour bestowed on him by His Majesty the King Emperor on the occasion of His Majesty's Birthday. Our department will always be grateful to the Minister for the paternal care with which he has been fostering it and will never forget the zeal with which he has been for the last three years protecting and defending it from unfair and uncharitable criticism both

within the Council and outside. Every body interested in the Agricultural Department will, we believe, recognise that it is due to his personal interest and exertions and to his attitude of encouragement and sympathy—so necessary for progress in scientific work—that it has been fairly generously treated during the Budget debates in the Council. We are afraid, now that the term of his office is drawing near, our department may perhaps be deprived of his kind care in future, but we are hopeful that, into whatever sphere of work he may be drafted in coming years, he will continue to have a warm corner in his heart for this department.

We are likewise proud that another distinguished son of South India, likewise connected with agriculture—the member in charge of the Portfolio of Agriculture in the Viceroy's Executive Council—the Hon'ble Rao Bahadur Sir B. N. Sarma, K. C. S. I.—is similarly honoured and we tender our heartfelt congratulations to him.

M. R. Ry., Rai Sahib K. Nageswara Rao Pantulu Garu, B. A., Under-Secretary for Development is the recipient of the title of Rao Bahadur and we convey to him our sincere felicitations. We are sure this is in recognition of his steady and conscientious work in the agricultural and co-operative departments.

Rao Sahib Abboyee Nayudu—An Enthusiastic Agriculturist.

This honours list also includes Mr. Abboyee Nayudu of Pulla, Kistna District, on whom is bestowed the title of Rao Sahib—an instance where a genuine and practical Agriculturist, who has often given enthusiastic support to the activities of the agricultural department in his district, has been honoured by Government.

He is a respectable and well-to-do land-owner of Pulla farming his lands himself and one known to the Department for several years past as an enthusiastic agriculturist. For over a decade he has kept himself in close touch with all agricultural improvements in progress in this province, and his interest was so genuine

among the members: 2. to arrange for an exchange of experiences on Agricultural matters: 3. to secure employment to the members and 4. to protect and promote the interest of the members. When these objects are carefully analysed it will be apparent that our Union is first, and in essence, an "Old Boys' Association" created with the object of linking up students past and present and creating a feeling of brotherhood and amity that ought to exist between the products of the same *Alma Mater*. All the other avowed objects are in a way grafted on to this original and main object.

By holding the College Day and Conference annually the Union not only provides an opportunity for "Old Boys" to meet old friends and to make the acquaintance of the present students, but also allows of a free exchange of opinions and experience on matters agricultural. Papers read at the Conference and subsequently published in the Journal and articles contributed to the Journal by various members are positive proofs of the opportunities provided for the members to record their observations and experiences. As to objects (3) and (4) relating to its function of procuring employment to the members and guarding their interests in general, the Union cannot be said to have been neglectful. It has always helped where it could and, for instance, in the matter of equalising the starting pay of Licentiates and Graduates in the Agricultural and Scientific lines, it cannot be denied that it has done its duty. If, however, it is desired that it should take on the functions of a regular employment bureau, we are sure, it will gladly take up the work, provided that its constitution is thoroughly and suitably re-organised and expanded so as to provide for the carrying-out of such additional work efficiently. Perhaps some of the members expect it to take upon itself the duty of backing the cause of such members of the department as happen to have been superseded or dismissed; if so, we fear, they have not bestowed much thought on the possibility or the advisability of such a procedure. While such duties may be appropriate in the

case of Labour Unions or certain Service Associations, they are absolutely irrelevant in an "Old Boys' Association" of our kind. While broad questions affecting certain classes or groups of members may be taken up for advocacy, it should be clearly recognised that individual grievances are beyond the scope, of our Union—at least as at present constituted. In this connection it may be useful to remember that a good many of our members are not Government employees, while some are independent landlords.

Taking a retrospect as to the past activities of the Union, we are rather doubtful as to whether we are proceeding on profitable lines. The main work that our Union has been doing in the past is (1) the holding of the College Day and Conference and (2) the publication of the Journal. Although these items are in no way insignificant, yet it is a fact that the Union has not had any definite programme of work that could keep it engaged between one conference and another. We are of opinion that our Union is capable of being of immense service not only to our department but also to the country as well—if only it would aim high and set up higher ideals of work.

In the present state of our country, nothing is plainer than that we are very backward as regards our Agricultural and Industrial development as compared with various other countries of the world. As far as Agriculture is concerned, ways of improving the present state of affairs point partly to the necessity of gathering more accurate information as to the present ways and means of production and of acquiring fresh knowledge on a scientific basis leading to the increase of production, and partly also they point to the necessity of causing a rapid diffusion of knowledge among the cultivators as to methods of improvement—tried and tested by the Agricultural Departments. While it is beyond the means of our Union to take up original research work, it can help the progress of the country by encouraging the acquirement by its members of fresh and authentic information as to particular local

methods current in various out-of-the-way places, since they are naturally scattered throughout the country. It can also help the Agricultural Department by causing a wide spread adoption of improved methods by encouraging its members to undertake and test on their own farms such as are recommended by the Department. In fact this latter method has been adopted with success in Mysore and it is reported that it is working well and has served to link many of the practical agriculturists with the State Department of Agriculture.

Some years ago, we remember, the working committee of the Union undertook the work of collecting statistics as to the economic conditions of some of the villages round about Coimbatore on the lines of the enquiry conducted by Dr. Mann in the Bombay Deccan. Although it is not known how far the enquiry then started was pushed through, there can be no denying that it was a most laudable undertaking and it gives us one instance out of many, wherein members of the Union can help in the acquisition of a fuller knowledge of the conditions under which the actual cultivators exist. There are also other ways by which the Union can stimulate the progress of knowledge. Our Members need not be told that the institution of prizes for essays on Agricultural subjects under the auspices of the Union used to be a regular feature of its activities a few years ago, but as it depended on the generous impulses of certain of its large-hearted members, it has not been quite such a feature as it deserves to be. The institution of Ramasastrulu-Munagala Prize in memory of the late Mr. Ramasastrulu Nayudu, who was the pioneer in this movement, is likely to fill a much required need, but we might point out that efforts might be advantageously made not only to increase the value of the prize and thus make it more attractive, but to enlist the sympathy of the great Landlords of the Presidency and institute more annual prizes through their help.

Again, we may perhaps refer to the tendency people generally have of looking to the Government not only for help but also for the initiative in enterprises of all sorts. Although we do believe the Government should give all necessary help up to a certain limit, we think that we, on our own part, ought to try to ease the situation and help the Government by trying to stand on our own legs and to be more self-reliant. It is perhaps not very generally known that many of the famous educational and scientific institutions of England are managed by private bodies which are helped by Government only in part. These bodies owe their existence in great part to the patriotic and large-hearted contributions made by the enlightened public and we believe that similar contributions in the cause of education and the advancement of science will be forthcoming if the great landed Proprietors—the Zamindars and the Rajahs—and the rich merchants are approached in the right way. In many respects, Bombay has been leading the way in these directions and, as one example out of many, we might cite the case of the great Sassoon Trust the interest from the vast funds of which is being utilised by the Bombay Agricultural Department for various items of special research work. The example of these Merchant-Princes of Bombay ought to be followed by all patriotic landlords of this Presidency and our Union may very well take on itself the work of approaching them and of enabling them to realise how they could help the onward march of the country's progress. In these respects our Moffussil Members of Council and Vice-Presidents have unique opportunities of helping the Union.

We are, however, afraid that some of the readers may think that these items are rather too tall an order to expect the Union to undertake the responsibility thereof. Perhaps they are, but notwithstanding all that may be said against it, we would rather prefer that it should aim high and set before itself great ideals, however impossible of achievement they may be considered to be at present, and strive to the best of its ability towards their accomplishment,

than sit self-complacently with folded hands for the greater part of the year. Nothing worth having was ever obtained cheap ; and no achievement worth the name can ever be accomplished without the requisite pain and sacrifice. And we would appeal to our members to bestow some thought on these points in their leisure hours and help the general body of the Union to arrive at a decision as to its future expansions.

SMILE.—

If the weather looks like rain,
Smile.

When you feel you must complain,
Smile.

Do not mind if things seem gray,
Soon there 'll come a brighter day,
You will find that it will pay
To Smile.

If the World looks sad and drear,
Smile.

Banish every thought of fear,
Smile.

Do the very best you can,
Play your part now like a man,
Make each day a better plan
And Smile.

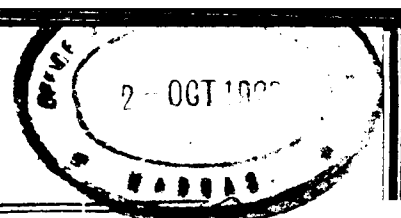
If you taste life's bitter cup,
Smile.

Should the doctors give you up,
Smile.

You are very far from dead,
Waste no time in useless dread,
Put your trust in God instead
And Smile.

3.

Grenville Kleiser. (Great Thoughts—Feb. 23.)



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Methods of Improving the Milch Cattle of India.

V. P. SUBRAHMANYA MUDALIAR, G. B. V. C.,
Deputy Superintendent (Retd.), Civil Veterinary Department.

When the Secretary of the Madras Agricultural Students' Union asked me whether I could read a paper at this conference, it struck me that I might take this opportunity to place before you all a few facts for consideration about the 'Improvement of the milch cattle of India', which I daresay is nothing new to those who are attached to the Agricultural and the Veterinary Departments. I am aware of my limitations and of the scantiness of material that I can furnish at present, and yet I have chosen this subject for its extreme importance to ryots and to other classes of men as well. Some of the statements below have been made from memory of what I had read or heard long ago. Their inaccuracies, if any, would not, I believe, affect the main arguments.

Agriculture has been said to be the backbone of India, and in fact it is the backbone of the world, since its function is no less than that of feeding and clothing the world. It is the only primary productive

industry and almost all other industries and commerce are mere processes of transformation, transference, or distribution of wealth produced by it.

The mainstay of such an all-important industry as Agriculture is cattle in India, though tractors, engines, and horses to a lesser degree, are doing their work in other countries. Apart from their value as a prime motive power, they are invaluable in producing milk—the life sustenance of millions and millions of infants, and of adults as well to a lesser degree.

The people are getting more and more used to consume milk in many ways, and the supply is very inadequate to meet the increasing demand. Consequently, the price of milk has risen and adulteration has become very common. This could be effectively checked chiefly by increasing the milk supply of the country.

There are few definite recognised milk breeds in India, and they are found in places where natural conditions are favourable. In other parts of the country, a few good milkers may be seen with particularly careful ryots. All other animals are very poor milkers and in most cases it does not pay to maintain them properly and they are consequently neglected.

Good milch cattle could be evolved in either of the following ways:—

(1) The local cows could be crossed with sires of the highly developed milk breeds of the European countries, as the Short-horns, the Ayreshires, and the British-Friesians and the progeny could be carefully reared to good milking animals. In the course of a few generations, the local cattle could be graded to very high class animals by crossing the progeny of the successive generations with sires of the same milk breed that was used in the first generation for crossing. This system of grading cannot be of universal applicability and can be confined only to the evolving of a few good milch cattle.

(2) The cows could be mated with sires descended either from good local milkers or from good milkers of recognised milkbreeds of this country. This system of improving the milkers is likely to be more widely applicable.

There are many difficulties in introducing the former system of grading. The Sires have got to be brought from foreign countries at prohibitive prices. When such animals land in India, they are not able to stand the heat of the country and they fail to thrive. They also become impotent. I believe that 3 Ayreshire bulls at Rs. 30,000 were got for Madras recently. One of them died prematurely. (Such was also the fate of rams imported from England for breeding in the sheep farm at Bantanhal). The other two bulls were not serving the cows properly in Madras and they had to be taken either to Bangalore or Ooty to get them fit for service. It would be very difficult to get on with such a system of breeding.

Even granting that the aforesaid difficulties could be overcome, the pure English, the three-quarter, the half, and the quarter breeds are easily susceptible to the contagious diseases prevalent in India. The percentage of animals that are attacked when there is contagion and the rate of mortality among the attacked are frightfully high. Such virulent diseases as Rinderpest may prove the death of whole herds. It may be said that these animals could be protected by the use of serums, vaccines, and other prophylactics; but it will be next to impossible to protect the very large number of animals that may be scattered in the country when such a system of grading is followed in any degree.

Next, let us consider the less virulent diseases as the foot-and-mouth disease. This disease makes its appearance not infrequently once or even twice a year. During an out-break almost all the pure English and the half-breeds take the disease and a large number of them die, whereas among the local animals all are not attacked and disease is very rarely virulent among them. Only a few suckling calves and weak animals die of the disease. It is not possible either to prevent the appearance of the foot-and-mouth disease or to immunise the animals against attack by any method as far as is known to me. At least such a susceptibility of the pure and the half-bred English animals as a whole and their high rate of mortality when attacked by the contagious diseases ought to act as deterrents to the introduction of exotic animals, and the advantages that the introduction is likely to confer do not outweigh the disadvantages.

Dr. J. Mollison, M. R. A. C. formerly Inspector General of Agriculture for India, is a great lover of cattle and his opinion on the introduction of English animals may not be out of place here. He has said in his text book on Indian Agriculture (see Vol. III p. 6) that "violent crossing must be sedulously avoided, males and females widely divergent in type and breed should not be mated. The offspring of such a union is at the best a half-caste and is often a mongrel.English bred bulls are now and again imported into India with the object of improving the indigenous breeds. Fortunately the indigenous cattle have been only sparingly tainted by the exotic blood. The two types are so different and the purposes for which they are bred are so divergent that it is impossible that the English and the Indian cattle can be crossed with advantage."

Nextly, let us consider the other method of improving the milkers i. e., by mating the cows with sires descended from good local milkers or from good milkers of milk breeds of this country. In these cases it is very desirable that prepotent sires should be selected.

It is true that the various tracts have got their own environments that have fixed the characteristics of the breeds that are found there. Transference of sires from one tract to another should be guardedly done. The tract to which the sire is taken should not be widely divergent in its environments and climatic conditions from the original home. Also the cows and the sires chosen to be mated should belong to the allied types nearly. I use the words 'allied' in the same sense as when I say that the Kangayam and the Ongole breeds are more allied to one another than either of them are to the Alumbadies. In fact the Alumbadies form a distinct type.

The cattle of India may be roughly divided into three distinct types—(1) the Ongole type (2) the Alumbadi type and (3) the Guzarati type. All the Indian breeds may be placed roughly in one of these three big groups and mating of animals belonging to different groups is not advisable. There are good milk breeds in the Ongole and the Guzarati types. The Ongole and Sindh animals are instances of milk breeds of the Ongole type and the Gir breed is an instance of milk

breeds of the Guzarati type. The Ongole animals give 16 to 20 lbs. of milk per day, the Sindhis give 30 lbs. and more, and the Girs give up to 24 lbs. These are promising materials with which work can be started. The impressions that I received as a student, at the Agricultural College, Saidapet, in 1882, were that the original English breeders of Short-horns started their work with less promising material. I do not know whether it is the same with the Ayreshires and the British Friesians also. Anyhow the Short-horns, Ayreshires, and the British-Friesians were not dropped from the heavens in the present state of excellence and the English breeders concerned had them not for the mere picking. If it was possible in England to raise the cattle to the present state of excellence, it ought to be possible in India also to a greater or lesser extent. It is the systematic selection of good dams and sires for mating coupled with the careful rearing of the progeny for a number of generations that has produced a British-Friesian Colantha—a cow that completed here 3,000th gallon in less than 10 months. Let us hope that we will with persistency and unwavering aims in breeding be able to produce Colanthas in India, Colanthas innumerable, and Colanthas as divergent in types as the Ongoles, the Guzaratis and the Alumbadis—the three representative types of India.

What has been said of the improvement of milch cows applies equally to the milch buffaloes. The ordinary buffaloes give not infrequently 15 lbs. of milk per day. There are very good breeds of buffaloes as the Gir. They give 30 to 40 lbs., of milk per day which is equivalent to 60 to 80 lbs. of milk of European cows from the point of view of a dairyman so far as butter production is concerned. These breeds could be compared with great advantage to the best dairy breeds of Europe.

The above paper was read on the 16th by Mr. T. V. Raja gopalacharya in the absence of the writer.

Discussion:—

Rao Bahadur J. Chelvaranga Raju, referring to the importance of the subject dealt with in the paper, said that he was proud to state that the author of the paper was an old friend of his and one of the "Old Boys" of the Saidapet Agricultural College. Mr. Mudaliar, he said,

had entered the Veterinary Department and after a long service had retired as Deputy Superintendent of the Veterinary Department. The audience, he added, would be interested in hearing that he had, after retirement, taken to Cattle-breeding and was doing very good work in this line in Tinnevely--his native district.

Mr. Vellingiri Gounder M. L. C., remarked that he expected practical instruction on these lines from the officers of the Agricultural Department.

Mr. A. M. Richards--Veterinary Assistant—said that work on the lines of improvement of the milk yield was being done at the Central Farm at Coimbatore and that so far only three generations had been kept under observation. The results obtained thus far had been very interesting, but at the same time had proved that the results of selection and breeding were by no means as simple as they were usually supposed to be. The daughter of a cow with a good record had in many instances shown a diminution in yield, while the granddaughter on the other hand had shown a remarkable rise in yield of milk. He said there was no doubt that a heavy yielding breed can be built up by scientific breeding, though it would certainly take a long time. He further remarked that so far the aim of the cattle breeder in Coimbatore was not a heavy production of milk but the creation of good work animals.

Mr. K. Unnikrishna Menon remarked in this connection that one of the aims of the breeder in this direction ought to be the shortening of the dry period of cows.

Prevention is better than Cure.

K. KRISHNA MENON, L. AG.
Assistant in Mycology.

This is a maxim well-known to everybody, though only very few people act up to it. It is often quoted in reference to human ailments but it is more applicable in the case of plant diseases because their treatment is more of a preventive than of a curative nature. In human illness medicinal means are often resorted to to effect a cure.

In plant diseases, this is not often done with any great success, as plants do not possess anything comparable to the blood stream of animals, the movements of sap in the former being essentially different from those of blood in the latter.

In this connection I do not think it will be out of place, to say a few words about that class of plant-life—the *Fungi*—which causes plant diseases. Fungi are low forms of plant-life. In appearance they differ from the higher, more developed plants in that they do not possess the green colouring matter—*Chlorophyll*. This lack of chlorophyll renders it impossible for them directly to absorb and assimilate inorganic materials and to form organic compounds for their development, and so they have to depend for their nourishment on other organic bodies, either living or dead. Those fungi which obtain their food from the living plants or animals are called PARASITIC FUNGI; those that live upon the remains of plants or animals are called SAPROPHYTIC FUNGI.

In this paper I propose to dwell at length on parasitic fungi in as much as they cause most of the destructive diseases that we generally come across in plants. The Mycology section has every-day to deal with one or more cases of the following forms of parasitic fungi; such as Rhizoctonia attacking the root of cotton plants, the stem-bleeding disease of coconut palm and the Red-rot of sugarcane attacking stems, Die-back of Citrus attacking branches, Leaf-spot on Turmeric and Rust on coffee attacking leaves, Mahali disease of arecanuts and Mildew on grapes attacking fruits, and smuts of cereals attacking grains. All these diseases are the various manifestations of parasitic fungi and it is evident from the above list that no part of a plant is free from their attack. Side by side with the study of plant diseases attempts have been made, with a certain amount of success, to find out what preventive measures one should adopt in combating diseases. Plant diseases like human ailments can be treated in various ways and the best is of course to act up to the maxim which I have chosen as the title to this paper. In the following paragraphs are briefly given some important principles of treatment, principles that have been formulated after a series of experiments, minute observations and years of continued study.

Clean cultivation. It is of primary importance to keep the plants under thoroughly favourable environments so that their growth may be vigorous and healthy. Such favourable environments are secured by good and clean cultivation, as also by proper tillage which encourages free development of roots, adequate drainage which secures thorough aeration and wide-spacing which allows free circulation of air and admission of light.

Hygienic and Surgical Methods. The surgical and hygienic means of dealing with diseases of plants are not unknown to plant pathologists. When hygienic and surgical methods are assuming increasing importance and popularity in the medical profession, it is of interest to note, that these twin phases of plant sanitation have long been the main-stay of plant-doctors. The first principle in plant-sanitation is to remove as completely as possible the affected parts of the plant or tree so that they may not offer any harbourage for the feeding and multiplication of fungoid pests. If the diseased materials are allowed to remain in the field or gardens or in their vicinity, the fungi which killed the plant will soon fructify and spread the spores around in the same way as if they were still attached to the standing tree. From this it is clear that the mere removal of the affected portions from a plant will not be of much use to eradicate the disease. Such removal must be followed by their speedy destruction by fire *in situ*. In certain cases, e. g. the Mahali disease of areca-nuts in the West Coast, the disease is carried over from season to season by affected fruits left lying scattered about in the garden. Here the resting spores which manage to live through the unfavourable season are mostly found in the old fallen nuts and spadices which are negligently allowed to remain in the garden.

Fruit-trees in particular lend themselves easily to surgical treatment when attacked by certain diseases. When one member of the plant suffers, the other members do not all necessarily suffer and the removal of the affected portion or portions, only benefits the remaining parts of the tree. This is taken advantage of in dealing with

the Die-back disease of Oranges, Lemons, and similar plants. In cutting off the diseased portions of an affected tree or plant, care should be taken to see that the seat of infection is completely removed. In dealing with Stem-bleeding disease of coconut palms the operator opens out the seat of infection with an ordinary chisel and all the diseased portions are completely scooped out and the wound is scorched and tar applied. When large branches of trees are cut off, the exposed surfaces should be smoothened and covered with tar to prevent ingress of wound parasites. It is the accidental wounds and the ill-trained gardener's pruning that offer special facilities for the entrance of wound parasites.

Another point of importance is *seed-selection*. In raising a crop particular attention must be paid to the selection of seeds; only the best and most healthy seeds are to be used. In most cases this is the most natural and easiest way of controlling a disease, e. g. fruit disease of beans is caused by sowing seeds from diseased pods. The diseased pods always contain diseased seeds and in selecting seeds one should see that they are taken only from those plants that are free from disease. The Red-rot of cane and the Ring-disease of the potato do considerable damage to sugarcane and potato crops respectively. The diseases are carried over from season to season by planting setts or tubers from diseased plants and could be mostly prevented if only care is taken to select disease-free setts or tubers for planting.

Rotation. In this connection I wish to emphasise another important practice adopted for checking plant diseases, I mean the rotation of crops. It is a well known fact that the spores of a given parasitic fungus do not indiscriminately infect every kind of plant that the spores happen to come in contact with. On the other hand the majority of the most destructive parasites known, can infect and set up a disease on one particular kind of plant or at most a few closely related plants. To take a concrete example, let us take the wilt disease of cotton caused by *Rhizoctonia solani*. The fungus which causes this disease remains in the soil and is capable of retaining its vitality for a long time. If cotton is repeatedly grown

in the same field the crop gets infected. So to starve the fungus another crop such as ragi or cholam which is not susceptible to the same disease must be grown.

Growing disease-resistant varieties. Just as it is possible to select and evolve varieties to produce improved fruits or grains, so also is it within the reach of the plant-breeder to secure disease-resistant varieties. It very often happens that those varieties which are resistant to disease are poor in quality or in out-turn. Here the Plant-Pathologist and the cultivator have to look up to the expert plant-breeder for assistance in making the necessary desirable combinations. As is well known a certain amount of success has been achieved in this direction, chiefly among the cereals. For instance, in Northern India a disease called rust was causing immense loss to wheat. By a series of crossing experiments the Imperial Economic Botanist has been able to evolve a new strain (Pusa 12) which besides being a rust-resistant variety is also a very good yielder. We have another equally good example in G. E. B. 24. This variety, which combines both quality and outturn, was evolved at the Paddy Breeding Station by the Government Economic Botanist and has been found to be resistant to two serious diseases of paddy viz., BLAST & EPHELIS.

Application of chemicals that are fungicides. This is another mode of treatment of plant diseases which is also important. I refer to the use of chemicals that are fungicides. Of these the Bordeaux mixture (a mixture of copper sulphate and lime) is one that the vine-growers of France first began to use as a means of protection against the much dreaded Mildew on grapes. A fungicide is a substance that will kill or prevent the growth of a fungus or the germination of spores. Fungicides are applied either to the seeds or to the aerial portions of plants. The latter is commonly accomplished by the operation of spraying.

In the former case the intention is to destroy the spores attached to the seeds, else the spores would germinate along with the seeds and infect the seedlings. The Short-smut of cholam which does considerable damage to cholam crops in this Presidency can be

prevented by a simple and cheap method which many ryots have taken to. If the seed is steeped before sowing in a 2% solution of copper sulphate, all the spores adhering to the seeds will be killed. Seed, thus treated, if sown will produce a crop free from smut.

Fungicides should be applied to the aerial portions of a plant before the fungus appears in order that the leaves and stems etc., may be protected from penetration. As already stated, on the West Coast areca-nuts are attacked by a disease known as Mahali which causes immense loss to the garden-owners during the monsoon. If the nuts are sprayed, before the out-burst of the monsoon with a mixture of copper sulphate and lime, they get complete protection since the spores that may subsequently fall on them will not germinate. A spraying machine is essential to give a uniform and complete coating to the surface. The small pressure sprayers used by the arecanut garden-owners of Malabar are the cheapest, best, and most convenient for the purpose. Diseases like Mildew on grapes, Rust on coffee etc., can be entirely or almost entirely controlled by spraying with Bordeaux Mixture at the proper time. I do not propose to dwell further on the subject of spraying, except to mention, in passing, that much money is wasted by spraying at the wrong time. Promptness, as you know, is an essential factor in the treatment of diseases and to deal with any of them successfully they must be tackled at an early stage.

Quarantine. In these days of cheap and quick transport, no country is isolated and farmers very often import more profitable varieties from other countries. Such introduction should be done with the greatest care since we can never tell which diseases are being imported along with them. In many instances, it is impossible to detect anything until it is too late. This brings us to another important item of controlling plant diseases, I mean the system of quarantine adopted in many countries, where newly imported seeds and plants are subjected to fumigation and periodical inspection by qualified persons to see whether they are free from disease. If found infected they are destroyed then and there.

Co-operation and Legislation. It is always necessary to have the co-operation of one's neighbours in combating plant diseases. There

is no use of getting one's own crops free from disease, if they are liable to get infected from the neighbouring fields. The neighbours who neglect to remove the diseased materials or fail to follow the instructions, are a menace not only to themselves but to their fellow-cultivators as well. To deal with such persons State intervention is necessary. The Madras Pests and Diseases Act of 1919, which lays down certain penalties to such ryots as fail to act up to its provisions for combating plant diseases, is an instance in point.

Conclusion. In this paper, I have, gentlemen, given a brief account of a few simple methods of treatment, which even a poor ryot can adopt to save himself from ruin. In these days of famine and struggle a single ear-head or a fruit saved is, I think, a distinct gain to the ever-toiling ryots of our country. If in this attempt of mine I have been able to create an interest in those who are always engaged in Agriculture, to take timely precautions (I say timely precautions because a STITCH IN TIME SAVES NINE) to protect their crops from the ravages of troublesome fungus diseases, I shall consider myself amply rewarded.

My sincere thanks are due to Mr. S. Sundararama Iyer, the Government Mycologist, for his advice in the preparation of this paper.

Discussion.

Mr. Anstead—Director of Agriculture—remarked that most of the methods at present advocated against diseases of plants—whether preventive or curative—aimed merely at the creation of certain artificial conditions. They proved always more or less of the nature of makeshifts and had only a purely temporary effect. He said he preferred the cultural method. This was a slower process and required a thorough grasp of the laws governing plant-life, but it offered a permanent and natural solution to a problem that was world-wide and declared that the present-day nostrums for diseases would some day be relegated to our museums as curios and reminders of the bad old days.

Mr. S. Sundararaman, —Govt. Mycologist—illustrated the great value of preventive measures as regards fungus diseases by an instance which came under his observation recently. He stated that in the earlier years of the Palmyrah Disease operations in the Godavari District, cases of coconuts dying of Bud-rot were not at all rare, but when the prompt destruction of diseased Palmyrah trees was strictly enforced, death of coconut trees absolutely ceased. This fact was borne out by one of the garden owners who had himself suffered in the earlier years. Referring to Mr. Anstead's remark regarding cultural methods for Fungus diseases, he said, experience with spraying for the coffee disease was bearing out this idea.

Mr. C. V. Vellingiri Gounder, M. L. C., referring to the control of the cholam smut, remarked that he found smut very serious on cholam this year. He wished also some remedy for *Sudumalli* (*Striga*) which was a serious pest of cholam. As to helping the ryots, he observed that they did not care for research or elaborate experiments, but wanted to have practical results which needed to be explained to them in popular non-technical language. He also remarked that he thought there ought to be more of co-operation among the various sections of the institution in giving advice to ryots.

Mr. F. R. Parnell, —Govt. Economic Botanist—referring to the remarks of the last speaker said that, in his opinion, there was no foundation for the statement made by him as to a lack of co-operation and affirmed the fact that the various sections were in no way exclusive and that they did help each other.

Mr. G. N. Rangaswami Ayyangar, —Millets Specialist—stated that among the various methods of combating diseases—preventive or curative—the development of immune or disease-resistant strains by breeding and selection was one of the most promising. Good work, he said, had already been done in this direction by breeders especially against fungus diseases, as for example in producing rust-resistant wheats. At Coimbatore, Paddy Breeding Station, it was found, though purely by coincidence, that a new strain, G. E. B. 24

proved resistant to Paddy Blast. In work of this character a detailed study of the various minute morphological characters of the varieties dealt with was needed, as also a great deal of patience. In his opinion, though breeding methods gave good promise, their usefulness should not be strained too much, since the question of breeding for resistance to disease was still in the initial stages of investigation.

Rao Sahib M. R. Ramaswami Sivan,—Govt. Lect. Chemist—replying to the criticism of Mr. Vellingiri Goundar thought that his remark as to a want of co-operation among the sections should have been based on incorrect information and remarked that in case any help was required he was free to come to the Institution and take the advice and help of the heads of sections. As to the results of research work conducted at the Research Institute, he confessed that there might be many failures but such failures were of value since success is usually built on perhaps a series of failures.

Mr. Anstead stated that the Agricultural Department was taking all possible measures to carry a knowledge of improved methods to the doors of the ryots. Leaflets in vernaculars couched in plain popular language were prepared and distributed. Lectures and demonstrations were given on occasions when people congregated at fairs and festivals, and he assured Mr. Goundar that all possible steps were being taken in this direction to help the ryot.

Mr. Venkatakrishna Mudaliar—Assistant Mycologist—gave a short account of the history of development of curative methods.

Mr. Krishna Menon replying to criticism remarked that the Smut alluded to by Mr. Gounder was the "Long Smut"—different from the "Short Smut," which is generally more common and is easily checked by Copper Sulphate steeping.

Some Factors Which Influence Rice Breeding in Tanjore.

K. RAMIAH, L. AG.

PRESIDENT, LADIES AND GENTLEMEN,

Within the short time at my disposal neither is it possible, nor is it proposed, to deal with the details of work connected with plant breeding in general or with Rice Breeding in the district. The very recent origin of the station at Aduturai does not authorise one to form generalised opinions and we have to wait for some years before definite results can be announced to the public. All that is attempted in this paper is the consideration of one or two factors bearing on Rice breeding especially in its relation to trade.

1. As a result of the selection work started by the Govt. Economic Botanist at Manganallur, which is now being continued at Aduturai, a strain in Redsirumani (Aduturai No. 1) has been evolved, which has consistently been giving a 16% heavier yield than the bulk from which it was isolated. This strain is being distributed to the cultivators during the last four seasons and the total acreage under this is estimated to be somewhere about 8,000 acres. Better yielding strains have been evolved in White Sirumani, Nellore Samba and Kuruvai which have been given out on a small scale for the first time this year.

2. Although there are several economic factors peculiar to this district which affect the rapid spreading of improved strains, I propose to deal in this paper only with two points viz., (1) the suitability of the different portions of the delta for particular varieties and (2) the suitability of particular varieties for trade.

3. At present the most important samba varieties are Nellore Samba, Kattai sembalai and Sembalai, red and white Sirumani arranged in the order of importance. In the Gazetteer of the district published in 1908 the important varieties of the district are given as Sembalai, and red and white Sirumani, which means that red and white Sirumanis must have been grown on a much larger scale then, than now. Nellore Samba was a variety unknown in the tract some twelve

years ago. It had been introduced from the north by some enterprising mirasdar and appears to have spread throughout the delta very rapidly on account of its high yields. Till three or four years ago it was very widely grown and people are now definitely giving it up as they have found that it rapidly exhausts the soil. In the eastern portions of the delta in the taluks of Negapatam, Mannargudy and Nannilam, more than 75% of the area is grown with *Kattai Sembalai*. This is evidently an introduced variety and being very much like Sembalai, a local variety, but with slightly smaller grain, it has been named Kattai Sembalai. The Sirumanis though not very heavy yielders are said not to exhaust the land so much as the coarser ones do, and hence we find a larger area devoted to these in the taluks of Mayavaram and Shiyali where the soil is not so fertile as in the upper portions of the delta where Nellore Samba is largely grown. It is on account of this special feature of the Sirumanis, coupled with the better price they fetch, that the change from them to a coarser variety like Nellore Samba has been slow. Moreover they give a better outturn of rice to paddy both by volume and by weight. They also, being of a slightly shorter duration than the other samba varieties, are more suitable to the lower portions of the delta where freshes are received late. Even of the two Sirumanis, the red is more largely grown though the white is certainly superior in quality from the consumers' point of view. There is no reason why Kattai Sembalai should not share the fate of Nellore Samba in course of time.

4. Successful attempts have been made by the department to supply superior strains of Red and White Sirumanis. Good strains of Nellore samba are expected to be ready for distribution from next year but the variety has unfortunately already lost its popularity. Work is to be started on Kattai Sembalai this year. Thus the breeder has always got to be on the alert to handle varieties as they are coming into prominence. When once the selection work is started on a variety, the minimum time taken to put out a strain for distribution is six to seven years and it will take at least another three years more for people to come to know of it sufficiently and take

to its cultivation. Sometimes these ten years is a sufficient period for the people to have grown a variety and given it up in favour of a better yielding new one.

5. Let us now find out how far the rice milling and rice trade affect the progress of the seed distribution. The district contains on an average 11 lakhs of acres under paddy and the estimated outturn is 790 thousand tons. The population of the district being a little over two millions and taking on an average twelve kalams or 720 lbs. of paddy as the annual consumption per head, there is still a balance of nearly 50,000 tons of paddy available for export whose value comes to nearly 50 lakhs of rupees. The chief markets for the Tanjore rice have been from a very long time Ceylon through Colombo and the West coast through Quilon. The export from Tanjore consists of both paddy and rice, but mostly of the latter. It is in connection with the rice trade of the district the rice mills play a large part. In the year 1908 there were only four rice mills in the district worked by power. Rice milling was then a most remunerative business and people rushed into it in great numbers with the result that the business was soon overdone and more plants were put up than could be kept profitably employed. The number of mills in the district multiplied to 212 in 1918 and at present the number is estimated to be nearly 250. The starting of such a large number of mills in the district may be said to be a blessing in disguise to the Tanjore landlords. As the number of mills multiplied they and their agents began to compete with one another in purchasing the paddies with the result that the price of paddy went high.

6. Almost all the rice exports were going out through the chief ports of the district on the east coast—Negapatam, Tirumalavasal, Toputurai etc., and hence probably the location of most of the larger mills in the lower portion of the delta near the coast. The existence of a larger area under Sirumani varieties in this portion of the delta might also have been a reason for the concentration of mills here. Only boiled rice is produced in any quantity in the district and the demand is only for boiled rice. Distinctions are drawn by the people of the different districts between different kinds of rice. The variety

taken by one set of people is unpalatable to another. The varieties specially in demand in Ceylon are the Sirumanis and almost all the Tanjore mills have been constructed suitable to the small grains. These mills cannot produce raw rice as in Burma, as the varieties of Tanjore are too small to be satisfactorily milled in the hullers of this district. From the Tanjore millers' point of view Sirumani is to be preferred to any other variety as it gives a greater outturn of rice to paddy. But if the mills do the milling on their constituents' account, they would rather prefer a coarser variety as then the output of the mill will be greater. There is always a difference of Re. 1 to 1/8 per bag of rice between Sirumani and any other variety. The export to Quilon is all being done as paddy. Quilon never cares for the quality of paddy received; in fact the coarser and the red-riced ones are preferred. Prior to the war besides the Tanjore rice, Ceylon was importing some paddy from Burma direct. During the war on account of the absence of freights the usual supplies from Burma could not be sent, so that there was a greater demand created for the Tanjore rice in Ceylon. This increase in demand indirectly swelled the price of the Tanjore paddy. To add to this, there was a shortage in production on account of the failure of the monsoon in 1918. Considerable trouble was at the same time experienced to move the surplus produce of paddy to places where it was needed, on account of the shortage of railway waggons. All these together brought about a crisis and the price of Tanjore paddy very nearly trebled itself. The Government realising the situation brought in the system of control and entirely prohibited the export of rice from the presidency. In addition to this, rice in large quantities was imported into the province from Burma, by restricting the export of Burma rice to western countries. Just at this time more than the usual quantity of the Burma rice was sent to Ceylon and the west coast through Quilon, so that the Tanjore rice was practically cut off from these places. To add to this, Ceylon of late has begun to grow some rice for her own requirements, so that the demand for outside rice is not so great as before. During the two years of control the Burma merchants have effectively captured the

Ceylon rice markets to the disadvantage of Tanjore. The Burma mills were producing only raw rice before; but now they produce boiled rice as well and that too of a good quality suitable for the Ceylon market.

7. This state of things should have resulted in bringing down the price of paddy and such a tendency was perceptible. But early during the year on account of heavy damage to crops by floods in Ceylon the price of rice went up. The Burma rice had not then come into the Ceylon market. The Tanjore merchants who are always in touch with the Ceylon rice market began to purchase paddy rapidly which kept the price from falling for a short time. But before the whole consignment could be sent to Ceylon, Burma rice had come in and it being considerably cheaper than Tanjore rice, the latter would not sell in Ceylon. As further purchase of paddy was stopped in the district, the price which was at Rs. 3 and Rs. 3-2-0 a kalam began to fall continuously and it is now selling at Rs. 2-8-0. Although it is only Sirumani rice that is exported to Ceylon, the price of the other paddies is always fixed relative to this as so much less per kalam. The rice trade in Tanjore is now in a stagnant condition. We find very large stocks of paddies and milled rice stored in the mills waiting for the prices to go up. In one mill at Tiruvalur I saw over 20,000 bags of rice kept ready. At Shiyali, where there is a concentration of mills, over 50,000 bags of rice can be purchased at the present moment. The branch of the Imperial Bank of India at Shiyali has advanced to those rice merchants about 4½ lakhs of rupees within the last three or four months. At the rate the merchants purchased the paddy in February-March a bag of rice cost nearly Rs. 15 and it must sell at Rs. 20 in Ceylon to allow of a small profit after allowing for the railway freight; but a bag of Rangoon rice sells in Ceylon for Rs. 15 at the present moment.

8. On account of the absence of the export of rice to Ceylon for the last three years, there is a definite tendency for the area under Sirumanis to go down, although it is not possible to find out the exact area without a detailed survey. Kattai Sembalai rice though

not so good as Sirumani is in demand in the black cotton soil tracts of Tinnevely and Coimbatore and the trade of Tanjore rice for the last two years has consisted mostly in railing this to places like Virudupatti, Satur, Tiruppur, Erode, Coimbatore and the Nilgiris and the area under this variety is steadily increasing every year in the mill areas.

9. Tanjore has thus got to compete with Burma in its rice trade. Burma has got several natural advantages over Tanjore—its large exportable surplus of rice, its immunity from crop disaster and famine, its highly organised and expert-developed milling industry and its facilities for water transport. Coastal trade did no doubt exist in Tanjore before. Most of the minor ports on the East coast which carried on a big trade in rice have all been closed now as they could not stand the unfair competition started by the Railway company. It is thus unlikely that Tanjore will ever be able to compete with Burma successfully, unless agricultural improvements result in a considerably increased yield per acre.

10. Although Tanjore is so near Madras it is Kistna and Godavari rices that have the hold of the Madras market. To compete with Kistna successfully the Tanjore rice must go down in price still further. As things stand at present unless the season becomes adverse, the price of paddy cannot be expected to go up. Hereafter the Tanjore landlords must be prepared to sell their paddies at a cheaper price than what they were getting for the last five and six years. Their net income must necessarily go down and their only salvation seems to be to increase the outturn per acre. This can be done by the growing of heavy yielding improved strains and a systematic manuring of the fields. The latter has got to follow the former, as otherwise the lands will get exhausted soon. The introduction of heavy yielding varieties is nowhere else so dependent on the manuring facilities as in the delta.

11. Unlike Burma the rice breeding work in Tanjore is more complicated. In Burma the limiting factor is the mills and any variety or strain evolved that is considered good from the millers' point of view is sure to spread. Here milling quality is only of

secondary importance. Taking it that Tanjore has lost the Ceylon market she has got to study and meet the various local provincial requirements which are many and varied. People will continue to grow Sirumanis and if the acre yield in these could be much increased there is no reason why it should not compete favourably with rices from other parts. A coarser variety than Sirumani, but at the same time not very coarse, is what is required for export to the black cotton soil tracts of Tinnevely and Coimbatore. There is a possibility of even a coarse variety like some of the Burma ones spreading in the district if it should yield well. This would be required by the poorer classes of the district and any surplus will also find a ready sale in the Quilon market. If heavy yielding strains could be made suitable for milling purposes as well, it will be a double advantage. I recently came to know that, when a strain (Aduturai No. 1) which was grown in a place near Koradacheri was taken to the mill, the mill owner found it give a better outturn of rice than the general red Sirumani brought to the mill and he offered a better price for this variety. But when he found that all red Sirumanis were being brought as Aduturai No. 1, he had to stop giving the premium.

12. The breeder has not only to attempt the evolving of heavy yielding strains of varieties that are grown on a large scale in the district, but also to satisfy himself, when introducing or evolving such new varieties, as to whether they would be acceptable to the mills and as to whether the rices would find a ready sale outside since the district will always have a decent surplus every year.

Discussion.

Mr. G. Rajagopal Naidu stated that about 20 years ago he had occasion to make enquiries into the Agricultural condition of Tanjore and the impressions he formed then were that Tanjore was very backward as regards its methods of cultivation. It had been backward for centuries; there was no system either of deep tillage or of manuring. Tanjore could not therefore compete with Kistna or Godavari. In Tanjore again, it was boiled rice that was in demand whereas raw rice was the rule in Kistna.

Rao Bahadur J. Chelvaranga Raju said, that in evolving strains of paddy, one had to make a thorough study of the requirements of the particular locality, so as to adapt the strains to the needs of the locality. For instance, at Gudiyatam (North Arcot), the main industry was the manufacture of puffed rice and obviously G. E. B. 24 was unsuitable for that place. Again where the demand was for a coarse rice—which is preferred by the working classes,—the introduction of a fine variety was clearly undesirable.

Mr. Subramania Kandar remarked that in his place short duration varieties were at present in great demand.

Mr. K. Raghavachari also said that in Tanjore Kar varieties were being given up, since they were all long duration paddies, and were rapidly being replaced by "Kuruvai" or short duration paddies.

Mr. K. Ramiak said that the object of his paper was simply to elicit discussion and that his experience which covered the space of but one year was too short to enable him to speak with any authority.

Statements showing the Exports and Imports of Rices in the Province.

Year.	Imports in Mds.	Exports in mds.
1911—12	227,000	...
1912—13	2,434,000	...
1913—14	...	12,000
1914—15	...	1,622,000
1915—16	...	1,415,000
1916—17	...	1,741,000
1917—18	...	3,345,000
1918—19	3,717,000	...
1919—20	11,842,000	...
1920—21	8,252,000	...
1921—22	...	...

Areas and yields of paddy tracts of the province.

Districts.	Total area under rice.	Ratio of area under rice to area cropped.	Estimated average yield of the crop per acre in lbs.	Total estimated yield in tons.	Serial Rank.
Presidency ...	11,361,500				
Ganjam wet...	778,600		1,300		
dry...	423,250		800		
	1,201,850	82.1%		603,100	4
Kistna wet...	1,004,500		1,900		
dry...	177,150		1,000		
	1,181,650	67.8%		931,100	1
Vizag wet...	787,800		1,400		
dry...	378,550		800		
	1,166,350	...		627,600	3
Tanjore wet...	989,000		1,750		
dry...	114,000		1,100		
	1,103,000	81.3%		829,100	2
Malabar wet...					
dry...	875,000	63.3%	1,400		
	875,000			546,900	6
Chingleput wet...	544,650		1,550		
dry...	94,000		1,100		
	638,650	85.0%		423,100	8
Godavari wet...	565,500		2,000		
dry...	64,000		900		
	629,500	83.0%		563,600	5
S. Canara wet...					
dry...	596,700		1,500		
	596,700	...		399,600	9
N. Arcot wet...	480,450		1,900		
dry...	43,950		1,100		
	524,400	46.8%		429,100	7
S. Arcot wet...	428,150		1,850		
dry...	86,650		1,100		
	514,800	37.4%		396,200	10

Jaggery—Raw Sugar—or Gul.

K. KRISHNAMURTHI RAO.

AND

G. GANAPATHY Aiyer.

Introduction.

Jaggery making is one of the most ancient and important village industries of India, especially of N. India, providing employment for a very large number of people during the winter season when they would otherwise be out of work. India consumes on an average about 25 lakhs (2,500,000) of tons of jaggery, while the quantity of refined sugar consumed is only about 5 lakhs (500,000) of tons, so that this industry will continue to hold its position as the main source of sugar for Indians for many generations to come.

Jaggery is a wholesome food and is even preferred to sugar in many preparations. Orthodoxy is partial to it. Its agreeable flavour,—very much liked by many,—its distinct superiority over sugar in sweetness and its cheapness contribute greatly to its popularity.

The outlay needed for preparing jaggery is small as compared with the huge sums required in the case of a sugar factory, and from the same amount of canes the quantity of jaggery obtained is at least 30 per cent more than what is obtained as sugar. In short, jaggery making is the poor man's industry and it supplies him with a cheap sugar food.

It cannot however be argued from the above that sugar production is superfluous in India. On the other hand, it is realised that a preference for sugar is gaining ground among Indians as evidenced by the large amount of imports (nearly half a million tons) costing us something like 15 crores of rupees annually. Unlike jaggery, sugar is a world commodity and can be exported when produced in excess. Hence there will be a need for establishing large and up-to-date factories for sugar production; but it is desirable that these should find new cane areas, entirely for themselves, so that jaggery production may not be prejudicially affected for at least a few generations to come.

Composition of cane: The composition of cane is by no means of a constant character; it varies within wide limits. In a normal cane this variation generally lies within the following limits:—

Sucrose	8	16%	Acids free and combined	0.05	0.2%
Reducing sugars	0.1	1%	Fat, Wax and gums	0.2	0.6%
Nitrogenous bodies	0.2	0.6%	Ash	1.5	3%
			Water	90	80%

As is well known, this variation in composition is influenced by several factors such as the variety of the cane, the soil, the climate etc. To instance one factor—the influence of weather conditions on the composition of cane—a variety of cane, B208, giving 19 per cent of sucrose in its juice at Samalkota or Palur, analyses only about 17 per cent when grown at Taliparamba. This is due to the very heavy rainfall at the latter place. Again, the composition of cane differs not only from clump to clump, but also from cane to cane in the same clump and in different portions of one and the same stalk. Tops contain less of sucrose but more of glucose and other impurities than bottoms or the lower portions.

Percentages in juice.

	Brix.	Sucrose.	Glucose.	Purity.
Tops	16.0	12.5	1.5	78.1
Bottoms	18.0	15.2	0.7	84.4

Nodes and the rind contain more impurities and have been found to require greater pressure for extraction than internodes.*

	Brix.	Sucrose.	Glucose.	Purity.	Non sugar.	Glucose ratio.	Fibre in cane.
Nodes	15.7	12.8	0.15	81.5	2.75	1.17	18.28
Internodes	17.7	16.4	0.61	92.6	0.69	3.78	8.00

	Fibre.	Juice.	Sucrose in juice.
	%	%	%
Rind	41.75	58.25	10.28
Centre (inside rind portion)	4.72	95.28	20.5

First mill juice extracted with less pressure is purer than the second mill juice.*

	Brix.	Sucrose.	Reducing sugars.	Ash.	Albuminoids.	Free & combined acid.	Gums.	Purity.	Glucose ratio.
I Mill.	15.38	12.93	1.54	0.37	0.18	24	10	84.07	11.91
II Mill.	14.60	14.41	1.29	0.53	0.50	26	56	79.15	11.30

* Cane Sugar and its Manufacture by H. C. Prinsen Geerliges P. 86 and P. 121.

It follows, therefore that in order to obtain a richer juice one must top the cane low, remove the rind and reject the nodes. The latter two propositions are impracticable. The only thing left to us is to top the canes low. This when accompanied with crushing at a low pressure ensures a good quality juice but is, as would be evident, attended with a decreased output, which is what happens when canes are crushed in a wooden mill.

Composition of juice. All the above mentioned ingredients of canes pass into cane juice and exist in it in different states. Sucrose, reducing sugars, free acids, organic and inorganic salts are in solution. Gums, proteins, portions of colouring matter and pectins are in colloidal solution, while cane wax, fine particles of bagasse and mechanical dirt are in suspension in the juice.

It is because of its containing gums etc., in colloidal solution that cane juice presents great difficulty in filtration. The aim of the sugar producer is to remove all impurities, whereas the jaggery boiler with his liming and skimming leaves in jaggery a good portion of the impurities. Heat coagulates the albuminoids which rise up carrying with them the insoluble colouring matter (viz) Chlorophyll and Saccharetin and other suspended matters. These form the scum and are removed. Portions of the precipitates formed on liming, such as the insoluble phosphates of calcium, pectins and gums are also partially removed during the process of skimming.

Colour. The colour of jaggery is mainly controlled by two agencies, viz., (1) the colouring matter existing in the cane and entering the juice on crushing and (2) the colouring matter developed during the process of boiling.

(1) The colouring matters that are present in the cane are (a) Chlorophyll, (b) Saccharetin (c) Anthocyanins and (d) Polyphenols (the tannins).

Of these, chlorophyll is of minor importance since it is insoluble in cane juice and is easily removed with the scums.

Saccharetin is the colouring matter fixed in the fibre and passes into the juice along with the fibre. This is insoluble in cane juices which are acid, but dissolves imparting an yellow colour to the juice when the fibre comes into contact with lime or any other alkali.

Anthocyanins are the colouring matters that impart varying shades of colour to the rind of the cane. These are soluble in cane juice and are completely precipitated by excessive amounts of lime but only partially by small amounts. The effect of this group of colouring matters on the colour of jaggery has however been found to be very slight from experiments conducted at the Sugarcane-Breeding Station, in which deeply coloured canes were often found to give lighter coloured jaggeries than light coloured ones.

Polyphenols or tannins are chiefly found in the buds, tops of canes and shoots and are soluble in cane juice, giving it a brown colour. Iron gives with tannin a bluish green reaction. From experiments conducted at the Sugarcane-Breeding Station it has been found in general that, other conditions being equal, juices containing more of tannin give deeper coloured jaggeries than those with less of it.

Jaggeries arranged in deepening order of colour.	Tannin % in juice.	Colour of cane.
Co. 210	0.043	Light pink.
Co. 227	0.053	Purple.
Co. 213	0.057	Pinkish.
Co. 211	0.081	Yellowish.
Co. 239	0.075	Yellowish green.
Co. 214	0.080	Yellowish green.

Other factors also probably interfere as there were a few cases of irregularity.

As has already been mentioned, the bad effects of these can be greatly minimised by removing tops of cane before milling.

2. (a) Solutions of sugars develop colour perceptibly when heated to high temperatures for long. Sucrose develops the least colour, glucose above 100°C a brown colouration and laevulose a still deeper one. In jaggery making, temperatures up to 120°C are common. Hence the greater the percentage of reducing sugars, the deeper is the colouration.

(b) Prolonged boiling intensifies the colour as this produces more reducing sugars.

(c) The presence of other impurities, like neutral salts and nitrogenous bodies induces pronounced darkening.

(d) In direct 'firing' it is not possible to avoid the effects of local heating.

(e) If overlimiting is done, the result is disastrous. A solution of sucrose boiled with lime develops only a light yellow colour; but when a solution of reducing sugars is boiled with a drop of lime cream, it darkens very much, the reducing sugars being decomposed into glucinic and saccharinic acids. This darkening is produced even by the salts of strong bases with weak acids like lime salts of weak organic acids, though only to a smaller degree.

To produce a good coloured jaggery, therefore, the canes should be topped low, the juices limed to slight acidity and boiled as quickly as possible.

Note. We may here note that decolourising agents like sodium bisulphite are being experimented upon for obtaining fine coloured jaggeries.

Keeping quality. It has been recognised that even sugars do absorb a certain amount of moisture when exposed to an atmosphere saturated with moisture. It is no surprise, then, that jaggery which is a much more impure stuff than sugar, absorbs a good deal of moisture when exposed to a saturated atmosphere. Now, jaggeries are known to differ in the rate of absorption of moisture and it was thought worthwhile to study what factors contributed to this. To this end, a juice was divided into six portions and treated differently as detailed below. These were made into jaggeries and their moisture absorbing capacities determined.

Treatment.	% Moisture absorbed in 9 days.	Character of jaggery soon after boiling.
1. Juice boiled as such	3.8	Colour good, slightly soft.
2. Juice limed	2.1	Slightly ash coloured and hard.
3. Juice plus 2 grms glucose plus lime	6.7	Colour same as No. 2, but not so hard.
4. Juice plus 2 grms glucose only	8.5	Colour same as No. 1, but slightly softer.
5. Juice plus 1.0 gm sodium chloride plus lime	17.3	Not friable.
6. Juice plus 1 gm Pot. sulphate	2.5	Same as No. 2.

From the above, it will be seen that sodium chloride and reducing sugars favour absorption of moisture, sodium chloride doing this much more than reducing sugars. Potassium sulphate has practically no effect.

Table A, showing jaggeries with about the same glucose ratio, but with varying chlorine contents.

Jaggery from.	Glucose ratio.	Chlorine.	Total moisture.
Co. 204 limed.	7.3	0.9	23.7
Co. 210 „	7.7	1.3	27.2
Co. 206 „	7.1	1.4	30.9
Co. 221 „	9.2	0.6	21.9
Co. 208 „	9.4	1.2	28.0
Co. 202 „	9.6	1.2	28.0
Co. 221 Unlimed.	36.9	0.5	32.8
Co. 201 „	36.0	1.2	38.5
Co. 203 „	35.9	1.2	38.6

Table B, showing jaggeries with about the same chlorine content but with varying glucose ratios.

Jaggery from.	Chlorine.	Glucose ratio.	Total moisture.*
Katha.	0.1	5.2	5.6
Dhaultu.	0.1	17.9	9.2
Co. 214 limed.	0.6	2.3	20.6
Co. 221 „	0.6	9.2	21.9
Co. 214 Unlimed.	0.6	16.6	27.8
Co. 221 „	0.5	36.9	32.8
Co. 204 limed.	1.0	7.3	23.7
Co. 204 Unlimed.	0.9	15.8	27.5
Co. 201 limed.	1.3	7.7	27.2
Co. 208 „	1.2	9.4	28.0
Co. 202 „	1.2	9.6	28.0
Co. 202 Unlimed.	1.2	31.2	36.4
Co. 201 „	1.2	36.0	38.5
Co. 208 „	1.2	38.9	38.9
Co. 206 limed.	1.4	7.1	30.9
Co. 206 Unlimed.	1.4	21.6	33.1

*Original moisture in jaggery + moisture absorbed in 26 days.

It will be seen from above that with jaggeries of about the same glucose ratio the total moisture varies with the chlorine content and with jaggeries of about the same chlorine content the total moisture varies with the glucose ratio. It is thus evident that chlorine and glucose easily affect keeping quality.

Cane gum is another factor that induces moisture absorption as a quantity of it prepared from cane juice was found to have absorbed 7.4% moisture when exposed to saturated atmosphere. It is interesting to note that action of lime on gums is beneficial in that it reduces the quantity of moisture absorbed as seen from below:—

Moisture absorbed in one month.	Gums.	Gums and 5 drops of lime cream.
16.11.21 to 15.12.21.	7.4%.	5.7%.

Preservation.

To preserve jaggeries, it seems therefore necessary to keep off moist atmosphere from coming into contact with them. One of the methods found successful at the Sugarcane-breeding Station is as follows. The jaggery samples are arranged on raised bamboo platforms, and are loosely covered over with trash and smoked. After about 2 hours' smoking, the loosely covering trash is wrapped round the moulds and an outer lighter covering of paddy twists completes the operation and secures greater immunity from absorption of moisture.

Liming and period of boiling.

Object of liming. Cane juice is acid in reaction and on boiling undergoes inversion, this being chiefly dependent on the period of boiling and the amount of acidity as may be seen from below:—

(a) Effect of the duration of boiling on inversion.

Variety unlimed juices.	Sucrose in juice.	Glucose in juice.	Purity of juice.	Period of boiling.	Amount of sucrose inverted in 100 grms of juice.
Co. 204	14.16	0.51	82.0	2½ hours.	1.5 grms.
Co. 206	12.24	0.19	79.0	2½ „	2.0 „
Co. 214	16.37	below 0.15	86.4	2½ „	2.1 „
Co. 202	14.0	0.54	81.1	3 „	2.8 „
Co. 201	12.58	0.60	78.2	3½ „	2.9 „
Co. 221	15.89	0.67	87.6	4½ „	3.5 „

(b) Effect of acidity on amount of inversion.

Acidity in juice. (decinormal potash required for 100 c. c. of juice)	Glucose ratio in juice.	Glucose ratio in jaggery.	Duration of boiling.
13.0	3.6	10.3	1½ hours.
17.0	2.9	11.7	1½ „
25.0	0.8	23.2	1½ „

As shown before, a high proportion of invert sugar in jaggery favours absorption of moisture. Liming reduces this inversion to a great extent as illustrated below:—

Variety—Co. 204.

		Sucrose.	Glucose.	Glucose ratio.
Composition of juice	...	14.16	0.51	3.0
Composition of jaggery prepared without lime	...	70.3	11.1	15.6
Composition of jaggery prepared with lime	...	77.4	5.6	7.2

Variety—Co. 206.

		Sucrose.	Glucose.	Glucose ratio.
Composition of juice	...	12.24	0.19	1.6
Composition of jaggery prepared without lime	...	65.1	14.1	21.7
Composition of juice prepared with lime	...	74.3	5.3	7.1

In juice limed to exact neutrality, differences in the duration of boiling do not seem to produce so marked an effect on the amount of inversion, which in this case seems to depend to a certain extent on the glucose contents of the juice.

Variety.	Sucrose in juice.	Purity in juice.	Period of boiling.	Glucose in juice.	Amount of sucrose inverted in 100 grms of juice.
Co. 205	12.51	79.1	2½ hours.	0.82	0.95
Co. 202	14.00	81.1	3 "	0.54	0.7
Co. 208	12.85	81.7	2½ "	0.45	0.7

Lime assists in coagulating albuminoids and precipitates a portion of pectin and gums and the whole of acid calcium phosphate in the juice. These precipitates are partly removed in the scum. Lime thus lessens the quantity of soluble impurities in the juice and thereby assists in bringing about a quicker crystallisation of sucrose.

*When to add lime:—*Since lime is found to act upon the scum of the juice, producing a dark stuff, it would be better to add the lime just after the removal of the first scum. This further avoids

the discolouration due to local action of lime on saccharatin of the minute fibre particles of the juice as these are mostly removed in the first scum.

*Quality and quantity of lime to be added:—*Shell lime has been found to give a purer and brighter product than stone lime, as the former is much purer than the latter.

Over-liming should never be done as this produces lime glucosates which at high temperatures decompose into dark and viscous substances. It is safer to have the juices slightly under-limed as this gives better coloured jaggeries than when the juices are made neutral or alkaline. Even under-liming does have a slight adverse effect on the colour of the product obtained for reasons mentioned elsewhere.

There is more inversion in the later stages of boiling than in the earlier. The duration of boiling roughly falls into two stages, the earlier one occupying the period before the so-called "Mutihukothi" of the local jaggery-boilers sets in and the later one representing the stage beyond that up to the removal of the pan from the fire. The earlier stage indicates a temperature of up to about 103°C and takes up about three quarters of the total time of boiling and the later one, indicates a temperature rising from 103°C to 120°C and takes only a quarter of the total time. Nevertheless, it has been found that inversion is greater in the later stage than in the earlier, thus bringing out the importance of temperature on inversion.

Date of boiling.	Glucose ratio in juice.	Glucose ratio after one hour.	Glucose ratio in jaggery in another half an hour.
22-5-23.	3.7	4.5	10.3
23-5-23.	3.9	4.3	8.3
25-5-23.	4.0	5.1	10.8

It follows therefore that considerable care should be taken to see that the minimum of time is taken in the later stage. Feeding must be uniform and the temperature should not generally be allowed to rise higher than 120°C. In the preparation of cubes however, the temperature may exceed this limit by 2°C to 3°C.

As far as is known, the practice of liming is not in vogue in North India. The secret of success there seems to lie in the fact that only as much quantity of juice is taken as can be boiled down in $1\frac{1}{2}$ hours. Moreover, the Upper Indian canes contain glucose in such small quantities that the amount of invert sugar formed is not enough to prevent the jaggery from setting. It must be admitted, however, that North Indian jaggeries though bright in colour are slightly acid in taste and comparatively soft; but this quality of stuff is preferred to hard but comparatively deeper coloured jaggeries.

Points to be remembered in jaggery making:—

1. Canes to be cut only when fully ripe:—As is well known, sucrose is at its maximum in the cane when it is fully ripe and to determine this judgment with the naked eye is unreliable, as during the ripening period the sucrose is subject to a sudden rise of 2 to 3% without any marked changes being noticed externally. On account of considerable variations in the composition of canes from clump to clump and cane to cane as mentioned elsewhere, a periodic analysis of several representative canes from different parts of a field is the only satisfactory method of determining the maturity of a whole field of canes.

Sudden rise during ripening.

Variety.	Date of Analysis.					
	21-1-1921.		21-2-1921.		19-3-1921.	
	Brix%	Sucrose%	Brix%	Sucrose%	Brix%	Sucrose%
Seedling No. 8664	14.32	9.99	16.58	13.16	16.87	13.37
" 13451	14.59	10.49	17.40	13.81	17.34	14.00
" 18131	16.33	12.75	17.87	14.71	17.91	14.51

2. Canes to be crushed soon after cutting:—Canes deteriorate very rapidly when the temperature during the harvesting season is high as in these parts. It is better, therefore, to keep them always in shade and sprinkle a small quantity of water over them occasionally. If this is done, the loss by inversion is much reduced (vide Year Book, Madras Agricultural Department, 1920).

3. The juice from the mill may with advantage be passed through a strainer before it enters the boiling pan.

4. The juice to be stored in clean vessels kept in shade:—In jaggery making as there is little risk of the machinery breaking down, there is no need to preserve the juice with formaline. Juice was found to undergo only a very slight change when kept for about 8 hours in shade in clean vessels.

Average of three juices.

Time of analysis.	Brix%	Sucrose%	Glucose%	Glucose ratio.	Purity.
9 A. M.	15.07	12.39	0.61	4.9	77.1
10-30 A. M.	16.14	12.40	0.64	5.1	76.9
1-45 P. M.	16.29	12.41	0.65	5.2	76.0
4 P. M.	16.41	12.49	0.67	5.3	76.1
5 P. M.	16.41	12.49	0.69	5.5	76.1

5. Apart from the influence of the other impurities such as gums etc., reducing sugars and chlorine play an important part in affecting the keeping quality of jaggery as has been pointed out already. The greater the amount of these substances the worse is the keeping quality.

6. In sugar factories, the juices are limed, any excess of lime removed by sulphurous, phosphoric or carbonic acids and the lime precipitates removed by filtration. As filtration is not practicable under the existing conditions of jaggery making, the safest course would be to under-lime the juice to avoid deepening of colour.

7. Prolonged boiling increases inversion and colouration and there is more inversion in the later stages than in the earlier. Therefore boiling must be finished within the minimum amount of time consistent with an economy of fuel. With pure juices, the boiling pan may be large and the time may extend up to three hours without much harm, but with pure juices it is better to have small pans. With juices of low purity (say below 75) to get a comparatively good product, the pans must be much smaller so that boiling may be finished within two hours.

8. Quick crystallisation and the formation of a large number of crystals means hard jaggery. With pure juices, these conditions are satisfied and moulds or cubes are readily obtained. With impure juices the crystallisation may be hastened as follows. Just after removal of the pan from the fire, a small quantity of powdered sugar or good jaggery may be added and the whole mass stirred, quickly transferred to a shallow trough and then stirred slowly. This is afterwards transferred into pits or zinc moulds. This procedure enables another charge to be started immediately with the same pan without much loss of heat.

It is not claimed here that any exhaustive study has been made on the subject of jaggery boiling. This is only some preliminary work recorded to show that there is a vast scope for systematic and elaborate work in the science of jaggery-making.

In this connection our thanks are due to the Government Sugarcane Expert for facilities afforded.

Discussion.

Mr. Govinda Kidavu—Deputy Director of Agriculture—observed that the main question as far as Malabar was concerned was the keeping of jaggery. In Malabar jaggery often ran liquid during the rains, that of Red Mauritius being particularly liable. If the latter could be improved, he declared the extension of sugarcane cultivation in Malabar was quite assured.

Mr. G. Rajagopal Nayudu said that it was possible to effect improvements in the methods of the ryot. Firstly cleanliness was a point on the importance of which stress should be laid. Secondly, attempts might be made to clarify the juice whether by the use of animal charcoal or of sulphur. He mentioned that in certain cases he had seen fine clay being used to clarify the cane juice before boiling. In conclusion he remarked that the colour and the keeping quality were usually diametrically opposed characters.

Reporter Mr. K. N. Ramasami Ayyar wished to know from the Government whether any steps had been taken to improve cane

cultivation in the Madras Presidency and whether any efforts had been made to send students to Java for studying the cane problem.

Sir K. Venkata Reddi Nair, M. A.—said that he was proud to be able to say that, far from being inactive, Madras was the first Province in India to take steps to carry on the recommendations of the Sugar Committee. The Cane Breeding Station, it must be remembered, was—though situated in Madras—really a Government of India concern. He added that at Anakapalle, steps were being taken to establish a cane station, and moreover an officer had been specially deputed to study conditions of Cane growing in Tanjore, Godavari and the Agencies.

Rao Sahib M. K. Ramasami Shastri remarked that inversion of sucrose into glucose was the chief point to be guarded against in jaggery making.

Mr. Vellingiri Gounder, M. L. C., was of opinion that so far as the Coimbatore ryot was concerned keeping quality was infinitely more important than its sucrose content.

Mr. K. Raghavachari—Assistant Director of Agriculture—stated that at Wallajahpet where large quantities of jaggery are manufactured, ryots store it in large earthen pots in which it keeps well for a year or more. Large bails, he said, were also sometimes prepared and lasted much longer than the small cubes.

Mr. B. Visayanth—Govt. Agricultural Chemist—stated that from his experience with regard to Coromund Jaggery, he could endorse the statement that keeping quality and colour were mutually exclusive. Addition of lime was necessary for ensuring its keeping quality but it resulted in blackening the jaggery. Addition of alum was useful in deliming the preparation, but it made it soft. The greater the quantity of lime, the harder he declared would be the jaggery; and the smaller the cubes, the greater the chances of jaggery turning soft.

Mr. Umakrishna Menon—Assistant Superintendent—said that cubes when bundled in straw and kept under straw lasted long.

*Mr. T. V. Rajagopalacharya—Assistant Professor of Agriculture—*observed that the Coimbatore ryot was a very shrewd person. He did not care in any way for colour; what he did care for was its keeping quality. He added lime at the very latest stage which resulted in a hard jaggery. He further added that *Samakkulam* was noted for producing the best quality in Coimbatore, and this jaggery was one of the darkest in colour.

*Mr. Noyce—Development Secretary (once President of the Indian Sugar Committee)—*declared that conditions in Java were entirely different from those prevalent in India. As might be seen from a perusal of the Sugar Committee's report, the central factor of the Javan system was the Sugar Factory. Moreover all research work was carried on financed not by the Government but by private corporations. There was little need therefore for sending anybody to Java for sugarcane work. As regards the breeding of new canes Rao Sahib T. S. Venkataraman probably knew as much as anybody in Java.

*Rao Sahib T. S. Venkataraman—Govt. Sugarcane Expert—*observed that the jaggery maker was often not anxious to get rid of the impurities of the juice because of the consequent loss of weight in the finished product. Widely divergent qualities were needed in the various jaggery markets of India. As for the Coimbatore ryot he had to cater to the demands of a market which favoured keeping quality rather than colour. As these two qualities were antagonistic to each other, the problem required thorough investigation, but could not be taken up for want of staff. The conditions in India were very different from those in other countries. Jaggery was actually preferred to Sugar in most parts of India and in his opinion it was a delicacy and almost a sweetmeat. The speaker thought that more work ought to be done in India before thinking of sending anybody to Java.

Mr. K. Krishnamurti Rao in replying to criticisms stated that the subject of the present paper was worked up as a sideline in the midst of more legitimate work and thought that more work was needed before making any definite pronouncement on the subject.

A Note on Potatoes and their Cultivation in South India.

F. H. BUTCHER.

Curator, Govt. Bot. Gardens and Parks, Ootacamund.

Introduction. The object of this paper is to make more widely known the possibilities of growing the potato over a wider area in the Madras Presidency than is now being done. At present, its cultivation is practically confined to the Nilgiri District where climatic conditions are more or less suitable for its growth. The potato being bulky and perishable cannot be sent great distances without increasing its cost to such an extent as to place it out of reach of the masses, and if it could be grown by the ryots in rotation with other garden crops for consumption on the spot, I have no doubt that it would provide a cheap and welcome change of diet. The potato, however, is essentially a Hill crop and its successful cultivation below, say, 3,000 ft. elevation is very problematical, but there are, I take it, many places in the Madras Presidency about, and above, that elevation, where potatoes are not now grown; and with the many early maturing varieties now on the market it might be possible to grow a crop even on the plains during the cold weather. The main difficulty in the past has been, I believe, the non-existence of a source of seed supply. That want has now been made good and first class seed potatoes in about 20 of the best varieties are now to be had at the Government Seed-Potato Farm near Ootacamund, which is under the control of the Deputy Director of Agriculture, VIII Circle.

History. The potato (*Solanum tuberosum*) is a native of the elevated valleys of Chili, Peru, and Mexico and requires a comparatively cool and moist climate for its growth. It was first introduced into N. America, probably by Spanish Voyagers, sometime before 1585, for it is recorded that it was brought to England from Virginia under the patronage of Sir Walter Raleigh in 1585. The Spanish had previously carried it from Peru to Spain and from thence it passed into Italy, France, Germany etc. The potato,

however, was not extensively cultivated in Europe, with the exception of Ireland, until the middle of the 18th century, from which period it has been largely grown throughout the temperate regions of Europe, and America. In Ireland the potato gradually replaced cereals and similar food crops on account of its heavier yield per acre. This brought about a dependence upon one food crop, with the result that when "Irish Blight" (*Phytophthora infestans*) devastated the potato crops in 1845 a famine occurred, and in the short period of two years no less than 600,000 persons died from diseases brought about mainly from want of insufficient or proper food.

The date of the introduction of the potato into India is obscure. But it was probably first brought from Spain during the 17th century. Roxburgh writing at the end of the 18th Century stated that it was largely cultivated in India during the cold weather and eaten by Hindoos. I have no information as to when the potato was first introduced into the Madras Presidency, but it was grown on the Nilgiris in 1824 as it is stated in Sir Frederick Price's History of Ootacamund, page 124, that a potato weighing 5 lbs. was grown in Mr. Sullivan's Garden at Stone-House Hill in that year. The original "seed" was probably brought from Bangalore some years earlier.

Cultivation. Potato growing as applied to the Nilgiris is undertaken on very much the same lines as in Europe with the difference that in Europe only one crop is grown annually, whereas on the Nilgiris two crops are usually grown, one called the first or main crop in April—July, and the second or seed crop in August—December. The dates of actual planting and harvesting vary according to local climatic conditions. For instance, in drained swamps the potatoes are sown as early as February, the soil being moist enough to start the tubers into growth before the Spring showers commence. On Hill-sides the first crop is planted at the end of March or early in April, and by the time the tubers commence to grow and require more moisture than the ground can give, the April showers commence, but should these much-looked-for

rains fail to materialise the result is a late crop, which is seriously damaged by the Monsoon. The second crop is only grown on hill-sides and in places where frosts are not likely to occur before it is mature. This as I have stated above is called the seed crop and is grown primarily to provide "seed" for the following year, as it is difficult to keep potatoes in store in the sub-tropical conditions of the Nilgiris from July until the following March, especially as the ryots have little or no facilities for storage.

There is always difficulty in getting "seed" for the second crop sprouted by the end of August as most varieties usually require to be stored in a warm godown for 3 months before the shoots begin to appear, until which time it is not ready for planting since it will not grow readily if planted before. We have artificially sprouted potatoes at Nanjanad on one or two occasions by covering them with fermenting stable manure, with very fair results; but this must be carefully done, otherwise the tubers rot through excessive heat and moisture.

As early as possible before planting, the ground should be dug or ploughed to a depth of not less than one foot and well weathered to destroy insects and weeds. A month or so before the "seed" is sown the ground should be harrowed, and if available, cattle manure applied evenly over the ground at the rate of 10 to 15 tons per acre, or failing it fish guano at the rate of 15 cwt, and well forked in. Drills about 2'3" apart and 6" deep should then be made and the "seed" or "setts" planted in these drills 15" apart and and cattle manure, or a slight sprinkling of fish guano, may be put in the rows before they are covered in. No further cultivation should be necessary until the first earthing, which consists of drawing the soil from either side of the rows towards the potatoes so that the plants appear to be growing on the ridges. This is done when plants are about 6" high and just before this operation a dressing of Nitrate of Soda applied around the plants at the rate of 1 cwt. per acre will be beneficial. This works out at about 2 tea-spoon-fuls per plant. Before application the Nitrate should be finely powdered and care must be taken to apply it *around* and not on the plant, otherwise the haulms will be damaged.

The second and final earthing must be done when the haulms are about 1 foot high and during this operation as much soil as possible should be drawn around the plant, but care must be taken not to cover up too much of the stem. When the haulms, that is to say, the stem of the plant has died down completely, which will be between three and five months from planting according to variety and climatic conditions the crop may be lifted, sorted and dried and placed in the store. The portion of the crop to be reserved for "seed" should consist of tubers weighing about 2 oz. and be well formed and sound in every respect. The balance of the crop, to be used for eating purposes, should be kept in a dark shed, or in bags, to exclude light, otherwise they will become green and unfit for the table.

Storage. A most important item is the careful storage of potatoes for seed purposes. In the north temperate regions where the temperature is low during the period the potatoes are stored, that is, October to March, there is little difficulty as regards this matter, but here in Madras where, even in the hills, we have a fairly high day temperature at that time of the year, potatoes soon commence to sprout and deteriorate. From trials made at the Nanjanad Farm it was found that potatoes will keep fairly well several months if spread out singly in a light airy shed. If seed potatoes are stored in this way they will not sprout quickly and when the shoots do appear they will be slow in growth and strong, and will not in consequence have to be removed more than once a month. If on the other hand the seed is heaped up in dark damp places the shoots will appear months before the planting season and will have to be removed two or three times in a month, with the result that when the time for planting arrives the tubers will be weakened and will be quite unfit for planting. Of course the ideal way to treat the seed potatoes is to place them singly in trays made for the purpose, and store them in sheds where full day-light is admitted, and plant them when the first shoots are about half an inch long; but this is not practicable on a large scale, and in a warm climate the shoots begin to grow too soon and have to be removed long before the planting season comes round.

To sum up, the successful cultivation of this most important crop lies in careful attention to detail, for no plant responds more readily to good treatment, and none is more susceptible to bad farming; and although the potato requires a temperate climate in which to grow at its best, good and profitable crops can possibly be grown in many parts of South India where at present the potato is seldom seen.

Discussion --

Rao Bahadur J. Chelvaranga Raju—enquired of the writer whether whole tubers or cut ones were more suitable for planting as seed. Referring to potato-growing experiments at Kavali, he said that, while it was proved potatoes could be grown in the plains, yet it had to be acknowledged that the crop would not prove a commercial success.

Mr. T. V. Rajagopalacharya—said that he was of opinion that a trial of early maturing varieties would prove successful. He also remarked that the cold weather temperatures in Bellary and Coimbatore would prove suitable to the growth of potatoes.

Mr. G. Rajagopal Nayudu—observed that potato-growing would not prove remunerative in the plains, but added that though the tubers grown on the plains were small-sized they were superior in taste. He was of opinion that by plant-breeding strains profitable for cultivation on the plains might be produced.

Rao Sahib T. S. Venkataraman—enquired whether the potatoes on the Nilgiris produced flowers and mentioned that Mr. Venkata Rao Badami of Bangalore—one of our "Old Boys"—was raising seedlings from actual seed and carrying on breeding work.

Mr. Anstead—said that by growing from seed two varieties, Nanjanad No. 1 and Nanjanad No. 2, had been evolved and were considered to be promising. As to planting cut and whole tubers, he said, whole tubers were certainly preferable, as cut ones were liable to be damaged by insects and fungi. In connection with the cultivation of potatoes on the Nilgiris, he observed, that the chief obstacle

in the development of potato growing was, till recently, what might be called the "Potato Ring." A group of Muhamarulan merchants stationed at Mettupalayam had the monopoly of the potato trade on the Nilgiris and the Badaga cultivator was entirely at their mercy. As a consequence the actual ryot did not derive any benefits by the trial of superior or improved varieties. By the kind offices of the Registrar of Co-operative Societies—Mr. Gray, a co-operative association for selling potatoes had been formed and the Badaga had received his emancipation.

Mr. Butcher—said that cut tubers were wholly unsuitable for seed. He remarked that on the whole the potato was a healthy crop and the only disease observed was wilting, which might be due to the Ring disease or to excessive moisture. Temperatures varying between 55° and 75° F. were in his opinion best suited for the potato, though it could stand higher temperatures. Frost was its worst enemy on the Nilgiris. He observed that the potato did flower on the Nilgiris but not so freely as in Europe, where potato fields were usually one sheet of bloom. What were known as "Potato Apples" or fruits were obtained from the bloom and from the seeds of such apples the varieties, Nanjanad I and II, had been raised.

Star Dust from the Poets.

While in thy lips thy words thou dost confine,
Thou art their lord; once uttered, they are thine.

Dean French.

Honour and shame from no condition rise,
Act well thy part, there all the honour lies.

Alexander Pope.

As one lamp lights another nor grows less,
So nobleness enkindleth nobleness.

J. R. Lowell.

[From "Great Thoughts" January 1923.]

The Ripening of the Sugar-cane.

BY

S. KASINATHA IYER, B. A.

I request permission to place before you this short paper entitled "The Ripening of the Sugarcane." At the outset let me preface my paper with the remark that nothing of the nature of completeness is claimed. No paper bearing on Agriculture can be complete without the full collaboration of pure Agriculturists. I had no doubt had occasion to discuss this with a few eminent Agriculturists informally and I am glad to record that the criticisms so obtained have been very fruitful by way of throwing new light on certain of our experiences. It is with the idea of discussing with a varied audience that this Conference is composed of that I put forward this paper before you.

In a paper read before the Science Congress at Bombay, an attempt was made to study the life of the cane at various stages of its growth. It was shown therein that it was possible to examine the sugar contents of the various parts of the cane without actually cutting it and when subjected to such an examination it was found that the cane exhibited a characteristic change in its sugar contents from the bottom to the top as the cane ripened. If the sugar contents of the various internodes are plotted against the number of the internode counting from the bottom, the curve so obtained slopes down at the early stages of the life of the cane and tends to become horizontal as it becomes ripe. The main theme of the paper referred to was to study the chemistry of the carbo-hydrate metabolism of the cane and it is only as a side-issue that this problem of ripeness suggested itself. It, however, seemed full of possibilities and was therefore pursued with greater concentration than at first. The results of the last two years are herein presented in a short form.

Before entering the subject proper, it is essential to discuss the methods now obtaining for determining the ripeness of the cane. The usual method is what may be called the *co-efficient of purity*

method. Briefly outlined the method consists in finding out the purity of the juice of the cane at about the time of its ripening period and when the value so obtained reaches a certain limit, which is different for different varieties, the cane is declared to be ripe. That this method is not satisfactory is admitted. Many of you who have been at the farms might know the comparatively little importance attached to cane analysis as compared with certain botanical characters that point to its ripeness such as profuse tillering, the closing up of the head of the cane etc. For the same variety the purity varies from place to place and from season to season. Differences of 5 to 10 per cent are very common between one place and another. In this connection a few discrepancies met with in the course of our investigation might be mentioned. Certain late shoots have given a co-efficient as high as certain others of the same variety and plot which were two months older. It must however be admitted that this method if modified might serve as a better index. For the same variety and season the purity might be determined at various intervals during its ripening period and when the value is at the maximum the cane may be said to be ripe. There is one weak point about this method, namely, that it is not handy. Further, we do not know when the value of the co-efficient will be at its maximum and it may therefore be necessary to allow the cane to stand on the field long after it has become ripe with all the attendant draw-backs.

Another method is that put forward by Migake Ishida of the Formosa Agricultural Experiment Station. The writer has proposed a new criterion which he calls the *maturity co-efficient*. It is the ratio of glucose to sucrose multiplied by one-hundred. It is claimed that the ripeness of the cane is indicated by a large and sudden increase in the ratio. We are not in possession of sufficient details to dispose of this method finally. But judging from the figures quoted by the writer himself there are during one full cycle of the life of the cane more than one period when the ratio shows a sudden increase. Further, the writer himself admits that the ratio is dependent for its value on factors like the soil, the climate, the variety etc.,

We have seen that the co-efficient of purity is a variable quantity and therefore not a reliable guide for determining whether the cane is ripe or not. It is natural that it should depend so much, as it does, on the delicate balance of sucrose on the one hand and the other soluble substances of the cane juice on the other, such as glucose, gums, salts, etc. In its place we have to search for a factor which can be expected to be more independent of the internal balance and economy of the cane.

At the beginning I referred to a paper wherein it was shown how, as a cane ripens, there is a kind of levelling tendency among the various internodes in the matter of their total sugar contents. To put it in other words, when the cane is unripe the top internodes contain much less sugar than the bottom ones, and slowly increase their sugar content until at the time of ripening they contain as much as the bottom ones. Putting the above in strictly mathematical language, the ratio of the sugar contents of the bottom and the top internodes approaches unity at the time of ripening. Conversely when the ratio is unity the cane is ripe.

Work done during the years 1921 and 1922 with accurate information regarding the age of the canes analysed has confirmed the conclusions arrived at. But what is more important than a mere confirmation of the old results is the incidental proof of its independence of climatic conditions. Work carried out during four seasons shows a remarkable consistency in the general nature of the curves on which this method is based considering the fact that we are dealing here with a living organism. It appears as though the effect of different climatic conditions, while it is widely different between cane and cane, seems to be practically of the same intensity among the various parts of the same cane. The ratio therefore is based on a property of the cane which we can fairly claim to be independent of weather conditions. The purity co-efficient is the ratio of two large summations whose corresponding quantities have a varying relation between one another. This might give ample scope for probable error to creep in. On the other hand the ratio that is now

proposed has as its basic principle a general property of the sugar-cane at the time of its ripeness which is independent of external conditions. Our criterion then to judge whether a cane is ripe or not is to find out if the ratio of the sugar contents of the top and bottom internodes is unity or not. Such a test might be applied with ease to single canes, but, when the question of judging a crop comes in, the application of the test is not quite as easy.

A striking feature of the curves of ripe canes is their relative flatness as distinguished from the definitely steep ones of unripe canes. This emboldened us to presume that if a cane be divided into two halves and crushed the two juices thus obtained will contain almost the same percentage of sugar in the case of a ripe cane. It was therefore thought that if a sufficient number of canes were cut into two halves and crushed separately the sugar contents (brix) of the two juices would be almost the same if the crop was ripe.

On these lines some work was done at the beginning of this year at Samalkot and Anakapalle which goes to justify our assumption. In the tables below are given the results obtained.

Table No. I.

Name of variety.	Date of analysis.	Brix.		Top.	Jaggery yield Percentage on weight of cane.
		Bottom.	Top.	Bottom.	
Purple Mauritius	26-12-'22	15.63	14.42	0.92	7.8
"	21-1-'23	16.92	15.89	0.94	8.8
J-2-47.	28-12-'22	14.86	13.52	0.91	7.3
"	27-1-'23	15.83	15.23	0.96	8.7

By the kind permission of the Deputy Director of Agriculture, I Circle, a small plot containing a single variety was placed at our disposal. It was divided into portions and each portion was analysed at intervals of a month on the lines indicated above. It will be found from the above table that the ratio definitely rises towards unity with corresponding increase in the jaggery yield.

Table No. II.

Variety.	Brix.		Top.	Jaggery yield.	Average yield.
	Bottom.	Top.	Bottom.		
B-34-12	19.61	19.48	0.99	11.76	11.80
B-1529	22.27	22.38	1.00	12.68	12.80
B-208	22.05	20.65	0.94	12.54	12.60
J-247	18.65	16.78	0.90	9.50	11.00
Java Hebbal	19.80	18.85	0.95	10.75	11.00

It will be found from the above table that where the ratio is close to unity the yield of jaggery has come up to the general average and that where the ratio is so low as 0.9 as in J-247 the yield of jaggery is only 9.5 per cent as against a general average for 12 years of 11 per cent.

Further experiments are in progress of which it is not possible to make any remarks at present. Before closing the paper it is necessary to say a word or two about the applications of this method. More than anywhere else, this method is of value in manurial and varietal experiments where a knowledge of the exact period of ripeness is essential to give comparable results. Two cane fields manured one with phosphate and the other with nitrogen are not likely to be ready for harvest at about the same time. The one may promote an abnormal vegetative growth and delay the ripening. If two such fields are cut at the same time the results are not comparable. In such instances the method I have suggested might come in quite handy.

As stated at the beginning nothing of the nature of completeness is claimed for the paper and I should be glad if it would bring about a full crop of discussion which can help me on to further fruitful researches on this side of the question. In conclusion I have to thank the Government Sugar Cane Expert for affording me all facilities at his station. I have also to express my thanks to Dr. R. V. Norris

greater than agricultural progress. In the countries of the New World and European colonies else-where, the abundance of virgin land has made for capitalistic farming and all that it implies of the application of science to agriculture. These facts had, and still have, important consequences. Industrial progress makes for the accumulation of capital and capital seeks investment. Where the investment is on land, the holdings have to be of large size, and the aid of science has to be sought for adequate return. The men that take to capitalistic farming have to be thoroughly trained in the science of agriculture, to make it a financial success. They are not, usually, men brought up in rural areas and are, therefore, not familiar with agricultural practices and conditions. This is even more true of the countries of the New World and the colonies, where the men who seek an agricultural career are absolutely new to the profession and, therefore, have to seek education in that subject in a school or college. The systems of higher agricultural education have been developed and perfected in the West to meet the needs of these men.

None of these conditions exist in India. We have to do here with an enormous population, deriving for the most part, its subsistence from land, which is rapidly proving inadequate to meet the needs. An average size of four acres for a holding does not hold out much prospect of capitalistic farming. Our industries have not been sufficiently developed, nor is it going to develop soon enough, for the accumulation of capital and for capital to seek investment in land. The mutual interaction between industry and agriculture, which is so beneficial to both and therefore to the community, resulting in a general rise in the standard of living, of efficiency, intelligence and enterprise, will take many a long year to come. Whereas, in the West, urban standards tend to raise rural standards, in India rural standards tend to depress urban standards; nor, even if we suppose, for a moment, that capitalistic farming will spread in India, is such a prospect to be

welcomed, except in special tracts and in the case of special crops. We cannot face with equanimity the prospect of a landless proletariat in an over-crowded country with hardly any out-let for her surplus population. Their presence has been a serious danger even in countries, far less crowded, of the West with limitless opportunities they had in their foreign possessions. Nor again, under the laws of inheritance prevailing in India, have large properties, brought up to the requirements of capitalistic farming, any chance of resisting the forces of division and disintegration.

These are obstacles to capitalistic farming in India, which will long remain insuperable, and yet until recently effort was directed towards the education of men for capitalistic farming. The graduates of the Agricultural Colleges in India, drawn perhaps from classes with agricultural incomes, have failed to develop agricultural leanings. The migration city-ward is a distressing phenomenon, even in the West, where conditions of small townships and villages approximate fairly closely to those of larger centres of population. Yet in India, where these conditions diverge so widely, that very few of the services—medical, sanitary and educational, to which English educated men are accustomed, are available in the village, we have not yet ceased to expect agricultural graduates to settle down to farming in villages remote from these services and with little opportunity for developing the intellectual and social interests they have acquired.

The experience of the past two decades of agricultural graduates, seeking in increasing numbers to preach scientific agriculture through the departments instead of practising it on their own farms, has convinced us that this type of agricultural education does not meet the actual situation in the country. We are now experimenting with middle schools, and several types are under trial. Even here, we have not grasped fully some of the essential features of the agricultural population, for

whose benefit the education is intended. We have not made sufficient allowance, in our schemes and syllabuses, for the accumulation of experience through forty centuries of agriculture, the essential rural atmosphere from which students are or have to be drawn, the apprenticeship they have had under their fathers and their inherited aptitude for farming. The ryots and their children know the value of good seeds, good manures, of good cultivation, of the conservation of moisture and of rotation. What he does not know are the resources which the latest developments in science place at his disposal. He does not know of the value of the improved implements of new types, and strains of seeds produced which increase yields and resist diseases, of the methods of combating pests and diseases, and of artificial manures. Where experience is already there which has stood scientific scrutiny—and in regard to many an item of agricultural operation such experience undoubtedly exists—we should not have spent time in traversing the ground over again, except so far as to interpret that experience in the light of science. And last but not least, we have not taken into account the fact that education should be designed, not so much to help individual investigation and judgment, as to create confidence in the work and in the recommendations of the Department. With agricultural departments in all the provinces rapidly developing in strength, the ryots have, ready for the asking, expert advice in agricultural matters and there is no need to give an elaborate course modelled on those given in Western countries, where men and land are alike new to agriculture.

These considerations point, to my mind, to the wisdom of confining agricultural education to those aspects of which the ryots are now ignorant and to those other subjects equally necessary to bring ryots into better harmony with their environment. Such a course should be far more practical than theoretical and be covered in about a year. It is best given on a seed farm, where seeds required for the locality are grown for distribution. The

farm should be run on business lines and worked at a profit, the profit going towards the expenses of board and lodging of the students. The pay of the manager and of a teaching assistant should alone, as a rule, be met by the Government. The farm should not be hampered by official routine but should bring the ryots and the Department into touch with one another. The students should ordinarily have had middle school education and be between 15 and 20 and capable of doing all the work on the farm. The after-noons should be devoted to simple lessons in the various subjects, or to inspection of crops in the locality grown under ordinary conditions. It is not necessary to go into greater details to enable you to form an idea of the course I have in mind, but there are some subjects which deserve mention. Among them are rural sanitation and hygiene, co-operation in credit, marketing and purchase, conservation of forests, methods of land survey, assessment and rules regarding revenue collection. No elaborate education in these is suggested, but it is expected that students should know these to help them, as much to understand and observe Government rules in regard to these, as to avoid being victimised by petty officials.

In advocating a simple and short course of this description, I am by no means suggesting that higher education should no longer be given. The very highest standard is necessary for those required to man the agricultural departments, but the number of colleges where this higher training is given should be limited to two—one for the north of India and the other for the south. In these two colleges, there should be training in administration as well. For those who fail to qualify for entry into Government services, facilities should be provided which should induce them to settle down to farming.

But the main effort, and much the larger proportion of funds, should be directed to the establishment of one year courses

designed to train up students drawn from among the class of small farmers, the labouring ryots, from whom comes the bulk of our agricultural production. They contribute, in proportion to their slender resources, more revenue than other classes. It is their money that goes so largely to the support of every branch of Indian education, and equity as well as policy demands that the major portion of the funds available for the agricultural education should be spent for their benefit, to make them more receptive of the scientific ideas which agricultural departments set in circulation, and not diverted to futile and impractical efforts of encouraging capitalistic farming for which opportunity hardly exists in India. An education on these lines, the best adapted, as I believe, to the needs and requirements of the bulk of our agricultural population, should prove immensely attractive and should help them to resist better the forces against which they are now powerless, and thereby speed up agricultural production to the level of the pressing requirements of the country.

Discussion.

Mr. Govinda Kidavu—remarked, with reference to Vernacular Agricultural Education, that his experience with the Taliparamba Middle School, so far made him doubt whether it would attract students from the class of ryots. In fact he found it difficult to attract students at all.

Mr. Vellingiri Goundar—observed that students that had passed out from Agricultural Colleges or schools should be given facilities for starting practical farming.

Rao Sahib C. S. Ratnasabhapathi Mudaliar said that he considered that teachers in Elementary schools should possess Agricultural training.

Mr. G. Rajagopal Nayudu said that he was not in agreement with the sweeping remarks made by the writer of the paper

to the effect that capitalistic farming would not suit India. He, on the other hand, would maintain that there were numerous hereditary landed proprietors of the class of Zamindars, Pattadars etc., who had good scope for capitalistic farming. The size of the holdings differed under different conditions, for instance, in China, he observed, the largest land-owner did not possess more than 20 acres.

Rao Sahib M. R. Ramaswami Sivan—said that he also believed that there was scope for capitalistic farming in India and cited the instance of Rai Bahadur Ganga Ram of the Punjab who had taken up capitalistic farming after retiring from Service. With reference to the case of students passed out of Agricultural Colleges he said he thought some provision for help from the state should be made for the starting of private farming; and appealed to the President—in his capacity as Development Minister—to bring in an act providing State Aid to Agriculture, much in the same way as he had introduced the State Aid to Industries Act.

Earning joy. Happiness must be tricked. She loves to see men at work. She loves sweat, weariness, self-sacrifice. She will be found not in palaces, but lurking in cornfields and factories, or hovering over littered desks; she crowns the unconscious head of the busy child. If you look up suddenly from hard work you will see her, but if you look too long she fades sorrowfully away.

Human happiness is the true order of growth, the sweet exhalation of work, and the seed of human immortality born secretly within the coarse and mortal husk. So many of us crave the odour without cultivating the early growth from which it proceeds; so many wasting mortality expect immortality!

David Grayson. [Great Thoughts, Jan. 1923].

Serum Simultaneous Method of Inoculation against Rinderpest.

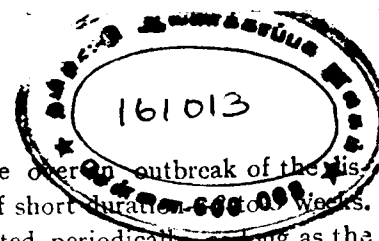
BY

K. KYLASAMIER, G. M. V. C.
DY. SUPERINTENDENT C. V. D. MADRAS.

When your honourary Secretary wrote and asked me if I would read a paper on some subject of general agricultural interest, I readily agreed to do so, having in mind the question of protecting cattle against one of their most deadly diseases in this Presidency. Prevention of contagious diseases being a matter of such vital importance to the stock-breeder and cattle-owner, I hope that a paper on the "Serum Simultaneous" method of inoculation against Rinderpest will be of some interest. Some idea of the ravages which this disease has caused in this Presidency may be had from the following figures of mortality for five years:—

1917-1918	30,733	1920-1921	17,273
1918-1919	44,164	1921-1922	10,121
1919-1920	31,237		

The total number of deaths annually from all the other contagious diseases put together such as Anthrax, Blackquarter, Hæmorrhagic Septicæmia etc, is less than that from Rinderpest. It is obvious therefore that rinderpest is the most deadly form of contagious disease of cattle with which we have to deal, and the question of its prevention is one of immense economic value. This disease is not peculiar to this country. It has existed in almost all the countries at one time or other, but in the more advanced countries the disease has been eradicated by various methods of protective inoculations and stringent legislative measures and its re-introduction is guarded against by quarantine regulations. Preventive inoculation has been in vogue in our own Presidency for over twenty years now and thousands of cattle have been inoculated by what is known as "Serum alone method". This is essentially



a protective measure adopted to tide over an outbreak of the disease and the immunity by it is of short duration—~~600 to 1000~~ weeks. These inoculations have to be repeated periodically as long as the disease lasts.

Writing about Rinderpest in the Administration Report of the Civil Veterinary Department for 1917-1918, Mr Ware says that "after an extended trial in this Presidency it must be admitted that "Serum alone method of inoculation" will not stamp out Rinderpest in this country while the conditions under which it has to be done in the villages remain as they are. Nothing less than compulsory inoculation will give the serum a fair chance, for in a typical village rarely as many as two-thirds of the cattle are produced for inoculation and although the staff has been instructed repeatedly to return to the village for re-inoculating those animals which had been already done, the ryots get tired of producing these once a month and when the animal eventually contracts the disease from some un-inoculated ones and perhaps dies the serum is blamed." The kind of protective inoculation which confers lasting or life-long immunity against the disease is known as the "Serum Simultaneous" method of inoculation. The advantages of this method of inoculation and its possibilities towards the eventual eradication of the disease are such that it merits all possible support and wider adoption. This is acknowledged by all those who are in a position to pronounce an opinion on the comparative merits of the various methods of protective inoculations.

In the Army this method has largely replaced the Serum alone method and large numbers of dairy cattle have been immunised. A brief description of the technique of this method of inoculation may not be out of place here. The basic principle, as in all other similar inoculations, is that one attack of the disease confers lasting immunity. The procedure adopted is as follows:—

½ to 1 c. c. of virulent rinderpest blood obtained from a known source and previously ascertained to be free from Piroplasms,

Trypanosomes etc., is injected on one side and a sufficient quantity of anti-rinderpest serum is injected on the other side. Hence the name "Serum Simultaneous method". The dose of serum for the different breeds of animals varies according to the susceptibility of the animal to the disease.

The highly susceptible, pure bred. English and Australian cattle receive 50 c. c. of serum per 100 lb. body weight and the country-bred cattle which are not so highly susceptible receive 8 to 10 c. c. per 100 lb. body weight. The reaction which is manifested by a rise of temperature in the inoculated animal begins about the third or fourth day, continues for about a week and then subsides. With a large dose of serum the reaction is mild or practically nil and with a smaller dose the reactions are more pronounced. Experience has shown that the quality of the immunity conferred does not depend upon the severity of the reaction produced and that there is no need to balance the dose of virus and serum. In fact it has been found that the bigger the dose of serum the better is it for the animal, because it is spared the needless suffering resulting from a severe reaction.

If it is desired to test or confirm the immunity conferred in those cases that show no reaction 5 to 10 c. c. of virulent blood alone is injected into the animal on the 8th or 10th day. The absence of reaction shows that the animal is immune to rinderpest. This test has been applied to animals 3 or 4 years after they were first immunised without producing any reaction or any sign of ill health.

This method of inoculation has been undertaken and successfully carried out during the last three or four years in this Presidency by the Civil Veterinary Department at the Central Farm, Coimbatore, the cattle breeding farm Chintaldevi, and in the Nilgiris, Nellore and Godavery districts.

The experience gained in immunising the different breeds of cattle during these inoculations leaves no room for doubt as to the suitability of this method for extended application.

Mr. Richards—Vet. Assistant—read the paper in the unavoidable absence of the writer on other work.

Discussion :—

Mr. Unnikrishna Menon—said that from personal experience he could testify to the effectiveness of this method for preventing Rinderpest and stated that, though he had requested the neighbouring ryots to send their cattle to the Central Farm for serum-simultaneous inoculation along with Farm animals, very few had sent their cattle. He was of opinion that the treatment required greater advertisement.

The Plighted Word. The heaviest fetter that ever weighed down the limbs of a captive is as the web of the gossamer compared with the pledge of people of honour. The wall of stone and the bar of iron may be broken, but the plighted word, never.

The greatest curse is to be satisfied with one's own low ideals. There is no reason for being discouraged because we are discouraged, but the man should be discouraged who is not.

Robert E. Speer.

When you admonish your friend, let it be without bitterness; when you chide him, let it be without reproach; when you praise him, let it be with worthy purposes and for just causes and in friendly measures; too much of that is flattery; too little is envy.

Jeremy Taylor. [From "Great Thoughts." Jan. 23.]

Srirangam, and some stations in Erode—Trichinopoly line. Daily between 4 and 5 bundles, each bundle containing 20 thousand flowers, come by railway. This is sold in the Madras Kothaval bazaar. The price ranges between 6 pies and 10 annas per 1000 flowers according to the demand.

(c) *Dhavanam* (*Artemisia Abrotanum*) and *Maruvam* (*Marjorum*). In and round Madras these are grown in Kaladipettai, Thondayarpet and in Triplicane, but in these places the production is limited to four months in the year viz., Margali to Panguni (December to March).

By railway these come into Madras all throughout the year from Virinjipuram, Jolarpet and Chittoor. About one hundred basketfuls of each are sold daily. A basket contains from 80 to 100 bundles of leaves of $2\frac{1}{2}$ pallams each. The price of a basket varies from Rupee one to Rs. 2—8—0.

(d) *Thiruthulai* (*Ocimum sanctum*). This is grown locally in places like Washermanpet, Tondiarpet and Kaladipettai. This is used only for pooja in temples and for making garlands. Five basketfuls of leaves each containing about half a Madras maund are sold daily. A basket sells from 8 annas to Re. one.

(e) *Kuruver* (*Plectranthus sp.*). Locally this is grown in Tondyarpet, Kaladipet and Kasimedu. By train this arrives from Papanasam and Kumbakonam also. The roots of this plant which have grown to a length of $1\frac{1}{2}$ to 2 feet are dug out with tufts and are packed in baskets after cutting away at the base of the plant. Six basketfuls of roots, each basket containing one hundred tufts or tussocks are sold daily. The price of a basketful varies from 12 annas to Rs. 1—8—0.

(a) *Chrysanthemum—Samanthi* (Tamil). This flower is available in the market in all months of the year except the four months (Panguni to Ani—March to June). Apart from local production, the following three important tracts also supply this flower. During the months of Adi to Puratasi (July to September) the supply is obtained from Malur near Bangalore. The flowers from this tract are the biggest in size, about 8000 flowers weighing one Ry.,

maund. White coloured, yellow coloured and pink coloured flowers are received from the above place, white no doubt predominating. About 35 to 40 bundles each containing 10 to 12 thousand flowers, come daily. The price of a thousand flowers ranges from 6 annas to Rs. 3. At this part of the year as there is a large demand, higher prices are generally realised.

During Puratasi to Karthigai—September to November—the produce from Jolarpet, Vaniyambadi, Ambur, Chittoor, Valur, Katpadi, Lutteri, and Gudiyatham floods the Madras Market. These flowers are yellow and white in colour and are much smaller in size than the Madras supply. Sixteen thousand flowers generally weigh a maund. About 50 bundles each containing 16 to 20 thousand flowers are received daily. The price at this part range between 2 to 8 annas per 1000 flowers. During Margali to Thai (November to January) the supply is received from villages near Dindigul, Kodai-kanal Road, Srirangam, Karur &c. These flowers are of yellow colour only and are the smallest in size. Twenty thousand flowers usually weigh a Railway maund, 50 to 60 bundles each containing 20 to 25 thousand flowers are received daily. As there is a great demand for flowers at this part of the year and as other flowers are not to be had in abundance at this period better prices are usually realised. The price ranges between 8 as. and Rs. 1—8—0 per thousand flowers.

(b) *Jasmines of sorts*. Malligai, Mullai, Gundu malligai, Iruvatchi, Jaji etc. The same go under different names in other places.

All the above sorts are available only between Panguni and Vaikasi (March to May) in abundance and in smaller quantities from Ani to the end of Avani (July to September). During the main seasons (i. e., between March and May) 1500 Madras measures of flowers will come into the market daily. In other months only 33% of the above will be coming.

These come from a radius of 10 to 15 miles from Madras, the chief place being, Cowle bazaar near Pallavaram, Poonamalli, Nandampakam, and Kattupakam near Poonamalli, Kodampakam,

Puliyur &c. near Madras. A Madras measure of this flower weighs about 24 tolas. The price of such a Madras measure varies from one anna to Rs. 2 according to demand. (This year the price on a particular day in July was Rs. 4 per M. M.)

There are two chief bazaars in Madras which go by the name of "Koodams" one located in Triplicane and the other near Mint Buildings. The Triplicane bazaar draws nearly two thirds of the total supply, while the Mint Building bazaar takes in all the rest.

A peculiar system prevails in selling. Producers bring their flowers and measure out in one of the above bazaars where they are customers. A note is made about the quantity brought by each customer against his name in the account book together with the rate settled for that day by the proprietor of the Koodam and accounts are closed weekly, fortnightly, or monthly. The producer does not at all fix the price. After the supply is received from all the customers the proprietor of the Koodam fixes the daily rate of a Madras Measure according to the demand and supply and charges a commission of one anna in the Rupee. If any money is required by any producer over and above the value of the quantity supplied by each, advances are made by the proprietor of the bazaar charging 12% interest and executing an agreement at the same time that he will regularly supply his produce to that particular bazaar.

(c) *Kattu Malligai* (*Jasminum angustifolium*). During the months of Karthigai, Margali and Thai (November to January) when it is not possible to procure other Jasmine varieties this comes to the market. The Muhammadans are the usual purchasers. About 100 bundles each containing one m. m. come daily to the market. The price ranges from one anna to Rs. 1—8—0 per m. m. This is sold only in Triplicane bazaar as it is a Muhammadan centre.

(d) *Thalambu*—*Pantanus odoratissimus*. There are two main varieties the yellow and white coloured flowers. Each of these again is subdivided into thorny and thornless. The latter is believed to be an introduced variety. The yellow flowers usually command better price as they are more fragrant. From Avani to Masi (January to February) this flower is available in the market. Chittoor

Tirupathur, Nagari, Puthur and Pundi are the chief centres from which this flower comes. About 100 to 120 basketfuls each containing 100 flowers are sold daily. The price of a basket ranges from Rs. 1—8—0 to Rs. 3 per 100 flowers.

(e) *Virutchi*—*Ixora*. This is grown locally in Mylapore and Kusapet and is also received from Koyambadi near Arumbakam and also from Poonamalli. This flower is available in the market during 10 months in the year. In December and January this is scarce in the market. Daily 3 to 4 basketfuls come to the market each basket fetching not less than Re. one.

(f) *Kadirpachai* (*Pogostemon Patchouli*). This is grown locally and is also received from Conjeevaram side. Four basketfuls of leaves are received daily during November, December and January and is sold like Thiruthulai.

The other flowers named in group (2) are brought in small quantities and as such the details about them are not worth noting.

Gentlemen, you may now ask me a question as to in what way the above information interests our members?

An amateur who wants to start life in practical farming cannot do better than go in for flower farming. Market advantages in big towns and cities are too important to be disregarded. A keen demand for all kinds of flowers not only in cities but even in small places ensures large profits. Several temples require these flowers and some flowers like Jasmine varieties have long been known and have been recommended by Sanskrit, Arabic, Persian and Muhammadan writers. Most of the flowers are highly esteemed on account of their fragrance and some particular flowers are used in the worship of special deities and are used as votings and hence held very sacred. Jasmine particularly is supposed to form one of the darts of Kama Deva—the Hindu God of Love. There is therefore much to be said in favour of flower farming and its demand. It is an excellent system of producing a monthly cash income and may be managed so as to yield a higher rate of profit than ordinary farming. Flower Farming is as simple as anything else and may be pursued with

pleasure and profit. Flower farming has been actually demonstrated by the many who have succeeded in making it pay as a very lucrative concern. Half an acre each under Roses and Chrysanthemums alone near big towns will yield 5 to 10 times more than any of the paying farm crops. With regard to over-production there need be no fear, as perfumes could easily be made, and there is a great demand for perfumes in most households.

Too much cannot be said about the opportunity for profit in growing flowers and I know of no better way of getting the amateurs, who want to launch into farming as a profession, interested in such matters than that of bringing to their notice the above narrated facts.

Discussion :—

Mr. C. Tadulinga Mudaliar—supplemented information regarding the Scientific names of many of the flowering or scented plants mentioned by Rao Bahadur J. Chelvaranga Raju.

Rao Sahib M. R. Ramaswami Sivan—complimented Mr. Raju on the very interesting and detailed information which he was able to obtain from traders in Madras and the thoroughness with which he had dealt with the subject. He agreed with Mr. Raju that Flower Farming was one of those interesting side-lines of Agricultural work which deserved attention at the hands of the novice.

Mr. T. V. Rajagopalacharya—remarked that from personal experience he could endorse the statements made by Mr. Raju as to the lucrative nature of Flower farming. He said he knew the case of a garden near Coimbatore, where land was leased out at the rate of Rs. 100 per acre. In order to make the best of flower production it was necessary that one should closely study the question of demand and supply of the locality concerned and also the nature of the seasonal demands.

Mr. Govinda Kidavu—cited the case of the Christian cultivators in Mangalore and Udipi where the women of the family were able to earn about Rs. 500 per year from a small plot measuring only about 5 cents.

Mr. Tirumuruganatham Pillai—suggested the manufacture of Attar and other scents as one of the side lines of flower farming whereby the effect of a glutted market may be remedied.

Mr. T. V. Rajagopalacharya—stated that one of the Muhammadan flower sellers of Coimbatore owned an extensive flower garden near the town and that it was a really profitable proposition.

Mr. J. C. Raju—in replying said that he had experimented with the manufacture of "attar" and that it was one of the side-lines by which an extra profit could be obtained. As to competition, he was of opinion, that there was enough scope for the expansion of the Flower Industry and there was not likely to be any difficulty owing to over-production.

Brief Thoughts.

They use the whip (the horse complains).

Who lack the sense to use the reins.

You cannot travel far on a lame excuse.

The "Do It Now" motto is very good if its advice is taken, but reading it everywhere or framing it above one's desk, does not absorb its virtue. It is a habit to be formed.

The courage to take hold when all looks promising may be largely hope and enthusiasm. The holding on when the prospect has grown dark and the way hard is something far braver and stronger.

We "try to do our best," we say, but so long as it is only *duty* it is likely to be a hard and wearing service. Only *love* can fill the measure to overflowing and turn it into a sweet privilege.

"Great Thoughts"—Jan. 1923.

A Brief Memorandum on Agricultural Reform in S. India.

(An Appeal to Govt. & M. L. C's.)

G. RAJAGOPAL NAIDU.

Retired Inspector of Agriculture.

The nucleus for scientific agriculture was formed in 1865 by Sir Charles Denison, then, Governor of Madras. Sir Arthur Cotton, the greatest Engineer-benefactor of India, while on furlough in England prevailed upon Messrs. Ransom and Jeffries, Agricultural Engineers, to demonstrate labor-saving tools, machines, etc., used in English agriculture. A large consignment of ploughs, harrows, seed drills, sickles, harvesting machines etc. were received by the Government of Madras for demonstrative education. After several vicissitudes the services of Mr. W. R. Robertson were secured for the purpose. He established an experimental farm and an Agricultural College at Saidapet, and laid the foundation for the present day activity in agricultural reforms. The controlling authorities were still sceptical for a long time about improved systems of husbandry; no definite policy was enunciated and no methodical work was undertaken. The fragmentary results of successes were never popularised for assimilation. The Indian cultivator was pronounced to be stupid, illiterate and conservative and he was judged unfit for progress. The merits of his conservatism and the sagacious economy locked up in his so-called stupidity never appealed to officials in their aloofness. Thus both of them were never on one common platform. There was no hearty co-operation for common good. The ryots are even now suspicious of the well-intentioned ways of Government. The position was graphically described by Sir F. A. Nicholson in his report on Agricultural Committee in 1888: The "organism of 1865 conceived in error, born by chance, bred up by accident, developed by starvation, and guided by change, never had any vigorous vitality."

2. The now developed department of Agriculture has not, for want of the required number of trained graduates, satisfactorily promoted the popularisation of approved results. It may take a long time. But in the eyes of the matter-of-fact agriculturists and the sceptical politicians, the reformed dept. has not justified its existence, since two blades of grass have not yet been grown in the country in the place of one under empirical conditions. The poverty of the land is proverbial. Its indebtedness is getting more intensive. The empirical practices and crystallised ignorance continue to prevail unaffected. Oil engines though appreciated for irrigation are not widely adopted. The productions are coarse and inferior. Economy has not been imbibed to save waste. The wooden plough still rules agriculture; sowing and weeding are still crude in the Tamil and Kerala lands. Other handicrafts and trades offer larger wages and greater attractions to labor in towns and cities. The land holders are left in the lurch.

While the work of the past was gloomy and dismal, the future is not less dark. If so, is it not sane to abolish the Agricultural Dept. and its college at Coimbatore? But as a matter of fact scientific agriculture has enriched the United States and other countries. Why she has failed here is a question to be looked into? Somewhere the rot is; it has to be discovered.

3. The U. S. Dept. was organised in 1863, three years after its inception in Madras. She progressed steadily step by step, taking lessons from failures and familiarising farmers with their successes. The Govt. instituted a sound survey with reference to soils, springs, climate, rainfall etc., and deputed a host of experts to study agriculture in European and Asiatic countries for the purpose of introducing disease-resisting, hardy, and prolific varieties of seeds and plants into suitable localities. Suvra Figs, African dates, Egyptian cotton, Arabian stallions, Indian mangoes, Nellore cows, Chinese ducks, Japanese rice, various foddies as Chulam and sugarcane, and a host of other seeds, plants, and animals are examples of their introduction. The result of this single line of work was manifested in extra profits to the agriculturists. Stimulated by several lines of profit in various channels, the Department has now grown

to be one of the largest in the country, tackling questions connected with every Department directly or indirectly connected with the welfare of farmers and their wives. Its magnitude can be realised if one knows that the controlling Department at Washington manages with a formidable army of over a thousand hands composed of professional and ministerial officers. The department by its intelligent and useful work made itself indispensable. She is ambitious of producing the world's requirement of cotton, rice and sugar. In consequence of the increasing wealth the country acquires and accumulates, the department is daily expanding. The superfluity of wealth amongst farmers led them to invest it even as low as 2% per annum. Over 20,000 million dollars were loaned out to Europe and other places. The farmers have become leaders in scientific civilisation. The flourishing condition of the U. S. Dept. of Agriculture will convince the most sceptical politician to entertain a new hope in regenerating South Indian agriculture from its chronic indebtedness, penury and poverty.

4. In order to bring about between the Govt. and the agriculturist a mutual trust, a healthy co-operation and scientific enterprise aided by indigenous capital, labor, and knowledge, the following requirements must be rigidly observed by the local agricultural department.

(a) A healthy policy must be boldly pronounced and undertaken. The progress of research and experimental work should be, without regard to criticism by the public and the press, published regularly and systematically, showing with reasons the general results thereof, so that the tax-payer may be conversant with the work of experts. This will warn the country to avoid pitfalls leading to failures and to accept only the successes. Then a correct knowledge can be imparted. If by illiteracy and shyness ryots do not freely co-operate with officials, the latter must endeavour to secure confidence by giving up their aloofness brought about by differences in social position, affluence, and education. The ryot's experience of ages cannot be trifled with. His co-operation is essential. His calculative shrewdness can avert many a costly

undertaking. The Botanical garden and the sugar station are just examples. The former suffers from want of water and the latter is impregnated with salt. Thousands of rupees were spent to mend them.

(b) Continuity of work as found in Rothamsted Farm should be enforced. Since impetuous and inexperienced officials often succeed capable and original workers, the costly and good work of their predecessors are, for want of a definite code or policy, often mutilated or undone according to their knowledge and fancies.

The breaking of epidemics for the first time in Sydapet Farm during Mr. Keess' time, the loss of the Bugiam cow at Coimbatore are examples. Sydapet breed of sheep, the manuscript notes of Cuddapa agricultural survey obtained at a great cost of labor and time are nowhere with all their merits.

(c) Recruitment of officials must be on a utilitarian basis. The best men irrespective of nationality and of tropical experience and education should alone be appointed. English and other lads being brought in direct from schools and colleges to get experience in India is a wasteful and uneconomical procedure. Of late Indians are appointed to high posts. They too for want of foreign travel and study are wanting in a general breadth of vision and a thorough grasp of agricultural problems. The Philippines and the West Indies supply our requirements. A knowledge of Chinese and Japanese Agriculture with their manual and home industries is essential for stimulating local thought and for dispelling indolence amongst the intellectual and parasitical members of the village society. Expert knowledge and cost must alone be the ruling factors in the choice of officers.

(d) The subordinate staff is only nominal. In education and position they must be similar to vaccinators. With primary education they must be fully conversant with the art of collecting and preserving village manures. They must be adepts in ploughing, sowing with drills and weeding with bullock implements and harvesting with scythes and machines. They must be skilled workmen in selecting and testing seeds, propagating plants by grafting

and cross fertilisation. Castration of farm animals must be freely done by them. They must be trained in the preparation and application of Fungicides and Insecticides. These subordinate demonstrators must be drawn from village agriculturists. The country requires thousands of them—men marked by dexterity of hands rather than endowed with brains—and they will cost least.

(e) The supervising staff as Inspectors or supervisors have in general proved themselves unworthy of the task imposed upon them. The fault is in the system of education. It requires to be modified to satisfy the present day needs, on the lines adopted by Booker Washington—the greatest reformer in America for coloured men. In his world-renowned Tuskegee Institute, every lad gets in the forenoon a training in the arts of gardening, smithy, carpentry, masonry etc., and the afternoon is devoted to intellectual culture. Thus the University trains the hand and the brain simultaneously to make the boys ideal citizens. Their spirit of building the Town Turkiji without the aid of foreign material and finishing it is an example of their valuable education. Here graduates lack manual training, artisans lack a rational knowledge of their arts. The present political difficulties and labor troubles are the natural outcome of the modern one-sided education.

(f) Agricultural associations must be organised at every taluq and district, controlled by a central society at Madras. Its members must be agriculturists and the officials of the Department. Honorary workers must be selected in villages and taluqs. Annual conferences must be arranged in taluqs, districts and the city, and supplemented by exhibitions and demonstrations. Officials must submit a review of their work. Agriculturists must give an account of their successes and failures in adopting improvements. This is the royal road for improvements with the least cost.

5. A comprehensive knowledge of the agricultural practices in the country is the keystone for agricultural improvements and economy. Sir Arthur Cotton realised this truth. He respected Indian Engineers who constructed the grand Anicut across the Cauvery and repaired it from the example set by them at a cost far beneath

the estimated amount. Raja Veeranna built the Anicut with mud and stones with the help of empirical masons. It has stood for over a thousand years resisting the tremendous pressure and force of the Cauvery freshes. Fortified with such experiences, he was bold enough to the surprise of thinking Engineers to bridle the wild Godavari and the furious Kistna rivers. Thus he fertilised the high level deltas and provided the cheapest service in the shape of navigation.

The agricultural department should not deem itself superior to the ryot, but should court consultation with and suggestions from the farmers. Confidence will then generate confidence and the spread of improvements will flow unimpeded.

6. It is imperative that the whole Presidency must be surveyed exhaustively with reference to climate, rainfall, soil, subsoil springs etc. as was done in the United States of America. It will lead to the importation and acclimatisation of a host of economic seeds and plants from similar parts of other tropical and sub-tropical regions.

The floating gardens of China, the practice of dwarfing fruit trees to make them more prolific, the method of artificial hatching without incubators, the utilisation of birds for fishing, the adeptness of the Chinese in smithy, carpentry, masonry and a host of other arts and crafts deserve to be studied by us. A deputation of officials to study agricultural industries in China and Japan, and a large importation of Chinese workers as demonstrators of several manual industries will secure our object at a very greatly reduced cost.

Irrigation is the panacea of the ills South Indian agriculture is exposed to. Of the various economic necessities irrigation demands the greatest consideration. In a tropical country governed by a fitful and precarious rainfall conserving the wasteful freshes is essential. For want of secure irrigation the present day agriculture is highly speculative, nay, it is a mere gambling with nature. Till this major occupation is insured with permanent irrigation, the country will never be freed from the grasp of want, scarcity, and famine.

The possibility of developing India into a land flowing with milk and honey has been beyond question proved by Sir Arthur Cotton. India is said to possess ten times more water than is required for her full irrigation in the shape of monsoonic rains and melted ice. Sir Arthur estimated his "All Indian Canal" for irrigation at 50 million pounds. It would now swell into three times the amount.

Is there no way to find this capital for Indian regeneration? Swami Vivakananda proved that money was our slave if we evolved patriotism. Mahatma Gandhi raised a crore of rupees for his political school. The Government of India found a similar contribution to the late European war. To this end the determined will and the sympathy of the government are required to be intensified. The people of England may be reluctant since their luxury is at present suspended. But the Government is bound to help India. She must raise a loan at least under Land Improvement Loan's Act to finish the project and realise the amount with interest if necessary in several instalments. This piece of work should never be calculated as speculative. It is a necessary and urgent affair in a nation. Improvements in other lines as education, sanitation, may be taken up one after the other.

7. The largest industry in India is food production, in which nearly 65% of the population is directly engaged. Excepting a small percentage which is either parasitical as beggars or mental workers, the rest are engaged in the preparation of food and dress and other home industries. All labor is on an unscientific basis. It is imperative that labor should have the active co-operation of experts. These experts in their useful and productive work will become fountain heads for the formation of Factories, Workshops and Laboratories. The fruit of such concerns will satisfy the necessities of scientific farming.

With the just expansion of scientific agriculture, workshops for manufacturing tools, machines, laboratories for chemical manures, biological cultures and power stations for multitudinous concerns in manipulating industrial crops and myriads of subsidiary industries will be the inevitable outcome.

Commerce and civilisation breed metal roads, waterways, and air navigation resulting in the building of motor and railway cars, steamers, and air-ships. These enormous necessary developments demand hearty co-operation of labor, capital, and experiences of the country and the Government. It means an unlimited capital as National Loans and Limited Companies; diversion of charitable and temple funds, contributions, donations and subscriptions.

8. Legislation is imperative for the people to do duties to themselves. Under the present conflicting conditions of society, even the most beneficial system of *Kudimaramel* has a woeful tale to tell. In Mysore, roads and avenues, tank bunds, irrigation channels are maintained neat and clean so as to be more efficient. Here minor repairs of above works devolve on pattaiars, the state supplying the required materials. Hence compulsory labor and its honest enforcement are inevitable.

9. Of the several devices serving the purpose of conveyance, waterways are the cheapest. If it costs 700 units on earth roads, it costs 180 units on metal roads, 16 units on a rail road, and 5 units on water roads, which with steam amounts only to $1\frac{1}{4}$ units. 150 years ago, Holland, France and Russia led the way for advancing countries to prefer canal navigation. Manchester was forced to dig a canal along the rail road to carry its raw products after a 60 years' costly experiences and losses. Hence our Govt. must patronise canal traffic in preference to railways which serve only a single purpose, whilst irrigation canals lead to production power and traffic. Poor India requires the cheapest of roads. Formation of metal roads and their maintenance have become antiquated for agricultural purposes. Thus every attempt must be made to construct anicuts, locks, and aqueducts across every stream and river and deepen them for power and passage.

10. Meteorological forecasts, and news of the world markets require to reach every village to avoid danger to properties during cyclones and to safeguard production and regulate labor and prices. Frequent exhibitions, practical demonstrations, formation of school gardens, instituting travelling railway laboratories and libraries, developing Boys' and Girls' clubs and agencies of the right sort to secure our ends at a nominal cost.

11. Within easy reach of every village at important centres, there must be instituted a biological station, a chemical laboratory, a scientific library and a meteorological station, a workshop, and an agricultural school. In fact it must be a repository of all knowledge on the health and wealth of villages. This may sound ambitious but it is imperative for material advancement.

12. Half the vital force in agriculture is in our women. Keeping them in ignorance disgraced Indian civilisation. Asiatic civilisation made our wives practically slaves, while Europe bestowed equality nay, superiority to them. Family ruptures and other defects resulted in unhappy homes.

Mr. H. B. Small of Canada discovered that women are neither inferior nor equal to men. Both supplement each other in developing a harmonious unit in society. Women by nature are fit only for delicate indoor work. Men are generally fit for sturdy out-door conditions. Following this order he changed education for women to meet domestic requirements. Home economy, chemistry of foods, their blending, cookery, sanitation, laundering, homekeeping etc., are taught in the pioneer McDonald College in Canada. This system is fast assimilated in the United States and Europe. In agricultural India, the Canadian system of education for women requires to be introduced to develop harmony in society.

13. When these and other cognate improvements are grafted in S. I. agriculture, prosperity will smile on the country and genuine patriotism will flourish. The discontented politicians when backed by such a progressive nation can easily attain their goal. Thus scientific agriculture is the foundation for building up true patriotism. It is idle for a poor down-trodden caste-ridden nation to aspire for Swaraj.

Let us jointly pray that the Mighty Vishnu, who devised means to bring from a very long distance, neglecting several other powerful nations between, the deserving Briton to rule over fallen India, will lead us through that sovereign to our deserving ends.

Discussion.

Rao Sahib M. R. Ramaswami Sivan—said that Dr. Kunhikannan, whose paper in his opinion should have been read along with the present one, differed in views from Mr. Nayudu. Dr. Kunhikannan thought that western methods would not suit Indian conditions and that when introduced they should be thoroughly modified so as to suit our conditions.

Rao Sahib T. S. Venkataraman—said, with regard to the remark made by the writer, that Chettipalayam station had, on the other hand, justified the selection and had proved thoroughly suited for the purpose of evolving new strains.

[Note: The other 3 Conference papers viz: "Sidelines of Farming," "Agricultural implements in S. Kanara" and "Agricultural improvements in the Cauveri Valley" will appear in our next issue.

Editor.]

Science and Govt. Administration.

"Scientific opinion deserves better regard and esteem than it gets, and it suffers this loss because of the quite unreasonable contempt with which it views the operations of politicians. The world of science abstains from making its voice heard in the only way it can be heard, through the megaphone of the politician, by reason of the pressure of its organisation. It has itself no organisation....."

Merwyn O'Gorman.

Nature April 21, 1923.

Knowledge is proud that he has learned so much ;
Wisdom is humble that he knows no more !

Nature, July 21, 1923.

REPORT

OF THE

Working Committee

OF THE

The Madras Agricultural Students' Union.*for 1921—1923.*

The Working Committee begs to submit its report for a period of 19 months ending 30th June 1923.

This is the second time in the annals of our Union that a committee has to record its activities for a period exceeding 12 months. The first instance was in December 1919 when the College Day was shifted from July to December, but the present case is the resultant of extraordinary circumstances created by an outbreak of plague in the colony in 1922. The effect has thus been a reversion to July 14th—the Foundation Day of our College and Research Institute. We are glad to record that owing to the careful preventive measures adopted on the Estate and by the mercy of the Almighty the plague epidemic passed off without taking toll of any human life.

The period under report has been marked by a steady and uniform progress of our department under the care and guidance of our popular Minister for Development—the Hon'ble Sir K. Venkata Reddi Nayudu, Kt.,—and we take this opportunity of congratulating him on the richly deserved honour recently

conferred on him. Though greatly handicapped by the universally felt financial stringency, Our Minister has been finding funds for the Department as far as possible. Moreover he has invariably been giving us his staunch support in spite of hostile criticism—a circumstance for which we sincerely thank him.

The period under review will always serve as a landmark in the history of Agricultural Education in South India. In March 1922; the affiliation of this College to the University of Madras became an accomplished fact, and the first B. Sc. Ag. examinations were held in March and April of the current year, as a result of which eight of our students were declared to have become eligible for taking the degree of B. Sc., in Agriculture.

At the same time, the old Diploma course automatically came to a close when the last batch of L. Ag.'s passed out in December 1922. Other changes are also impending. It is understood that an Intermediate course, which is intended to lead to the present University Degree in Agriculture and to which S. S. L. C. eligibles alone will be admitted, is likely to be introduced.

The period under report is likewise important in that it has witnessed the inauguration of Vernacular Agricultural Education in the Presidency. Two Agricultural Middle Schools have been opened, one at Tali-paramba in North Malabar and the other at Anakapalle in the Northern Circars: and we only wish more schools of this nature are started in the near future.

The 30th June 1922 saw the laying of the Foundation Stone by His Excellency the Governor—Lord Willingdon—of the “Freeman Buildings” designed to accommodate the teaching section of our Institute.

The “Knapp’s Scheme” as to the re-organization of the salaries of the subordinate staff was given effect to, but, though it is felt, on the whole, to be a step in advance, the prevailing feeling has been that it has not given adequate relief to all—
PAY AND PROSPECTS. especially the officers in the lower grades. We are glad to state that the discriminative treatment in the starting pay of Diplomates and Graduates in the Agricultural and Science sections—mentioned in the last Annual Report—was done away with by the Government as a result of representations made in accordance with the resolution of the General Body Meeting of the Union held in December 1921. It is, however, regrettable that this equalisation has been brought about by a process of levelling down the pay instead of by the more desirable one of grading up. This has naturally created some dissatisfaction and we trust this situation will improve when better financial conditions prevail.

The severe financial stringency has, we believe, been the cause of the delay in providing appointments to several of our students who passed out during the year and we are sure this is only a passing phase in a progressive department like ours.

We regret the absence from our midst of Mr. H. C. Sampson, C. I. E., who was our Director at the time of the last College Day and Conference. He has
OUR DIRECTORS. retired from the Indian Agricultural Service and is, we hear, employed as a Cotton Specialist in Nyassaland and we welcome the promotion to this place of Mr. Anstead who has been connected with, and has always been of great help in, the celebration of many College Days in the past.

Consequent on the changes in the Principalship there have been three changes in the Presidentship of our
OUR PRESIDENTS. Union. Mr. R. Cecil Wood, M. A.,—who was President of our Union for several years in succession dating from its very foundation—left Coimbatore in April 1922 on two years’ deputation to Tanganyika as Cotton Expert under the Empire Cotton Growing Corporation. We very much miss his genial presence to-day, but rest content in the hope that he would be with us for the next College Day. To Mr. Wood, to Dr. R. V. Norris who was also our President for sometime and to Mr. F. R. Parnell, who has been Our President for a year now—our sincere thanks are due for the warm interest evinced by them in the affairs of the Union.

The last College Day and Conference were held during the three days 19th to 21st December 1921 under the Presidency of Mr. N. MacMichael, M. A.,
PAST CONFERENCE AND SPORTS I. C. S., Commissioner of Land Revenue and Settlement. In the course of a short and interesting address, he congratulated the officers of the Agricultural Department on the steady and satisfactory

progress made and warned them of the possible danger of substituting "eyewash" or showy work on paper—for honest unostentatious work.

The following papers were contributed for the Conference :—

1. "Agricultural Bacteriology"—Mrs. Dorothy Norris.
2. "Agricultural Production."—Mr. E. V. Sundara Reddi.
3. "Harvest Exhibitions."—Mr. K. Venkata Rao Badami.
4. "Juniors & Research Work."—Rao Sahib Y. Ramachandra Rao.
5. "Why the Department has not impressed the public so far."—Mr. K. T. Alwa.
6. "Possibilities of Plant Breeding."—Mr. M. Anandan.
7. "Coconut cultivation in the Laccadives."—Mr. K. Govindan Nambiyar.
8. "The Management of Alkaline Soils."—Mr. B. Viswanath.
9. "Paddy varietal experiments."—Mr. G. Jogi Raju.
10. "Gogu cultivation in the Vizagapatam District."—Mr. S. Sitharam Pathrudu.
11. "Agriculture as a profession."—Mr. Huidekoper.

At the close of the Conference the President announced a donation of Rs. 1,000 by the late Mr. Vengail K. Krishnan Nayanar—one of our Patrons—towards the establishment of a prize for the best student in practical Agriculture. The annual sports were held on the afternoon of the 19th December 1921 and were a notable success. Mrs. Parnell kindly gave away the prizes. One note-worthy feature of the sports was that in as many as four of the items, previous records were broken. The Champion of the Day and the winner of the Vengail Nayanar Cup was C. S. Duraiswami, who also won the Mrs. Anstead Cup for One Mile Race, and the Dr. Norris Cup for Cross-country Race. The "Saidapet Old Boys' Cup" for 100 yards Race was won by H. Balraj. We congratulate Rao Sahib M. R. Ramaswami Sivan on his wards winning the Ramnad Shield for Inter-tutorial Tug of War. After prize distribution, Mr. Parnell announced the news of the promised offer by one of our Patrons—Mr. V. Arumugam Pillai of Sundakamuthur—of a cup to be styled the "Prince of Wales Cup" for one of the College Day events for which the Union feels very thankful.

The Committee wishes to place on record its feeling of thankfulness to the President, Mr. MacMichael, Mrs. Parnell, Mrs. Anstead, Mr. R. M. Savur and other ladies and gentlemen who contributed to the success of the function in various ways. The Committee tenders its thanks to the Volunteers and to their Captain, Mr. K. Ramiah, and to Mr. T. V. Ramakrishna Ayyar, the Hostel Warden, for their ungrudging help, and to the Local troop of Estate Boy-Scouts for the splendid services rendered.

The Committee is very much pained to have to record the loss by death of no less than five of its members during the period under report. The late Mr. Vengail

OBITUARY. Krishnan Nayanar is a name—we daresay—very familiar to most of our members. He took genuine interest in the Union and has helped it in many ways in the past and we take this opportunity of placing on record the deep sense of loss of the Union in his untimely demise. We lament the recent death of Mr. S. Subbayyah, one of our older members; and we likewise grieve for Messrs: B. Pushpanatham Thomas, C. Arulnandam Pillai and T. K. Sambamurti—some of our young members whom death has carried away in the prime of their youth.

MEMORIAL FUND. An amount of Rs. 504 collected by the Provisional Secretary—Mr. K. Krishnamurti Rao—towards the “Ramasastrulu Nayudu Memorial Fund” was handed over, as per resolutions passed by a meeting of subscribers, to the Union with a request to institute an annual prize for the best piece of research work bearing on Agriculture done by one of its members. Thanks to the generous offer of Mr. D. Balakrishnamurti to round up the amount of interest to Rs. 50 towards the cost of the Medal, a prize—to be styled as the “Ramasastrulu—Munagala Prize”—was advertised in the Journal and as a result three papers were received. We are glad to announce that it is this year awarded to Mr. V. Ramanathan as adjudged by a Committee consisting of Messrs: F. R. Parnell, A. K. Yegnanarayana Ayyar, Dr. John Mathai and the Editor, Rao Sahib Y. Ramachandra Rao—to whom our thanks are due.

We congratulate Mr. P. V. Isaac, M. Sc., one of our PERSONAL. active members in the past who went to England for further studies, on his appointment as Imperial Dipterist in the Entomological section at Pusa.

During the period under report Messrs: S. R. Venkatakrishna Mudaliar and K. Ramiah were promoted to gazetted rank and we offer our congratulations to them. We also congratulate those of our members who have been officiating in the Indian and Madras Agricultural services.

OUR YOUNG FRIENDS ABROAD. Messrs: C. Bhakta Samuel and C. M. Ranga Reddi, our old students who left for Scotland a few years ago, are now back in India after taking their degrees. Mr. A. Chinnathambi Pillai, L. AG., who had proceeded to Sierra Leone on deputation as Technical Adviser in Rice Culture has finished his work there and, after staying for sometime in England on study leave, has now returned. We welcome him back. Mr. Krishna Rao Nayudu is still in Edinburgh. Messrs: T. Lakshmana Rao, B. A., K. Adinarayana Rao, L. AG., and H. C. Javarayya, L. AG., are now in England undergoing a course of higher studies. We wish them every success. We hear Mr. Sankarakumar Pillai has proceeded to Java on leave to study the conditions there and we wish him success in his efforts.

OUR PATRONS. Messrs: C. V. Venkataramana Ayyangar, B. A., B. L., M. L. C., and Rao Sahib C. S. Ratnasabhapathi Mudaliar, now President, District Board, Coimbatore, have become our patrons, for which we express our thanks. We are proud to note that among our Patrons, Lieut. the Raja of Parlakimedi has been

given the hereditary right to the title of Raja, Mr. T. A. Ramalingam Chettiar, B. A. B. L., M. L. C., has had the title of Rao Bahadur conferred on him and the Hon'ble Mr. C. P. Ramaswami Ayyar, Member of the Executive Council, has been made a C. I. E.

From the funds at the disposal of the Union pecuniary help in the shape of a loan was given to the extent of Rs. 300 to student A. Sivarajan who took his Diploma in December last. The loans given to students in the past have in great part been recovered.

In response to our appeal, contributions to the extent of Rs. 1,300 have been promised by members, of which about Rs. 200 have been collected so far. The Committee

is glad to be able to state that as a result of its efforts, the Government have sanctioned the lease of a site of about 37 cents to the south of the Post office on a rent of annas 8 per year. They have also sanctioned the grant of Rs. 670 towards the cost of construction of the Building under the proviso that the Union be first registered under the Indian Registration of Societies Act 1860. Further steps can therefore be taken only after the discussion of the question of registration in the ensuing General Body Meeting.

A present of curtains for use for dramatic entertainments on the occasion of the College Day was promised by Messrs: K. Venkata Rao Badami, K. Ramiah and J. Ranga Raju. The hearty thanks of the Union are due to those donors for their generous offers.

The Committee is glad to report that the publication of the Journal has been regular except for a short period of two months when plague was severe in town. The Journal, they regret to point out, has not been self-supporting at the present rate of subscriptions and the Committee feel that the subscription should be enhanced to enable it to have more funds at its disposal.

The indexing of the previous ten volumes has kindly been undertaken by Messrs. Rao Sahib T. S. Venkataraman and T. V. Rajagopalacharya and we understand considerable progress has already been made. Our thanks are due to them for their kind undertaking.

In accordance with the resolution passed at the General Body Meeting in December 1921, for the recovery of arrears totalling to about Rs. 1,700/ the Committee are glad to state that as a result of strenuous efforts made the amount under arrears has been very much reduced.

Owing to various reasons, Mr. Anandan, who was elected Treasurer in December 1921, was unable to assume charge of his duties and eventually resigned. In these circumstances, the Secretary had to look after the work of the Treasurer in addition to his own duties. Otherwise there were no changes in the personnel.

Before concluding, the Committee begs to express its warm thanks to Mr. F. R. Parnell, the President, and to Mr. R. D. Anstead—the Director—for their continued interest in the Union and to the Auditors Messrs. K. Krishnamurthi Rao and V. Ramanathan.

B. VISWANATH,

Honorary General Secretary.

Statement of Receipts and Charges of the Madras Agricultural

DETAILS OF RECEIPTS.	AMOUNT.			TOTAL.		
	RS.	A.	P.	RS.	A.	P.
Opening Balance as it stood on 1-12-1921.						
Cash on hand	740	15	2			
Fixed Deposit in the Dt. Urban Bank	1,200	0	0			
Post Office Cash Certificates	232	8	0			
Advances recouped :—						
From the Printer Rs. 300.						
„ Clerk Rs. 10.						
„ Students Rs. 450.						
	760	0	0	2,933	7	2
Donations for the Building Fund				159	0	0
Ramasastrulu Munagala Fund				504	0	0
Contribution towards the making of curtains...				50	0	0
Interest on fixed and current deposits, on Post Office Cash certificates and on loans to students				272	3	4
Collections under Permanent Fund				556	12	10
„ „ College Day Account				845	8	6
„ „ Journal account				2,240	7	5
TOTAL				7,561	7	3

Checked and found correct, 10th July 1923.

Students' Union for the period ending 30th June 1923.

DETAILS OF EXPENDITURE.	AMOUNT.			TOTAL.		
	RS.	A.	P.	RS.	A.	P.
Postage				74	7	0
Expenditure under Permanent Fund.				33	4	6
„ „ College Day Account				744	7	4
„ „ Journal Account				2,968	0	1
Miscellaneous				18	15	0
Closing Balance on 1-7-1923.						
Amount deposited in Fixed Deposit	745	7	0			
„ „ Ramasastrulu Fund	536	11	1			
„ „ in the Current Account...	241	6	11			
Advances to be recouped Rs. A. P.						
From the Artist for the curtains	30	0	0			
„ „ Clerk	10	0	0			
„ „ Students (excluding interest)	330	0	0			
For the purchase of curtains	172	0	0			
	542	0	6			
Cash on hand	1,656	11	10	3,722	5	4
TOTAL				7,561	7	3

K. Krishnamurti Rao,
V. Ramanadham,

Auditors.

N. B. Of the amount of Rs. 1,656-11-10 shown above as cash on hand, Rs. 1,000 has since been deposited as "Fixed Deposit" in the Coimbatore District Urban Bank Ltd.

11-7-23.

B. Viswanath,
General Secretary and Treasurer.

DETAILS OF RECEIPTS.	Rs. A. P.			DETAILS OF EXPENDITURE.	Rs. A. P.		
	Rs.	A.	P.		Rs.	A.	P.
Permanent Fund.							
Subscriptions from Members ...	256	12	10	Stationery and purchase of books ...	33	4	6
Donations from Patrons ...	300	0	0				
TOTAL ...	556	12	10		33	4	6
Journal Account.							
Advertisement charges ...	212	4	0	Printing charges ...	2,105	14	10
Subscriptions ...	2,028	3	5	Establishment charges ...	313	10	0
				Stamps ...	363	4	9
				Stationery ...	58	3	0
				Miscellaneous ...	36	15	6
TOTAL ...	2,240	7	5		2,968	0	1

DETAILS OF RECEIPTS.	Rs. A. P.			DETAILS OF EXPENDITURE.	Rs. A. P.		
	Rs.	A.	P.		Rs.	A.	P.
College Day Account.							
Collections by way of subscriptions	845	8	6	Entertainment ...	157	0	1
				'At Home' charges ...	169	0	4
				Sports ...	217	8	0
				Photo ...	21	8	0
				Rosettes and Badges ...	51	12	6
				Stamps and stationery ...	85	4	0
				Miscellaneous ...	42	6	
TOTAL ...	845	8	6		744	7	4

Checked and found correct.
10th July 1923.

K. Krishnamurti Rao
V. Ramanadham.
Auditors.

Welcome Address.

BY

THE PRINCIPAL—MR. F. R. PARNELL.

SIR VENKATA REDDI NAYUDU, LADIES AND GENTLEMEN,

It is my very pleasant duty, on behalf of the Madras Agricultural Students' Union, to welcome all our visitors to the College Day Celebrations. Many of you are old friends who know from past experience how pleased we are to have you with us once again. Some are here for these celebrations for the first time and I can promise that we will do our best to ensure that it shall not be your last.

To our Minister, Sir Venkata Reddi Nayudu, who has so kindly consented to honour us by presiding on this occasion and to Mr. Noyce, our Secretary to Govt., I wish to offer a special welcome. I should like to take this opportunity of offering to Sir Venkata Reddi our hearty congratulations on his Knighthood, a well-deserved honour and a happy recognition of the good work that he has done. I recently witnessed part of the reception accorded to him on his first return to his native district after that honour; any ordinary reception must seem cold after that, but our good wishes, though less boisterously expressed, are equally sincere.

I cannot but notice, with deep regret, the absence of one who, but for his untimely death, would, I am sure, have been with us to-day. I refer to our old friend Mr. Vengail Krishnan Nayanar who took such a live interest in the Union for many years.

This year we have reverted to the old time for holding the College Day viz., July. We were unfortunate last year in having very heavy plague infection on the Estate in December and it was decided that it would not be fair to ask visitors to come here at that time. In order to avoid the possibility of the same thing happening this year, and to reduce the time between the 1921 College Day and this year's it was decided to revert to July. Yesterday was the 14th Anniversary of the opening of the College by Sir Arthur Lawley on July 14th, 1909 and this year's date is, therefore, most appropriate.

The Secretary will read the annual Report of the working of the Union and there is, therefore, nothing for me to say on that subject. I should like, however, to refer to the importance of the general meeting of the Union to be held on Tuesday morning. The question of registration has to be discussed and I hope the general condition of the Union, its aims and working will be considered with a view to widening the scope of its work and placing it in a sounder financial condition.

I am pleased to see several of our Honorary Visitors here to-day.

Presidential Address.

Sir K. Venkata Reddi Nayudu—President—in opening the Conference declared that, as a Minister, he was personally most proud to be associated with agriculture, for, was it not appropriate that, coming of an Agricultural family—a family belonging to a community of agriculturists—known as the “Kapus”—he should be in charge of Agricultural Development? Referring to the congratulations made by Mr. Parnell and the Union on the Knighthood conferred on him, he said he did not consider that as an honour conferred on him individually, but rather as an honour done to the Development Department as a whole. For, if he was able to show any work as the Development Minister, was it not because he had received the loyal co-operation of all the various sections? He was particularly glad to state that he had received the best help of all from the Agricultural Department. Adverting to the fact that several of the European Officers of the Department had retired from service during the past two years, he said he was sorry that the country had to bear the loss of their valuable services. He was afraid that such a retirement was probably due to the sense of insecurity created by irresponsible speeches, made in Congress platforms and elsewhere, with regard to the future responsibility for the pension contributions of Europeans in the services. Although such a retirement had the effect of indirectly bringing about the Indianisation of the Agricultural Service aimed at by the Reform Act,

sooner than originally intended, he was sincerely grieved that thereby the technical skill and experience possessed by the European officers was irretrievably lost to the country. He, however, plainly informed the European officers that any adverse opinion formed by them as to the motives of the Indian Legislature was absolutely unfounded and solemnly assured them that "India would never play them false."

Referring to the Presidential address of the last Conference (1921) he said he concurred with the President—Mr. MacMichael—in condemning "eyewash" and advised the department to continue to do honest, unostentatious work as heretofore. He did not however think that there was a greater danger of the substitute of "eyewash" under a democracy than under any other form of Government. He confessed, however, that in the first two years of the present Legislative Council, there was a good deal of misinformed criticism directed against the Agricultural Department, but that when a hand-book such as "The Popular Account of the Madras Agricultural Department" was published the situation was greatly remedied. He laid great stress on the value and necessity of publicity, especially under a democratic Government and declared that in his opinion advertisement was necessary for the Agricultural Department, as otherwise the work done by the department would escape the notice of the public.

As stated by His Majesty the King Emperor at Rome, Agriculture was the foundation on which the whole fabric of a nation whether viewed from the political, economic or social standpoints depended, and as such needed the whole-hearted encouragement of the State. He emphasised therefore, the importance of the Agricultural officers being in greater touch with the ryots and thereby benefiting them. He was of opinion that research work carried on honestly and unostentatiously should go hand in hand with advertisement and demonstration.

He stated that he was satisfied from personal observation that work in the Agricultural Department was on right lines and that from the beginning he turned his attention, therefore, more to the Department of Industries instead. As far as Agriculture was concerned, what was greatly needed at the present moment was in

his opinion an expansion of staff for purposes of demonstration, as rightly demanded in the Legislative Council. The great disproportion and inadequacy of a staff of 78 officers to serve an area of 39 million acres of cultivated land in the Presidency was self-evident. Again there were about 5 million acres of arable land now lying waste that remained to be utilised—a work that the Agricultural Dept. had, in his opinion, to undertake. He was glad to be able to state that, through the kind offices of Mr. Noyce, Development Secretary, about 15 new posts had recently been sanctioned. He further added that as compared with other parts of the world the standard of living in India was very low and that a raising of the standard of living was bound to interact and induce a higher standard of production and thereby make Agriculture as a profession more remunerative. Referring to the students among the audience, he said that as future citizens they owed a duty to the "soil", which devolved on them the work not only of bringing more land under cultivation and thus increasing production, but also of taking to the ryots the results of research work turned out at this institution and thus of helping the development of their motherland. He added that he was sure there were among the officers of the Agricultural Department, some on whom the Spirit of Science had descended and thought that with their co-operation the expansion of the Department on useful lines was assured.

President's Concluding Speech.

Sir K. V. Reddi Nayudu, rising amidst cheers said that he felt he ought to congratulate the members of the Conference on a very successful session. He declared that he was glad he was able to stop till the close of the conference, for he felt he had thereby become a better informed man. He, however, felt that it was rather strange that all the papers contributed by the institution should have come mostly from junior officers and declared that, although it was laudable of the Heads of sections to encourage juniors, he had expected a few at least from the senior officers. He also thought that some of the

important crops—such as cotton and oil seeds—should have received some attention at the conference. Referring to Dr. Kunhikannan's paper he said he was of opinion that in a vast country like India there was scope both for small holdings and for capitalistic farming and declared that what was really needed at the present moment for effecting improvement in Agriculture in India was the development of co-operation among villagers. As regards State aid to agriculture, he said that he had long been having under contemplation the introduction of an act similar to the State Aid to Industries Act, which he had the fortune to see through the Council recently and he promised in case he was again returned to the Council, it would be his earnest endeavour to press for it with all the devotion he was capable of. He said there were many anomalies in the present constitution of the Government, of which a Minister in charge of Agricultural Development but without any power of control over Irrigation was but one, but he declared that, whether he was a Minister in the next council or merely a Member, Agriculture would always be dear to his heart as he believed that its development was one of the best means of bringing about the uplift of the country.

He then declared the Conference closed.

The President of the Union—Mr. F. R. Parnell,—then thanked Sir K. V. Reddi heartily for his kind and able services in guiding the discussions during the Conference.

CORRIGENDA.

(1) Please read in Vol. XI No. 5, in article on "Reminiscences of a recent tour in the West Coast" in p. 164, para 10, line 3, "*Trichur Farm*" for "*Trichur Town*."

(2) Please read, in the same issue in article on "Plantain Cultivation in the Cauveri Valley," p. 166, line 2, "*the latter*" for "*the former*."

Editor.

Editorial Notes.

College Day and Conference, 1923.

The Thirteenth College Day was this year celebrated on the 14th July and the Agricultural Conference was held in continuation thereof on the 15th and the 16th July. This reversion of the time of holding the College Day from December—which had become the custom from 1919—to July 14, the date of the opening of the College, as was the practice in earlier years was due, as may be evident to such of our readers as have followed the history of the colony at the Agricultural College, Coimbatore, to quite unavoidable circumstances. The out-break of the plague prevented the Union from holding the College Day as usual in December last and a fear of its recurrence in December this year induced them to go back to the original date—14th July.

Though July is without doubt a pleasant month, and compares quit favourably with December, it cannot be denied also that it is a little too early to allow of all the students to partake in the entertainments accompanying the celebration. Many of the new students can join only by the beginning of the month and will generally not have had time to become familiar with the atmosphere of the College. Moreover there is little of any crop for the visitors to see on the farm: and lastly the benefit of the Christmas vacation—wherein the heavily worked local committee of the Union could relax their limbs—is denied them in July. But in spite of all draw-backs, July was felt by all to be safer in view of the general liability of Coimbatore to plague about December.

The guests. The earliest visitors to arrive reached Coimbatore on the 12th July; but the great majority arrived on the 14th. They were received at the station by the volunteers headed by their Captain, Mr. H. Shiva Rao, and their wants were duly attended to. The thanks of the Union are due to the Warden—Mr. T. V. Ramakrishna Ayyar—for kindly placing the new block

of Students' Quarters at their disposal for lodging the visitors. The boarding of the Indian guests was catered to by the Officers' Mess attached to the Indian Officers' Club—and our thanks are due to the Secretary of the Mess for the efficient way in which the wants of the guests were attended to.

The list of guests (which is published in full elsewhere) included several distinguished personages—among whom were to be numbered the Minister for Development, Sir K. V. Reddi Nayudu, Mr. Noyce, I. C. S., Secretary to Government Development Dept., several members of the Legislative Council and a few Honorary Visitors. The thanks of the Union are due to Mr. R. D. Anstead, Director of Agriculture, for his kindness in deputing all the Gazetted staff of the circles and a large number of the District and Farm Staff to attend and take part in the Conference. Several familiar faces were however missing, of whom those of Messrs. H. C. Sampson, R. C. Wood, Dr. Norris, etc., were not the least. In this connection one cannot but regret the premature death of the late Mr. Vengail Krishnan Nayanar, whose unfailing presence used to be identified with the celebration of many a College Day in the past.

Athletic Sports. Under the energetic directions of the Sports Secretary, Mr. K. T. Bhandary, the play ground rapidly assumed, on the morning of Saturday, the 14th July 1923, the usual gala appearance, with flags and buntings of all the colours of the rainbow fluttering in the monsoon winds, beckoning, as it were, the passers-by to witness the Sports. As usual three large tents were provided for the use of the guests—Europeans and Indian—and the Indian ladies; but it must however be remarked, in this connection, that these did not provide sufficient accommodation for all, especially in view of the vagaries of the weather—and it appears to us that more accommodation should be provided for on future occasions, though perhaps the new College Building, one side of which faces the ground, may possibly be of service in this direction by that time.

Crowds of sight-seers began to arrive long before 3 P. M., when the Sports were due to commence, and ensconced themselves on suitable vantage grounds for witnessing the *tamasha*. The new College Building under construction proved to be a coveted place for this purpose as evidenced by the large members that had gathered on the top floor, on the windows and the verandah. The visitors began to arrive by 3 P. M. and were duly received by the Vice-President and the Secretary and the Sports commenced exactly at 3 P. M.

However neither the Vice-President, Mr. Tadulingam, nor the Secretary, Mr. B. Viswanath, had been prepared for the reception of an entirely un-invited guest who also arrived in time. The clouds, which had been since the noon rather more than usually dark and heavy over the Hills on the west, gradually thickened and marched forward with the monsoon winds. What began as a slight and pleasant drizzle soon developed into a driving rain, and compelled many of the spectators to seek refuge wherever shelter could be found. Nothing daunted, a great many, however, braved the rain, protected either by raincoats and umbrellas, and stayed on for cheering the competitors. The judges had, of course, rather a hard time of it during this unusually inclement weather and it redounds greatly to their credit that they stood their ground in spite of such a severe handicap. Before long, however, it looked as if, the Rain-God had, out of compassion for the distress he had caused, begun to relent somewhat and towards 5 P. M. the drizzle stopped completely and the evening's events were gone through so smoothly and successfully that one forgave the rain altogether and, in the fullness of heart, agreed with Shakespeare that "All was well that ended well."

The thanks of the Union are due to Mrs. Parnell for kindly arranging for the European refreshments and Rao Sahib T. S. Venkataraman is to be thanked for the trouble taken by him in providing refreshments for the Indian guests. The "At Home"

was on the whole quite a success in spite of the fact that the rain prevented the guests being attended to as well as could otherwise have been possible.

The Various Events. The cross-country Race run along a track of about five miles was finished on Saturday, the 7th July, and was won by Ratnavelu who finished it in 37 min. and 55½ seconds. The preliminary heats were over on Thursday the 12th July. There was altogether a large number of entries and keen competition was observable in many of the events and records were broken in 3 of the events. The high jump was specially interesting as the winner—Jivaratnam—broke the record clearing 5 feet 1 inch with ease in spite of the ground being slippery on account of rain. The "Old Boys' Race" of 100 yds. was, under the enthusiastic example set up by one of the "youngest" of the 'Old Boys'—Rao Sahib M. R. Ramaswami Sivan—competed for by several and was won by Mr. U. Vittal Rao. The Half-mile Race open to visitors was won by one of the Estate Boys—Srinivasalu—the Senior Patrol leader of the local "Ramakrishna" Scout troop. There were in addition races for scouts, cubs, estate girls and farm boys. The only two items conspicuous by their absence this year were the "greasy pole" and the "Sack" race.

When all the events had been gone through the distribution of Prizes was attended to in front of the main Shiamiana in the midst of a large gathering of spectators. Sir K. V. Reddi Nayudu, Development Minister, and Mr. Noyce, Development Secretary, graced the occasion with their presence. The Principal, Mr. Parnell, in requesting Mrs. Noyce to be so kind as to give away the prizes, said that, in spite of the inclemency of the weather, this year's events had been noteworthy in that in as many as three events previous records had been beaten. The champion of the year was M. Ratnavelu who thus won Vengul Nayanar's Championship Cup. He also won the "Saidapet Old Boys Cup" for 100 yards race and the "Dr. Norris Cup" for Cross country Race. "Mrs. Anstead Cup"

for one mile race was won by A. R. Krishnamurthi. The "Ramnad Shield" for inter-tutorial Tug-of-war was won by Mr Sundaraman's Wards, while the "Chunampet Shield" for inter-tutorial Relay Race was won by Mr. T V Rajagopalacharya's Wards.

The occasion was also availed of for presenting the successful students of the Farm Night School amongst whom were some Adi-Dravida boys with various appropriate prizes.

The eventful day was brought to a close at 7 P. M. by a call for cheers to Mrs. Noyce and the Guests of the evening, which was lustily responded to by the students and the spectators.

The sincere thanks of the Union are due to the following gentlemen who helped to make the Sports a success and whose services were specially valuable as they were rendered under very difficult weather conditions:—The Judges: Messrs. W. G. Dyson, D. S. Reddi, R. D. Anstead, P. H. Rama Reddi and Rao Sahib M. R. Ramaswami Sivan; the Time-keepers: Messrs. F. T. T. Newland and K. Krishnamurthi Rao; and to the Starters: Messrs. G. R. Hilson and D. G. Munro. Our thanks are also due to Messrs F. R. Parnell and C. Tadulingam who undertook to meet the cost of prizes to the cubs and scouts respectively.

As owing to the heavy rain the pile of cotton stalks had become very wet, the bonfire which had been programmed to take place at 7-30 P. M. in the evening had to be postponed to Monday the 16th instant. This arrangement, however, proved to be not a very happy one, as most of the students and the denizens of the estate could not be present to witness the sight, as they were engaged in the dramatic entertainments on that evening.

The Agricultural Conference. The Conference met in the large hall on the ground floor of the College, at 12 noon, on Sunday the 15th July, when the President-elect Sir K. Venkata Reddi Nayudu Kt.,—Minister for Development, declared the Conference open and called upon the Principal to deliver his welcome address.

The President of the Union—Principal Parnell—then read his address of welcome (printed elsewhere in full) in which he heartily welcomed all the visitors especially the Minister, Mr. Noyce, Development Secretary, and Members of the Legislative Council and Honorary Visitors and congratulated Sir K. Venkata Reddi on the honour recently bestowed on him.

The General Secretary, Mr. B. Viswanath, then read his annual report, wherein a statement was made as to the progress made by the Union during 19 months that had elapsed since the last College Day. The President-elect then rising amidst deafening cheers delivered an extempore speech lasting for nearly an hour, in which he dealt with various points involved in the policy of the Government as regards the development of agriculture and advised the officers to beware of "eyewash" and the students to remember that by reason of their agricultural education they owed a duty to land which they were to fulfil in their future career. A precis of his speech is printed elsewhere in this issue.

He then presented Mr. V. Ramanathan, L. Ag., the "Ramasastrulu Munagala" Medal for the best account of research work done by the writer.

The President then called on Rao Bahadur J. Chelvaranga Raju to read his paper on "Flower Trade in Madras." Mr. Raju said in the present days of Financial stringency—when agricultural graduates were left without openings for making use of their knowledge, Flower Farming was a profitable line of work which he could recommend them to take up with advantage. He stated that there was a great demand for flowers in towns and if one could cultivate a variety of them and supply the sorts needed at periods when they were particularly in demand, one could make Flower Farming a very lucrative concern. He gave a list of the more important flowers and scented plants that were in demand in the Madras market and gave interesting notes about most of them. His paper was followed by a very interesting discussion in which several members took part.

Mr. K. Krishnamurthi Rao then read a paper prepared jointly by G. Ganapathi Ayyar and himself on "Jaggery Making—factors influencing quality." The writers were of opinion that so far as India was concerned Jaggery was not likely to be replaced by Sugar as a poor man's food for a very long time to come. They considered the various factors which governed the composition of the Jaggery, its colour and its keeping qualities and made definite recommendations as to the points to be attended to in preparing good jaggery. This was followed by a discussion in which several members took part.

Mr. K. Ramiah then read his paper on "Some factors which influence Rice Breeding in Tanjore" in which he dealt with the conditions in Tanjore that had to be taken into account in breeding paddy varieties suited to the Tanjore Delta. He showed that in addition to the intrinsic qualities of the new strains, as regards their acceptability as food for various classes of people and their capacities of giving heavy yields, two other points had also to be kept in mind in evolving such strains. Firstly, as when designed for export paddy has to be milled in bulk in Rice Mills, the milling qualities of the new strain should be considered; and secondly as Tanjore Rice has to meet the competition of Burma Rice the new strain should be designed to meet the special needs of the consumer outside the district regards both quality and cheapness. There was a very interesting discussion on this subject in which several took part.

At 3 P. M. the Conference adjourned for the day to meet again the next morning at 8 A. M. The usual Group Photograph was taken at 3-30 P. M.

At 5-30 P. M. there was a demonstration at the All-India Sugar-cane Breeding Station, Chettipalayam, which was attended by a very large number of visitors including Sir K. V. Reddi Nayudu, Development Minister and Mr. Noyce, Development Secretary. The demonstration aimed at making the visitors acquainted

with all the various items of work involved in raising new varieties of high quality canes from seed and in testing their comparative merits so that only the very best could be selected for propagation. There was also a very interesting series of exhibits arranged by Mr. K. Krishnamurti Rao, Assistant Sugarcane Expert, showing the composition of Sugar and Jaggery and the effect of various factors responsible for the quality of the Jaggery produced, as also a practical demonstration of an improved furnace for Jaggery making.

There were in addition an exposition of various interesting experiments relating to the development of the root system of cane varieties which are expected to be of very great utility in making canes fit for various types of soil conditions. Mr. K. Krishnamurti Rao had the great privilege of standing Tea for all the visitors of the evening.

At 9 P. M. the members of the Indian Gazetted Officers' Association Agricultural Department—had the high honour of entertaining Sir K. Venkata Reddi Nayudu and several members of the Legislative Council at dinner, in honour of the title recently bestowed on him.

At 8 A. M. on the 16th July, the Conference met again under the Presidency of Sir K. Venkata Reddi Nayudu who requested Mr. K. Unnikrishna Menon to read his paper on 'Some side-lines of Farming.' Mr. K. Unni Krishna Menon said that owing to the existence of competition and the non-availability of large blocks of land for cultivation, it was necessary to devote some attention to side-lines of Farming, so as to make regular Farming more remunerative. Dairying was one of the most promising lines in his opinion, the animals being stall-fed with green fodder obtained from plots of perennial crops like Guinea grass, Elephant grass and Lucerne. Rearing goats, keeping poultry, apiculture and sericulture were suggested as other possible side-lines. The paper was followed by a discussion in which various members took part.

Mr. S. Kasinathan, then, read his paper on the 'Ripening of the Sugarcane.' He said that the determination of the ripeness of sugarcane was a difficult problem. The ordinary method, which is known as the *co-efficient of purity method*, was not in his opinion very reliable, as the standard of purity varied from place to place and between one variety and another. Nor was a new method adopted by a Japanese Chemist in Formosa known as the *maturity co-efficient method* more practicable. Taking into account the proved fact that the sucrose content of the joints of a cane decreases from the bottom to the top and that at the time of ripening, their sucrose content gradually increases till the contents of the top and the bottom internodes equalise, the writer hit upon the method of cutting the canes of a portion of the field into top and bottom halves and analysing their juices separately. When the sucrose contents of the two equalised, the cane field had, in his opinion, become ripe: and in corroboration of his statement he produced figures of actual results obtained so far.

Mr. K. Krishna Menon, was next called upon to read a paper entitled—'Prevention is better than cure,' wherein he explained the origin of diseases of plants caused by Fungi and showed how diseases of this character could be avoided by certain precautionary measures. Clean cultivation, crop-rotation, seed selection—these were methods which any ryot could understand and practise and by the adoption of which many diseases could be prevented. In certain cases treatment with Copper Sulphate or spraying with Bordeaux Mixture acted as preventives and could be readily adopted.

Mr. G. Rajagopal Nayudu—one of the old Saidapet Boys and experienced Agricultural Inspector of the Madras Agricultural Department who had retired about 17 years ago, then followed with a paper entitled "A Brief Memorandum on Agricultural Reform in South India." After tracing the genesis of the Agricultural Department in Madras, he compared the

Madras Department with the United States Department of Agriculture and adduced certain reasons which, in his opinion, were responsible for the comparative lack of progress shown by the former. He suggested various remedies, chief of which were the following: viz: a greater publicity of its activities, a more intimate touch with the ryot, a continuity of policy and work, deputation of men for foreign training, improvement of irrigation, of water ways and road ways, and improvement of women's education.

Mr. F. H. Butcher—Curator of Botanic gardens, Ootacamund, then read a paper on "Potatoes and their cultivation in South India." The paper dealt with the salient points of Potato culture on the Nilgiris giving all important details of its cultivation, including the preparation of the ground, the seed rate, manuring after cultivation and storage. In summing up, the writer stated that no plant responded more readily than the potato to good treatment and added that although the crop required a temperate climate to be at its best, good and profitable crops could possibly be grown in many parts of South India where at present it was seldom seen."

The Conference adjourned for lunch at 11 A. M. and met again at 1 P. M.

Mr. Richards read a paper entitled "Serum Simultaneous method of Inoculation against Rinderpest" by Mr. K. Kylasamier, Deputy Supt. C. V. D., in the unavoidable absence of the writer on other work. The writer said that Rinderpest was one of the most deadly of cattle diseases accounting for more than 50% of cattle mortality in India. Till recently the only measure taken by the Department was to immunise the cattle during times of pestilence by the "Serum alone method." This conferred only temporary immunity. During the last 3 or 4 years another method—"the serum simultaneous method"—had come

into practice whereby the protective serum as well as contagious blood from an infected animal were simultaneously injected into the animal. This method, he said, conferred life-long immunity for the animal and was, therefore, one that every cattle-owner should adopt.

Mr. M. Mangesha Rao then read a paper on "A Review of Agricultural Improvements in South Kanara," in which he passed in review the progress achieved to date in spreading improved methods of Agriculture in South Kanara District, the chief items being the introduction of better varieties of Sugarcane and paddy, green manure crops, improved manures, improved ploughs and the mhote.

A paper on "The Methods of improving the Milch Cattle of India" by Mr. V. P. Subrahmanya Mudaliar was read in the absence of the writer by Mr. T. V. Rajagopalacharya, wherein Mr. Mudaliar condemned the system of importing foreign breeds to improve the milking qualities of native breeds. He was of opinion that, on the other hand, efforts should be made by selection and breeding among the indigenous races of cattle to evolve better kinds of milch cattle. The paper was followed by a discussion of the question among the members.

Mr. V. T. Subrahmanya Kandar—an "Old Boy" and at present a practising farmer in Salem District—was then called upon to read his paper on "The possibilities of Agricultural improvement in the Cauvery Valley." He gave an account of the existing conditions of agriculture and suggested several improvements which he considered possible in that tract. It was followed by a discussion in which some took part.

Dr. Kunhikannan of the Mysore Agricultural Department next presented a thoughtful paper on "Agricultural Education in India" which was read by Rao Sahib M. R. Ramaswami Sivan in the absence of the writer. He was of opinion that in Agricultural Education, as in education in general, Western

systems and ideals were of value only in so far as they fitted in with the conditions of the country. Agricultural Education in the West, he observed, had been developed under the influence of capitalistic farming induced by high prices and had been sustained by the high standard of industrial progress. In India, conditions were quite different; there was an enormous rural agricultural population that lived on land parcelled into innumerable small holdings and was further characterised by a low standard of living. He was of opinion that for the ryot who acquired a working knowledge of the main principles of Agriculture from his boyhood, education should not be on the lines of the present courses followed in Agricultural Colleges, but should be designed to supplement his knowledge rather than cram him with alien ideas. In his opinion, "the main effort and much the larger proportion of funds, should be directed to the establishment of one year courses designed to train up students down from among the class of small farmers," rather than to a further expansion of higher Agricultural Education.

The paper was followed by a discussion in which several took part:

The President, then, rose amidst cheers* and made a short speech, in which he expressed his appreciation of the value of a conference of the sort over which he had the honour to preside and declared that he had gathered a great deal of information on agricultural matters. He, however, wished that a few papers at least had been contributed by the experts; and remarked that important crops like cotton and oil-seeds had not received the attention they warranted at the conference. After declaring that whatever he might happen to be in the next council he would always take interest in Agriculture and Agricultural subjects, he declared the conference closed.

Mr. Parnell as President of the Union then thanked Sir K. Venkata Reddi Nayudu for the very able manner in which he had guided the deliberations of the conference.

At 4-30 p. m. the Minister in company with Mr. Noyce and Mr. Anstead enquired into the grievances of a deputation of ryots of the Coimbatore District in regard to the date of enforcement of Pest Act for cotton, after which he left for Madras by the Mail.

At 8-30 p. m. the bonfire was lit in honour of the College Day celebrations and soon after at 9. p. m. the visitors and the staff were treated to a dramatic entertainment by the students at a theatre specially fitted up for the occasion in the conference hall.

Dramatic Entertainment. The unique feature of this year was that for the first time in the annals of the Union, its entertainments were presented under its own curtains. As promised at the last conference, the following curtains were presented by various donors for whom the grateful thanks of the Union are due. (1) A drop-curtain with the Goddess of Plenty—Lakshmi—presenting a ryot with a good harvest and with the Coimbatore Agricultural College in the back-ground—from Mr. K. Venkata Rao Badami of Bangalore. (2) A street scene with buildings, on either side, of eastern and western type presented by Mr. K. Ramiah (3) A garden scene—(Union's own) and (4) A grand Durbar scene—from Mr. J. Ranga Raju of Madras. The first was prepared to design given by Mr. Venkata Rao and the first three curtains, we are proud to record, were the splendid results of the united efforts of our College Artists—Messrs. C. Ranganadha Mudaliar, C. R. Doraiswami Mudaliar and M. Singara Royan. The Union is specially thankful to them for the promptitude with which they got them ready so as to make them available for use on the College Day. Mr. Ranga Raju's Durbar Scene was prepared in Madras and also bears evidence of high artistic effort. We are glad to announce in this connection the generous offer of another curtain depicting a forest scene by Mr. C. Narayana Ayyar, Dy. Director of Agriculture, VIII Circle, for which the Union is thankful. With this curtain added, the Union will be in possession of a fairly full equipment sufficient for almost any theatrical effort.

Before the curtain rose, Student Kannan Nambiar entertained the audience with several very clever card tricks and a few feats of magic. He is to be congratulated on the excellence and neatness of his performances, which are all the more remarkable as he is but an amateur.

The first piece presented was "Chiselling"—an adaptation from one of the French farces, in which Mr. M. U. Vellodi showed some very splendid acting as Trotter, the servant of a young sculptor, Larkspur—Ramaswami Naidu—who makes him pose as the marble statue of Alexander the Great in order to deceive an old but eccentric art connoisseur—from whom he expects a bequeathment. Piper—the Inn keeper was well represented by Suryanarayana. The numerous comic incidents in this farce kept the house in continuous laughter.

The second piece was in Tamil and was an adaptation of Moliere's "Mock Doctor." All the actors played their parts well especially the cunning wife of the Mock Doctor who cleverly took revenge on her husband for his ill-treatment of her. Rajaratnam, who took the clown's part, kept the audience in roars of laughter with his extempore Tamil songs touching on the humorous side of life at the Agricultural College. The third piece was enacted in Telugu by the Telugu students. It was a farce composed locally wherein the whole process whereby a student from the mofussil is attracted to and joins the Agricultural College was humorously depicted. Ranga Rao did his part very well as a Telugu Munshi managing his class of ill-assorted, impertinent and sleepy students. The actors are to be congratulated on their efforts, though it was easy to see that they were rather prone to an overdoing of their parts. The entertainments came to a close at about 1 A. M.

The Business Meeting. At 8 A. M. on the 17th, the members of the Union met in the small Lecture Hall with the President, Mr. F. R. Parnell, in the chair. After some preliminary speeches by various members regarding the aim and work of the Union, the

consideration of the various items of changes in the rules, of which notices had been given in the October 1922 issue of the Journal by Mr. T. V. Rajagopalacharya and others, was taken up. There was a great deal of animated discussion on some of the items of amendments and alterations. As the business of the meeting was not finished at 11 A. M., it was adjourned to 4 P. M. in the evening when the President again took the chair. It was about 6 P. M. before all the items could be gone through and at this stage the President left the chair on account of a prior engagement, when the Vice-President assumed the Chairmanship. In this connection, we feel impelled to express, on behalf of the Union, our warm appreciation of the excellent, able and extremely patient manner in which the President guided the discussions on the numerous knotty points that came up in the course of the consideration of the change of rules. The question of registering the Union under the Registration of Societies Act was next considered and it was decided that the registration might be made after making fuller enquiries as to the details, the Working Committee being empowered to attend to it. The election of office bearers was next taken up. We are glad to announce that our popular and genial Vice-President, Mr. C. Tadalinga Mudaliar, was re-elected unanimously once again. Mr. M. U. Vellodi was elected Honorary Secretary, Mr. D. Srinivasa Rao Treasurer, and Rao Sahib Y. Ramachandra Rao was re-elected Editor, as also were Messrs: T. V. Rajagopalacharya and V. Muthuswami Ayyar by overwhelming votes as members of the Working Committee. The full list of the members of the Council and the Working Committee is given overleaf on the cover as usual.

The meeting was a record one both as regards the time taken and the momentous changes involved therein and it was nearly 9 P. M. before the Vice-President could declare it closed.

The character of the changes in the constitution of the Union will be apparent by a study of the new rules passed (printed in full elsewhere) : but the main changes are, in brief, as below.

Hitherto the members paid Rs. 10 or Rs. 5, according as they were I or II class members, to get admission into the Union, and had no recurring subscriptions to pay, becoming in fact thereby life-members of the Union, but every member did not subscribe for the journal. Under the new rules, on the other hand, every fresh member has to pay an entrance fee of Rupee one and a yearly subscription of Rs. 2 if a student, Rs. 3 if a non-student but having an income of under Rs. 100 per month, Rs. 4 if one with a monthly income of over Rs. 100 and under Rs. 250 and Rs. 5 with an income of Rs. 250 and above, but with the difference that every one of the members would get the journal free. These new rules will however affect only the new members, the old members being given the option of coming under the new rules or merely subscribing for the Journal at the new rate of Rs. 4 as they please. The rest of the changes were incidental on these fundamental alterations, and merely related to an expansion of the Council and of the working committee.

It is believed that the new rules will lead to a larger sum becoming available for the Journal, which has so far not been self-supporting, but our exact financial position will probably be more evident when next year we find what response is forthcoming from the members.

A fair number of the guests left Coimbatore for home on the 17th and the majority departed on the 18th, leaving the colony to digest as best it could the surfeit of activities it had during the College Day functions, and to fall back into the uninteresting but inevitable humdrum round of daily routine.

In conclusion, we take this opportunity of thanking the Principal, Mr. Parnell, and all heads of sections for assistance readily rendered in various ways and Mr. Newland and the Engineering Staff specially, for help rendered in fitting up the stage and putting on the electric lights.

The Liverpool Meeting of the British Association.

A novel feature of the meeting of the British Association at Liverpool on September 12—19 this year will be a Scientific Exhibition at which there will be exhibits of apparatus in connection with each section of the association and certain others showing recent advances in applied science. It is anticipated that all the leading manufacturers of Scientific apparatus will be represented and that the latest inventions in instruments and apparatus will be exhibited.

The following Sections will be represented at the meeting : A. Mathematics and Physics ; B. Chemistry ; C. Geology ; D. Zoology ; E. Geography ; F. Economic Science and Statics ; G. Engineering ; H. Anthropology ; I. Physiology ; J. Psychology ; K. Botany ; L. Educational Sciences ; and M. Agriculture.

On Wednesday, September 12th 8-30 P. M. the inaugural general meeting is to be held : the Presidential Address being given by Sir Ernest Rutherford, on the Electrical Structure of Matter.

Government Aid in Research Work.

It is rather refreshing to find, while usually it is the role of India to try and hobble after England in her march of progress, that for once at least England is exhorted to follow India in backing up research. In making comments on the progress made in agricultural research in India as set forth in "the Review of Agricultural Operations in India" Calcutta (1923), *Nature* (June 16th 23) writes as follows : "All these measures (the formation of the Indian Central Cotton Committee, the levying of the Cotton cess etc.,) are an example of energetic and purposeful action taken by Government under the inspiration of results achieved by research in the interests of Agriculture. The progress already made has, no doubt, been favoured by the great field which the Indian crops provide for plant improvement. But when favourable conditions are allowed for, there remains the fact that the Government appreciates, and has been quick to develop economically the results of Scientific Work. It was not content to let these results rest at

6. Mr. D. B. Sivarama Rao (1913) Agricultural Inspector, Kolar, Bangalore in the grade of Rs. 57-4-77
7. Mr. M. K. Seetharama Settiar (1915) Officiating Assistant Superintendent, Lal Bagh Gardens, Bangalore (Pay Rs. 100 + Ag. Allowance) vice No. 5.
8. Mr. C. Narasing Raju (1915), Teacher, Hebbal Agricultural School, Bangalore in the grade of Rs. 57-4-77.

From the above, one could readily observe that Nos. 1 and 5 are well off; Nos. 2, 4 and 7 are fairly progressing; the rest have been doomed by Retrenchment.

Yours sincerely,

"HOPE FOR THE BEST."

APPENDIX I.

List of Winners and Records.

Events.	Successful competitors.	Year's record.
100 yds. race.	1. Ratnavelu, M. 2. Ramaswamy, V. 3. Pattathan, N.	12 sec.
Long Jump.	1. Ramaswamy, V. 2. Ratnavelu, M. 3. Varadachary, K.	16' 13½"
Putting the shot.	1. Ramaswamy, V. 2. Jivaratnam, A.	23' 9"
High jump.	1. Jivaratnam, A. 2. Pattathan, N. 3. Sundara, U.	5' 1"
Quarter Mile race.	1. Ratnavelu, M. 2. Ramaswamy, V. 3. Subramanian, R.	60½ sec.
Throwing the Cricket ball	1. Daniel, R. 2. Annaswamy, A. K	4½ yds.

Half Mile Race.	1. Ratnavelu, M. 2. Krishnamurti, A. R. 3. Daniel, R.	2 min 37 sec.
Half Mile Race (open).	1. Srinivasulu. 2. Venkataraman. 3. Gnanasigamani.	L. M. H. School. Govt. College. L. M. H. School.
Hurdle Race.	1. Ratnavelu, M. 2. Pattathan, N.	21½ sec.
Old Boys' Race.	1. Vittal Rao, U. 2. Sivarajan, A. 3. Dharmalingam, S.	
One Mile Race.	1. Krishnamurti, A. R. 2. Doraiswamy, S. V. 3. Ratnavelu, M.	6 min 10 sec
Obstacle Race.	1. Jivaratnam, A. 2. Varadachari, K. 3. Subramanian, R.	
Inter-tutorial Relay Race.	Mr. T. V. Rajagopala-chariar's Wards.	
Cross country Race.	1. Ratnavelu, M. 2. Daniel, R. 3. Doraiswami, S. V.	37 min 55½ sec
Inter-tutorial Tug-of-war.	Mr. S. Sundararaman's Wards.	

APPENDIX II.

Athletic Records.

Events.	Best Record.	Year.	Competitor.
100 yds Race.	11 sec.	1921	J. Balraj.
Long Jump.	18' 2½"	1921	S. N. Venkataramanan
Putting the Shot.	29' 6½"	1921	T. B. Anderson.
High Jump.	5' 1"	1923	A. Jivaratnam.
Quarter-mile race.	60½ sec.	1923	M. Ratnavelu.
Throwing the cricket ball.	97 yds.	1918	A. V. Babi.
Half Mile Race.	2 min. 26½ sec.	1921	C. S. Doraiswamy.
Hurdle Race.	18½ sec.	1919	T. Seshachalam.
One Mile Race.	5 min. 4 sec.	1918	K. S. Krishnamurti.
Cross Country Race.	37 min. 55"	1923	M. Ratnavelu.

APPENDIX III.

Championship Record.

Year.	Marks obtained.	Name of Champion.
1911	39	Gururaja Rao, K. M.
1912	39	Mal, R. G.
1913	39	Mal, R. G.
1914	33	Venkatachala Mudaliar.
1915	32	Venkatachala Mudaliar.
1916	53	Ramanna Rai, K. S.
1917	39	Dharmalingam, S.
1918	51	Babi A. V.
1919	59	Dasappa Malli, B.
1920		Dasappa Malli, B.
1921	40	Doraiswamy, C. S.
1923	55	Ratnavelu, M.

(Sd.) K. T. Bhandary,
Secretary, Sports Committee.

APPENDIX IV.

List of Visitors to the College Day and Conference 1923.

1. The Hon'ble Sir K. Venkata Reddi Nayudu Kt., Development Minister.
2. Mr. F. Noyce, I. C. S., Secretary to Government, Development Department.
3. Mr. R. D. Anstead, M. A., F. M. C., Director of Agriculture, and Mrs. Anstead.
4. Mr. M. V. Vellodi, Personal Asst. to the Director of Agriculture.
5. Rao Bahadur Venkata Ranga Reddi Garu, M. L. C., Kurnool.
6. Khan Bahadur Haji Abdullah Haji Kasim Sahib Bahadur, M. L. C. Udipi.
7. Rao Bahadur J. Chelvaranga Raju, Retired Dy. Director of Agriculture, Madras.

8. Mr. C. M. Ranga Reddi, L. Ag., B. Sc., (Edin).
9. Mr. G. Rajagopal Nayudu, Retired Agricultural Inspector, Madras.
10. Mr. V. C. Vellodi Gounder, M. L. C., Coimbatore.
11. Rao Sahib C. S. Ramasabhapathi Mudaliar, Coimbatore.
12. Mr. C. V. Venkataramana Iyengar, M. L. C., Coimbatore.
13. Mr. V. Narayana Reddi, B. Sc., Bangalore.
14. Rao Bahadur T. S. Balakrishna Ayyar, B. A., B. L., Coimbatore.
15. Mr. R. S. Sankara Ayyar, B. A. B. L., Sub-Judge, Coimbatore, and Mrs. Sankara Ayyar.
16. Mr. C. T. Wilson, Principal, Forest College, Coimbatore and Mrs. Wilson.
17. Rev. Ernest Kirk, Coimbatore.
18. Mr. Kesavan, Veterinary Officer, Nagercoil.
19. Mr. D. Sadasiva Reddi, B. A. (Oxon), Principal, Govt. College, Coimbatore.
20. Khan Sahib Abdul Rajak, M. L. C. Coimbatore.
21. Mr. C. T. Tangavelu Pillai, M. L. C., Secretary to the Development Minister.
22. Mr. Narasiah, Bar-at-law and Misses Narasiah.

*List of Departmental Visitors.**Gazetted Officers.*

1. Mr. A. C. Edmonds, B. Sc., Deputy Director of Agriculture, I Circle.
2. Mr. K. T. Alwa, Ag. Dy. Director of Agriculture, II circle.
3. Mr. A. V. Thirumaruganatham Pillai, Ag. Dy. Director of Agriculture, III Circle.
4. Mr. D. Anantha Rao, B. Sc., Dy. Director of Agriculture, IV Circle.

5. Mr. N. S. Kolandaiswami Pillai, Ag. Dy. Director of Agriculture, V Circle.
6. Mr. Saadat Ullah Khan, Ag. Dy. Director of Agriculture, VI Circle.
7. Mr. M. Govinda Kidavu, Ag. Dy. Director of Agriculture, VII Circle.
8. Mr. C. Narayana Ayyar, Ag. Dy. Director of Agriculture, VIII Circle.
9. Mr. T. Budhavidheya Rao, L. Ag., Asst. Director of Agriculture, III Circle.
10. K. Raghavachari, L. Ag., Asst. Director of Agriculture, IV Circle.
11. Mr. C. V. Seshachari, L. Ag., Asst. Director of Agriculture, V Circle.
12. Mr. K. Gopalakrishna Raju, L. Ag., Asst. Director of Agriculture, VI Circle.
13. Mr. R. N. K. Sundaram, C. D. A., N. D. A. (Glasg.) Asst. Director of Agriculture, VIII Circle.
14. Mr. F. H. Butcher, Curator, Botanical Gardens, Ootacamund.
15. Mr. K. Ramiah, L. Ag., Asst. Economic Botanist, Aduturai.

Non-Gazetted Staff.

I Circle.

1. Mr. N. Sitharamaswami Nayudu, Asst. Agricultural Demonstrator.
2. Mr. R. Sitharamayya, Asst. Agricultural Demonstrator.
8. „ N. Gopal Rao. do.

II Circle.

4. „ V. Ratnaji Rao, Agricultural Demonstrator.
5. „ K. Gurumurti, B. Ag. Farm Manager.
6. „ P. Satyanarayana, Asst. Agricultural Demonstrator.

III Circle.

7. Mr. A. Gopalakrishnayya, Farm Manager.
8. „ M. V. Raghava Rao, Agricultural Demonstrator.
9. „ P. Nagadhara Nayudu, Asst. Agri. Demonstrator.
10. „ K. V. Seshagiri Rao, do. do.

IV Circle.

11. Mr. Bhairya Shiva Rao, Agricultural Demonstrator.
12. „ S. R. Srinivasa Ayyangar, do.
13. „ A. Yesudasan, do.
14. „ P. Janakirama Ayyar, Assistant do.

V Circle.

15. Mr. M. Subramanya Pillai, Agricultural Demonstrator.
16. „ K. Sitarama Ayyar, Asst. do.

VI Circle.

17. „ A. Chinnathambi Pillai, Farm Manager.
18. „ V. T. Subbavva Mudaliar, Agricultural Demonstrator.
19. „ A. K. Ganesha Ayyar, Asst. do.
20. „ P. R. Subrahmanya Ayyar, do.

VII Circle.

21. Mr. K. K. Raghavan, Farm Manager.
22. „ M. K. Sankaran Nambiar, Taliparamba Agricultural School.
23. „ M. Mangesha Rao, Agricultural Demonstrator.
24. „ A. Gopalan Nair, do.

VIII Circle.

25. Mr. W. Raghavachari, Agricultural Demonstrator.
26. „ V. S. Narayanaswami Ayyar, do.
27. „ P. Abhishekanatham Pillai, do.
28. „ K. Jagannadha Rao, do.
29. „ H. Narahari Rao, Asst. do.
30. „ S. Viravaradha Raju, do.

Botanical Garden, Ooty.

1. Mr. Chinniah, Assistant Farm Manager.
2. „ Soopi Haji do.

Planting Districts.

1. Mr. K. W. Chakrapani Marar, Farm Manager.
2. „ K. M. Jacob, do.

Live-stock.

1. Mr. M. P. Kunhikutti, Agricultural Demonstrator.

*NATIVE STATES.—Visitors from:—**Travancore.*

1. Mr. P. Samuel, L. Ag., Agricultural School, Alwaye.
2. „ R. C. George, L. Ag., Agricultural Inspector.

Cochin.

3. Mr. K. Krishna Variar, B. Ag.
4. „ M. Sankara Menon, B. Ag.

Pudukottah.

5. Mr. Vydhyanatha Ayyar, Farm Manager.

Departmental Notes—July 1923.**Appointments and Postings:—**

1. Mr. A. V. Thirumuroganatham Pillai, to be Assistant Director of Agriculture, IV Circle.
2. Mr. T. Budhavidheya Rao Nayudu to be in charge of the current duties of the Dy. Director of Agriculture, III Circle.
3. Mr. R. C. Broadfoot, on return from leave, to be Deputy Director of Agriculture, VI Circle, Madura.
4. Mr. Saadat-Ullah-Khan, Probationary Deputy Director of Agriculture to work in the VI Circle under Mr. Broadfoot.
5. Mr. K. T. Alwa, Acting Deputy Director of Agriculture, II Circle, to be Assistant Director of Agriculture, II Circle, and to be in charge of the current duties of the II Circle.

6. Mr. K. Gopalakrishna Raja, Assistant Director of Agriculture, VI Circle, to do the duties of the Assistant Superintendent, Central Farm, Coimbatore.

7. Mr. K. Unnikrishna Menon to act as Assistant Director of Agriculture, VII Circle.

8. Mr. Bachina Ramayya Chudhuri, B. Sc., to act as Deputy Director of Agriculture, vice Mr. H. C. Sampson on leave.

9. Mr. S. M. Kalyanaraman to be Assistant on probation in V grade in the Cotton Specialist's office.

10. Mr. S. N. Venkataramanan to be Assistant on probation in V grade in the Cotton Specialist's office.

11. Mr. K. M. Venkatachalam, to be lower subordinate on probation, IV Circle.

12. „ V. Kenchiah Gounder, do. do.

13. „ S. Aaron Christian, do. do.

14. „ G. J. Balraj, do. do.

15. „ P. K. Krishnan Nambiar, do. D. D. L. S. Coimbatore.

Leave:—

1. Mr. M. Govinda Kilian, leave on average pay for 10 days from 7th to 16th May 1923.

2. Mr. C. V. Sundaram Ayyar, Assistant in Entomology, leave on average pay for one month from 7th August 1923.

3. Mr. C. J. George, Assistant in Entomology, leave on average pay for 27 days from 6th August 1923.

4. Mr. M. K. Nambiar, Headmaster, Agricultural Middle School, Taliparamba, leave on average pay for two months from or after 20th July 1923.

5. Mr. C. S. Madiah, Farm Manager, leave on average pay for four months from or after 15th July 1923.

6. Mr. E. K. Nambiar, Farm Manager, leave on average pay for two months from or after 15th July 1923.

7. Mr. M. Gopalachetty, Farm Manager, leave on average pay for one month from 12th July 1923.

8. Mr. M. Gopalachetty, Farm Manager, extension of leave by two months.

9. Mr. V. Ratnaji Rao, Agricultural Demonstrator, leave on average pay for 18 days from 7th to 24th June 1923.

10. Mr. K. Ramanatha Ayyar, Agricultural Demonstrator, leave on average pay for two months on medical certificate from or after 12th July 1923.

11. Mr. A. M. Muthayya Nattan, Agricultural Demonstrator, VI Circle, leave extended by one day on average pay.
12. Mr. Gopalan Nair, Agricultural Demonstrator, leave on average pay for one month from 19-7-1923.
13. Mr. V. Narasimhamurti, Assistant Farm Manager, extension of leave by two months on medical certificate.
14. Mr. D. S. Subrahmanya Ayyar, Assistant Farm Manager, extension of leave on average pay for 28 days and leave on half average pay for two days in continuation thereof. Later, extension of leave on half average pay for ten days.
15. Mr. P. L. Narasimham, Assistant Farm Manager, I Circle, extension of leave without pay for six days.
16. Mr. M. L. Narayana Reddi, Assistant Farm Manager, Live Stock, leave on average pay for 14 days from 4th August 1923.
17. Mr. S. Viravaradha Raju, Assistant Agricultural Demonstrator, VIII Circle, on average pay for two months from or after 26th July 1923.
18. Mr. V. Chidambaram Pillai, Assistant Agricultural Demonstrator, VI Circle, leave on average pay for two months from the date of relief.
19. Mr. K. Vasudeva Shenoi, Assistant Agricultural Demonstrator, VII Circle, on average pay for 20 days from 2nd to 21st July 1923.
20. Mr. K. Vasudeva Shenoi, extension of leave by one day.
21. Mr. V. Achutam, Assistant Agricultural Demonstrator, III Circle, leave on average pay for 8 days from 24th May 1923.
22. Mr. J. Sundara Rao Bhutgoswami, extension of leave on half average pay on medical certificate for six weeks.
23. Mr. H. Narahari Rao, Assistant Agricultural Demonstrator, cancellation of leave on average pay for 20 days.

Permitted to Retire:--

The Govt. with the sanction of the Secretary of State for India are pleased to permit Dr. R. V. Norris, Govt. Agricultural Chemist, to retire from the Indian Agricultural Service with effect from the date of expiry of the leave granted to him in Notification No. 129 dated 12-5-1923.

Departmental Notes—August 1923.

Appointments:—

1. Mr. P. S. Jivanna Rao, Upper Subordinate, Science Section, to act as Asst. Lecturing and Systematic Botanist vice Mr. O. Tadulinga Mudaliar on other duty.
2. Mr. A. V. Thirumuruganatham Pillai, Asst. Director of Agriculture, IV Circle, to do the current duties of the Deputy Director of Agriculture, II Circle, vice Mr. K. T. Alwa granted leave.

3. Mr. K. Raghava Achariyar, Upper Subordinate, is appointed to act as Asst. Director of Agriculture, in the vacancy caused by the grant of leave to Mr. K. T. Alwa and is posted to the IV Circle.

4. Mr. G. Venkata Narayana, B. Sc., (Ag), to officiate as an Assistant, V grade in the Government Lecturing Botanist's section vice M. R. Ry. P. S. Jivanna Rao on other duty or until further orders.

5. Mr. I. Kurina Rao, Proficiency Certificate Holder appointed Lower Subordinate, V grade, Agric. Section on probation, and posted to IV Circle.

Leave:—

1. Mr. K. T. Alwa, Officiating Deputy Director of Agriculture, II Circle, leave on average pay for three months and 29 days with effect from the date of relief.
2. Mr. K. Cheriyan Jacob, Asst. to the Govt. Lecturing Botanist, leave on average pay for 15 days from the 9th with permission to affix the 24th being a public holiday.
3. Mr. S. Subrahmanya Iyer, Agricultural Demonstrator, further extension of leave for six months.
4. Mr. J. David, Sub-Asst. to the Govt. Lecturing Botanist, leave on average pay for 15 days from 14th instant.
5. Mr. M. J. Sadasiva Reddi, Asst. Farm Manager, Palur, leave on average pay for 15 days from 1st September.
6. Mr. V. Narasimhamurti, Asst. Farm Manager, extension of leave on half average pay for 58 days and leave not due on half average pay for 32 days.
7. Mr. M. L. Narayana Reddi, extension of leave for 7 days and later on for 3 days in continuation.

The Rules of The Madras Agricultural Students' Union, Coimbatore. *Founded in 1910.*

(Revised at the General Body Meeting held on 17th July, 1923.)

1. *Name of the Association and its Head-quarters:—*The Association shall be called "The Madras Agricultural Students' Union" with head quarters at the Agricultural College, Lawley Road, P. O., Coimbatore District, and code word shall be 'Union'.

2. *Objects:—*The objects of the Union shall be :

- (i) to encourage an *esprit decorps* among its members,

(b) One copy of the Journal will be given free to Patrons, associates and members other than Honorary members and an annual subscription of Rs. 4 shall be collected as the subscription for the Journal from all others.

14. *Vacancies*:—Vacancies occurring in the Committee in the interval may be filled by the Committee.

15. All proposals of amendments to the rules shall be communicated to the General Secretary before the 31st of May every year for being published in the issue of the Journal previous to the Annual General Meeting. All amendments should bear the name of the proposer and the seconder who should both be members of the Union.

16. An Annual Report of the College Day and the Conference, the statement of the financial condition of the Union, the corrected list of addresses of the members of the Union, a brief summary of other matters of general interest concerning the College and a quarterly account of the work of the Committee and the Council, including a statement of receipts and expenditure, will be published in the Journal.

17. (1) There shall be a Reserve Fund which shall consist of donations from Honorary Members and Patrons, entrance fees and such other amounts from previous balances as may be transferred at the Annual meeting and this Fund shall be utilised to meet such charges as may be decided on at the General Body Meeting.

(2) For general expenditure the budget of the following year shall be passed by the General Body, the draft budget being published in the issue of the Journal missing the one immediately preceding the College Day.

(3) The Working Committee of the Union shall arrange to invest the several Funds of the Union in fixed or current deposits in suitable banks.

(4) The accounts of the Union shall be audited by two members of the Union who are not members of the Working Committee and the financial statement together with the balance sheet under each head as they stand on 31st May every year shall form an essential feature of the Annual Report, the Auditors for the purpose being selected by the General Body.

Transitory Rules:—(1) Members, benefactors and associates admitted prior to 17-7-23 will exercise all rights and privileges under the old rules, but may be allowed to come under the new rules provided no concession is claimed for their paid up subscriptions for the membership in whole or in part.

(2) The revised rules shall come into force from 17th July 1923 for all purposes except in the case of Membership and subscription to the Journal which shall come into operation from 1st January 1924 and admission to full membership shall be kept in abeyance till that date.

LIFE'S MIRROR.

There are loyal hearts, there are spirits brave,
There are souls that are pure and true;
Then give the world the best you have
And the best will come back to you.

Give love, and love to your life will flow,
And strength in your utmost need;
Have faith, and a score of hearts will show
Their faith in your word and need.

Give truth, and your gift will be paid in kind,
And honour will honour meet;
And a smile that is sweet will surely find
A smile that is just as sweet.

For life is the mirror of king and slave,
'Tis just what you are and do;
Then give to the world the best you have,
And the best will come back to you.

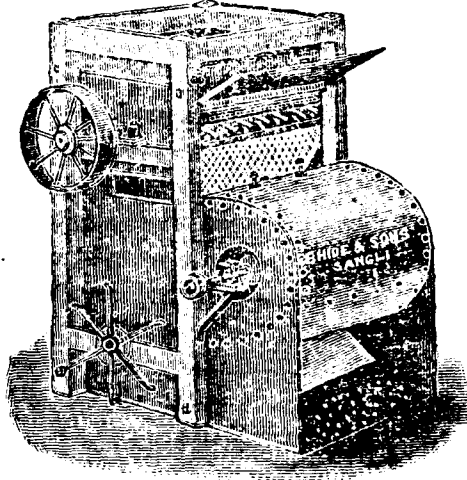
Madeline S. Bridges.

(Great Thoughts—July 1923.)

(v)

Groundnut Decorticator.

நிலக்கடலைத் தேய் உடைக்கும் இயந்திரம்.



or Opener Worked by Engine power. The machines are of three types—A, B, C and their working capacity is 80, 100 120 bags of seed in 12 hours respectively. Write for illustrated pamphlet.

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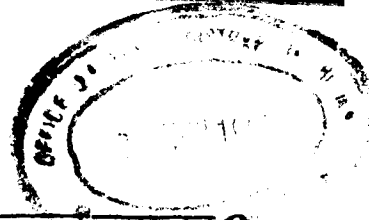
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இப்பத்திரிகையில் விளம்பரம் செய்பவர்களுக்கு மிகுந்த லாபமுண்டு.
மாணேஜர்,

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(சென்னை)



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Some Side Lines of Farming.

K. UNNIKRISHNA MENON,

Asst. Superintendent, Central Farm.

Communication by road, water or air has been considerably improved in recent years. As a result of this, the more business-like western farmer has been enabled to become a competitor of the Indian ryot in selling raw products in world markets. Industrial crops are being grown on greater areas on farms, though the demand for food grains is ever on the increase in order to meet the needs of a growing population. Therefore cultivation has to become both extensive and intensive. The purchasing value of money has considerably gone down. Living has become more costly than the rise in prices of raw products would indicate.

With such a state of affairs staring us in the face in this country, the time and trouble associated with farming must also be considered to be more valuable. The Indian farmer can, to his benefit, realise the greater value of his time and energy by skilfully selecting one or more of the side lines in farming. They would serve to find him some more suitable work or to avoid waste and save expenditure.

Cow-keeping is a profitable line of work which he should easily get on with. Almost every ryot owns a few cows and calves along with his work-bullocks. The latter that toil for him in the fields claim all the attention and resources at the ryot's command, while the former are underfed and remain unproductive serving, at best, as a poor source of manure for the owner. If he chooses to own better milkers with a short dry period and feed them and their calves properly, they will surely become a source of much greater profit. A short dry period not exceeding 90 days is a great desideratum and it serves to decide whether a cow is profitable or not although she is a good milker. In most country animals it is more than 150 days long and an effort to shorten it by better feeding and breeding is necessary. The Deputy Director of Agriculture, Livestock, is working at it also. Bull calves fed well from the very commencement become strong work-bullocks and save the owner all the money he often borrows and pays to the breeder and the broker to purchase them. Heifer calves, when well-fed and properly looked after, calve sooner and repay their maintenance. Better milkers if looked after properly pay well. Stall-fed animals remain healthy and strong if only they are given some exercise. This is borne out by the experience on the Central Farm which owns nearly 350 animals that are dependent upon 30 acres of grazing land. The increasing consumption of tea and coffee indicates a growing demand for milk. The price of milk has trebled in recent years. There is a very great demand for unadulterated butter from various parts of the country. If the ryots of a village will combine together and produce and sell butter on a co-operative basis, it will pay them much better than by the sale of milk alone, besides leaving skim-milk and curd which can serve to swell the profits.

How to provide better food for the cows is the question that naturally arises out of this consideration. The ryot can very profitably put down a small area in his garden land for perennial fodder crops like the Lucerne, Guinea grass or the Elephant grass.

Lucerne is best fed as hay and can be grown without any extraordinary amount of care. Green Lucerne may cause hoven. The other two are hardier crops than Lucerne and require less attention, but

regularly furnish green fodder so necessary for an increased milk-flow. Lucerne gives a cutting in about 25 days yielding over 3000 lb. green, or 1000 lbs. hay, per acre and the grasses yield from 100 to 160 cart-loads green per acre per year, @ 200 lbs. per rupee of Lucerne hay and about 1000 lbs. of grass.

Elephant grass is also a good bind grass and I have successfully grown it along the slopes of water channels, the sides of which it strengthens. It behaves like the wild sugarcane and stands hot weather very well, though the number of cuttings during this period are fewer than during other parts of the year or from a garden land. A regular ration of Lucerne hay would enable the farmer to economise and reduce the more costly concentrated feeds. Experiments in progress on the farm here tend to prove this.

Another common but fruitful source of wastage on a farm which ordinarily escapes attention is furnished by the thinnings obtained from a cereal crop. Ryots in this district grow cholam, and often throw away the thinnings under the belief that they are poisonous to cattle. They are certainly correct in their opinion. But there is a method by which what is considered poisonous may be turned into very palatable food. This is by making silage of them. The process is very simple. The thinnings are allowed to wilt in the sun for a day. They are collected the next day after the dew is off and put into a pit closely packed and covered over with a layer of earth 3 to 6 inches thick. The pit must be left in that state for 3 to 5 months when the silage may be dug out and used in place of green fodder during hot weather. Such a pitting of these thinnings without allowing the action of air or water renders them innocuous, making them at the same time more palatable. My experience on this farm has proved this.

Another item of work which the ryot will find profitable is to keep sheep and goats especially in places where grazing is plentiful. If they can get a little concentrates as well they will grow quickly and kid oftener. Goats of the better type yield milk and pay amply for the feed. The one great advantage they secure to the ryot is that they find a bite from places abandoned by cattle and can always follow them.

Poultry keeping is another line of work the ryot can turn his attention to. The birds usually pick up all the shed grains in the field and the threshing floor whenever grain crops are harvested, and would need little additional food. They use up the remnants of food whether of cattle, sheep or human beings and reduce the loss. If the ryot feeds up the fowls a bit whenever they cannot pick up their food they are sure to give a continuous supply of eggs or young ones hatched out. The most profitable side in poultry business is to have as many laying hens as one can possibly manage. The best breed for this purpose is the white Leghorn. Country hens should, however, be used for hatching and nursing chicks. It is profitable to sell all birds above 2 years old, all cockerels other than leghorns and all bad layers. A few cockerels may be purchased every year to infuse new blood in the run. The profits will grow when the number of layers is increased. If the farmer can take care to give each bird upto 3 oz. of grain and cake meal or bran per day with $\frac{1}{2}$ to $\frac{1}{2}$ oz. of digestible proteids and some greens, egg production is not only assured but can also be greatly increased. The prices of eggs and birds for the table are nearly three-fold of what they were a few years ago. No other business pays better than poultry keeping as a side line of farming.

All these items will help to increase the manure supply, the want of which stands in the way of better crop production.

In districts where facilities exist for planting trees it pays a farmer to do so. The extensive, bare hill tops in rainy tracts like Malabar can easily be clothed with the foliage of trees which immensely increase the manure supply of the country, improve springs and enrich lands etc.

Vegetable, flower and fruit growing are other side-lines to adopt when a farm is situated near a town. Of these, vegetable growing pays most and sooner than any other agricultural investment.

Besides these there are several other side-lines such as Apiculture, silk rearing and the like specially adapted to tracts and requiring special training. I have not dealt with them here. The few side-lines here dealt with are those that a ryot may most easily and profitably adopt.

I thank you, Ladies and Gentlemen, for the patient hearing you have given me.

Discussion :--

Rao Bahadur J. Chelvaranga Raju doubted whether an area of 30 acres of land for every 250 cattle would prove to be sufficient. He was of opinion that cattle go down in condition when stall-fed and was doubtful whether stall-feeding was a practicable proposition in India. Cattle had to be given exercise and grazed in large open areas if they were to remain in good condition. He cited the conditions at Manjri Farm, Bombay Presidency, in this connection.

Mr. Rajagopal Nayudu remarked that it was only the thinnings of unirrigated cholam that proved poisonous, while irrigated cholam did not. He was further of opinion that the thinnings were not to be found in such considerable quantities as to merit being ensilaged. He also stated that the grazing question was a very important one. Experience in European countries showed that 5 acres of land was needed to keep each head of cattle in condition and that 3 acres of land was the minimum under any conditions.

Mr. D. Ananda Rao remarked that he was intimately connected with the College Dairy for some years and that so far as his experience went he considered the area of 30 acres for every 250 heads of cattle quite insufficient. He said he did not think much of stall-feeding and was of opinion that Dairy farming was not an economical proposition unless one had large areas of grazing ground.

Mr. Littlewood—D. D. Livestock—observed that stall-feeding was advisable only where cows of a high quality were concerned. Ordinary cows would not pay for their feeding. Pedigree cows yielding 35 lbs. a day could in his opinion be profitably stall-fed. In spite of the large area of grazing grounds in Chintaldevi Farm, stall-feeding had to be done as the grass on the grounds was not at all sufficient. In reality open grounds were needed not for grazing but for exercising the animals. Guinea grass ought not, in his opinion, to be allowed to grow tall but be cut and fed when 3 feet high—when it would be more succulent. He thought silage was not

needed in irrigable areas like Coimbatore but might be very useful in a dry place like Bangalore. Fowls, in his opinion, ought to be specially fed if they were to be profitable.

Mr. Unnikrishna Menon in reply to criticisms made said that the demand for milk was growing, as was also a demand for good work cattle. At the same time more and more of waste land was being brought under cultivation. In these circumstances, he affirmed that stall-feeding was the only logical solution for increasing milk production. He further added that when he suggested dairy farming, he did not imply any suggestion of a large cattle breeding farm, but only meant dairying on a small scale as could be maintained as a side-line to ordinary farming. As to silage, he was of opinion that it would be beneficial since the thinnings—especially in fields of “Periya manjal cholam”—were really of considerable quantity and were usually being ploughed in. In conclusion he remarked that it was advisable to have either good and paying cattle or none to all.

Tit-bits.

You will find, if you reflect, that your temper is the least expensive thing you can keep.

Laugh heartily at your own troubles, but never, never, never, at anyone else's, even though they be men who have spoken ill of you.

To be a snob, you have to be certain that you yourself are absolutely all right, and that the majority of your fellows are absolutely all wrong.

If each one of us should try doing his whole duty for a single week, what a transformation those seven days would work in the world!

Great Thoughts.

A Review of the Agricultural Improvements in South Canara.

M. MANGESA RAO.

My object is to give a cursory view of what we have been doing in S. Kanara, which is one of the remotest Districts in the Presidency. I am omitting details, as far as possible, to keep myself within the time limit.

Sugarcane. Taking Sugarcane cultivation first, as the subject first tackled in the District by our Department, I may state that that cultivation was, in the past, neither very paying nor very extensive. The varieties then grown were inferior ones such as Dasakabbu, Karikabbu and Hullukabbu. These varieties had also degenerated as the result of continued indifferent cultivation. The importance of manuring the Sugarcane crop sufficiently had not been recognized in practice. The methods adopted in the preparation of Jaggery were very defective. Canes were pressed in wooden mills and the juice boiled in small narrow-mouthed pots over a number of small hearths. In fact, there was wastage at every step and its cultivation was in consequence losing favour with the ryots.

When such was the state of affairs, Red Mauritius canes, tested and found to be a superior variety in the Taliparamba Farm, were sent out to this District for trial in 1907. This variety had a hard rind, a qualification very much desirable in the District, where depredations from jackals are not a negligible quantity. It had a good tillering habit and yielded a larger out-turn per acre. Although there was in the first instance the usual opposition, on the part of the ryots, against new innovations, the new variety of Sugarcane did, in course of time, impress the ryots one after the other. Some of the local leaders rendered substantial help—one of whom was Mr. Abdulla Khan Sahib of Udipi, now M. L. C., who got the cane variety cultivated in his own lands and distributed the planting material to his tenants and other ryots. The variety spread slowly but steadily. Alongside with it the use of iron mills for milling this hard cane was demonstrated and popularized. The hardness of the

rind of this cane compelled the ryot to go in for the iron mill, whether he wished it or not. The old wooden mills had to go to the back ground—and many of them can even now be seen lying idle in the lumber rooms. Later on improved furnaces with iron pans were brought to the notice of the ryots. The ryots soon recognized the saving of time, trouble, and fuel by their adoption. Every one of these new items brought the ryots an additional margin of profits, which they were not slow to perceive. As a result, the introductions gained increased popularity as time went on; and with it the area under sugarcane also increased steadily and is, since then, ever on the increase. The old varieties have at present been practically displaced by the red Mauritius Cane. The only exception is the Dasakabhu which is seen cultivated in small plots near the markets for sale for chewing purposes. The higher out-turn of the new variety, the additional gain in juice, obtained by the use of the iron mills and the saving of the cost of fuel effected by the adoption of the improved furnaces and iron pans, all contributed to increase the profits of the ryots to no small extent. And when the price of sugar rose by leaps and bounds as the result of war-conditions, the demand for Jaggery rose higher than ever. All these events combined together to render sugarcane cultivation a very profitable concern. It will now be seen that the sugarcane cultivators have since improved in their status. They have built more spacious houses to live in, purchased more land, and they are now better able to go in for the luxuries of life. It is estimated that this improvement alone brings into the pockets of the ryots about 8½ to 9 lacs of Rupees more, every year.

Though a good many took to the Red Mauritius some of them neither attended to the manuring of the crop nor to the draining of the fields during the monsoon as they should have done, and some laxed into inattention in these respects latterly; with the result that in many a place the canes grown became thinner in size and poorer in growth, especially on the river banks which are affected by floods. A vigorous propaganda work was therefore carried out in 1920 to educate the ryots in the absolute importance of a better-manuring of

cane crops—with special emphasis on the use of Fish Guano—and of paying better attention to the drainage. Fish-manure is since being used as a rule. And this has improved the general condition of the cane-crops; and many of the ryots have become so mindful of the necessity of manuring that, when Fish Guano became scarce in the season before last, a good many ryots went to the extent of purchasing the costly stuff of 'Kollatharu'—a small dry fish imported from Arabia and applied it to their cane crops in the absence of Fish Guano and the resulting sugarcane crops did respond to their troubles well enough.

We are also trying some other cane varieties in this District. B 147, B 6450, and B 3412 have been tried in many places so far; and have been found successful in places with specially well-drained soils not subject to the stagnation of water in any degree, but in the villages on the river banks where drainage is bad they have not fared well. Here they grow thinner in size and make no impression on the growers. We are, however, distributing these sets to many ryots in different villages. Though its adoption may not become quite general, it is certain to stay in such of the soils as are congenial to its cultivation. Fiji B and Java, two other varieties that are under trial, are now grown in small plots. Both of them are promising and well spoken of by the ryots who grew them—but they have yet to be tested on a field scale before anything definite can be said about them as regards their future in this district. A comparative varietal demonstration plot has this year been started in one of the ryots' fields in Bangrakuloor village to test these varieties.

Green Manure Cropping. This District being a narrow strip of land between the Western Ghats on one side and the sea on the other, is a place of hills and dales, having a steep gradient from East to West. The S. W. monsoon is at the same time very heavy here. There is therefore a good deal of washing of the soils taking place every year. In order to make up for the depletion of organic matter resulting from this cause, there is the time honored practice in this District of collecting green leaves from the *kumaki* lands or from the nearest jungles for manuring the lands either directly or

after using it as a litter in the cattleshed. I may remind you here that the cattleshed in this District is one very much resembling the cattle box of European countries both in its construction and in the treatment of the manure. The cattle dung with urine is daily spread and covered over with green leaves and the cattle are penned over it. But this old system is becoming a rare thing in the coastal villages owing to the absence of *Kumakies*, jungles or forests in the vicinity. The want of green leaf has therefore become one of the difficulties of the agricultural classes. Many of the sugarcane ryots have already begun to carry out our suggestions to make use of canetrash for litter under the feet of cattle; and we have been further exerting ourselves for some time past to introduce the green-manure-cropping. Dhaincha and Kolinji were tried. The former was found to have two disadvantages—namely, it is grazed by cattle and secondly it requires greater moisture for a successful crop than in the case of Kolinji. Hence the ryots began to prefer the latter. Since last year, therefore, we have been confining ourselves to Kolinji alone. The green manure cropping was first brought to the notice of the ryots in 1917. In the first two years it hardly made any appreciable impression on them. In the third year the Kolinji seed given to the ryots failed to germinate, being bad seed. This circumstance made our green manure work increasingly difficult and a good deal of uphill work had to be done in the succeeding year to regain the confidence of the ryots in this matter as well as to persuade the ryots in many new centres to purchase and try the seed. The seed of that year fortunately showed very good germination and most of those that purchased and sowed it got very good green manure crops. The only exceptions were a few rich landlords who purchased the seed on immediate cash payment and to satisfy the Demonstrator than with any special intention of trying it for its advantages—some never in fact used it at all. This fact served however as an eyeopener. Since then we have been able to approach, for the most part, the humble actual cultivators and this ensured more satisfactory work. No doubt it is more difficult to persuade and convince the smaller ryots because of their greater conservatism and their illiteracy, but once persuaded,

they do their part of the work with greater sincerity. When most of the ryots got good crops of Kolinji, as said above and used it as manure for the succeeding paddy crop, the result was an appreciable increase in the yield of Paddy. Some ryots found that their paddy crops grew too luxuriantly and were inclined to lodge owing to a heavy application of green manure. They were thenceforth advised to utilize the green stuff obtained from a given area for application on twice or thrice the area according to the luxuriance of the green manure crop. It was, however, gratifying to us, to hear them complain of excess manure resulting from the green manure application as it was in contrast with their grievance in the past of manure scarcity. The steady popularity which the green manure cropping gained will be evident from the increasing sales of seed and the increasing area under that crop from year to year—which is detailed below :—

Year.	Quantity of seed sold.	Estimated area in which the green manure crop was grown.	Estimated area to which the resulting stuff was applied.
1917	170 lbs.	15 acres	15 acres.
1918	450 lbs.	38 acres	38 acres.
1919	510 lbs.	Failed to germinate	—
1920	7861 lbs.	66 acres	100 acres.
1921	2200 lbs.	185 acres	370 acres.
1922	4005 lbs.	{ 334 acres Self sown 90 acres or total 424 acres.	{ 668 acres. 180 acres, or total 848 acres.

An experiment conducted in ryot's field in Kotegar village showed that the paddy crop treated with the green manure of Kolinji gave 3 mooras of Rice more per acre, than the one not similarly treated i. e. an extra profit of 18 Rupees per acre. The opinion of many other ryots who have tried it is to the effect that the Paddy Crop thus treated gives an additional yield varying from 2 or 3 mooras of rice per acre (1 moora of Rice = 28 na. m).

But there is some difficulty about the Kolinji seed. The crop grown late in the season does not develop pods. The one grown earlier develops pods but a good portion of them get diseased. Most of the ryots too had not made any effort to collect their own seed. But they have been, during the last season, advised to sow seed in the monsoon on any available bit of land—be it waste land or back yard for seed purposes and to collect their own seed where possible and some of them have begun to follow the advice.

A large number of fields with very luxuriant crops of self-sown Kolinji could be seen, in the Kulur valley, during the last month. Two photographs of these crops among other things have been taken this year for use at exhibitions.

There is a good deal of work yet to be done in this direction. For as yet we have reached only a fraction of the ryot population. And the results of the present work show that green manure crops are bound to gain ever increasing popularity until their cultivation becomes a common practice of the tract.

Bones. The advantages of using Bonemeal as a supplement to green manuring are being demonstrated to the ryots. About a ton of bone meal was distributed last year to a number of Co-operative Societies for trying its effects on Paddy in conjunction with green leaf. The results of the several trials varied as regards the percentage of the additional yield obtained. In 4 cases out of 8, the additional yield was approaching 25 per cent, in one case 20 per cent, in two cases 16 per cent and in one case 7 per cent. The results may undoubtedly be taken as satisfactory in spite of the varying nature in the quantity of extra yield. Some among the ryots who conducted the trials have subsequently reported to me that the second crop of paddy raised from those same plots was also excellent. Yet another among them pointed out to me a few days ago when I had paid him a visit, the excellent growth of the "Yennel" nursery raised in the self same plot that had received Bonemeal and green manure treatment, and said, he had not seen such a good growth of a nursery in that particular field in his past experience.

But the Bonemeal is a costly stuff,—costing about Rs. 100 per ton, when sold by the Firms. Raw bones are available scattered about on hills and corners in quantities sufficient to meet the local requirements. A portion of it, is now collected by Koragars and sold to the Coffee Works in Mangalore—where it is converted into Bonemeal, by their costly disintegrators run by engines. But this Bonemeal is utilized exclusively for coffee plantations. There are yet large quantities of bones in the interior villages which can be availed of by the ryots. With a view to work out the probable cost of making bonemeal from bones collected in the interior villages,—a ton of it was got collected through the Panchama Co-operative Society of Puttur, carted down all the way to Mangalore, and disintegrated in one of the Coffee Works there, on payment to the latter, of the actual expenses. The total cost worked out to about Rs. 75 per ton. This figure would have been much lower but for the high cost of carriage. The bonemeal so obtained was offered for sale to Co-operative Societies and bonafide ryots who wished to conduct trials with it, at a slightly higher rate than the cost price. With a view, further, to see whether the cost can be substantially reduced by avoiding the transport charges and to enable the ryots to prepare his own Bonemeal nearer his home, trials have been inaugurated in the Farms of our circle, of preparing Bonemeal by the Liming and the Pitting method—a method found quite successful by Mr. John Kenny, late of Hyderabad. With the same object in view again the Puttur Co-operative Union has been persuaded to purchase a Bentall's Bonemill costing about Rs. 150 and to use it for reducing bones to meal as a trial. If either of these methods is successful, the ryots would be assured of the supply of this manure at their very doors as it were and at a *very cheap* cost, and the popularization of it as a common manure will then become doubly easy.

Fish Manure. In the past, ryots were rarely using this local product for their crops, except raw fish for tobacco. A good deal of propaganda work, demonstrations, comparison of yields, free distribution of the manure for trials, lectures, publications of leaflets on the subject had to be resorted to before the ryots could be

made to recognize the usefulness of the manure. Now it is largely used for sugarcane crops and for Paddy, and to some extent for coconut and arecanut gardens. But its scarcity in the year 1920 and '21 consequent on the absence of catch in the sea caused both disappointment and inconvenience to many of the ryots. Last season however, there was again a good catch of fish and ryots have returned to the use of the manure and this is a good sign.

Paddy Varieties. A few varieties from outside the district have been tried and these are:—

Thawalakannan. A paddy variety from the Taliparamba Farm was tried by about 8 ryots during the last 3 years. The results are encouraging in parts. It is specially suitable to "bail" lands with good water supply. More seed has been distributed this year to the ryots.

Strumani. This variety having been found to be profitable under certain conditions, is now being grown by a large number of ryots in a group of villages round Kumbala because of its following characteristics—small seedrate; single planting 10 inches apart; profuse tillering; yields heavily when planted in rich or well manured fields with good water supply; percentage of rice to paddy is higher than in local varieties; rice is one of a superior quality. This variety is extending steadily.

G. E. B. 24. A small quantity of this seed was got last year and distributed to 3 ryots in 3 different villages near Mangalore for trials in the second crop season. The results were encouraging. It gets ready for harvest 20 days earlier than the earliest local variety called 'Athikraya'. Its yield is estimated to be higher than the above named local variety. Percentage of grain to paddy is 50% as compared to 40% in the local varieties. The rice is of very fine quality and is more suitable to *majal* lands of fair water supply than in *bails* of abundant water supply.

As a variety maturing 3 weeks earlier without prejudice to the yield, it has appealed to a very large number of ryots in this district, who have *majal* lands, where at the lag end of the second-crop-season, water supply often fails; and a variety of this nature

which enables them to harvest the crop earlier is therefore bound to be most welcome. Many ryots to whom this variety was mentioned, are already eager to be supplied with the seed. The 3 ryots who had secured the seed from the last season's trial plots, would not part with any portion of their seed, but have on the other hand desired me to supply them with more seed. We have again this season received some more G. E. B. strains for trial and these are being tried both in the 1st and 2nd crop seasons.

Karutha Modan Hill Paddy. Of the 3 Hill Paddy varieties from Malabar viz., Modan, Thonnuram and Karutha Modan distributed to some dry land villages for trials, the last named i. e. the Karutha Modan has given much satisfaction because of its profuse tillering and higher yield. The cultivation of this variety is spreading. In addition to the seed which is supplied by us the ryots are purchasing it from those who had grown it in previous years. It is in fact slowly displacing the poorer local variety.

Single Mhotes. This lift was not known in this District. Lifting water by bullock power was a novelty to them, and is even now so, to most people. The usual lift here is a Picottah worked by 3 to 4 men. The single mhote was introduced here about 8 or 9 years ago;—some mhotes were put up for the ryots by the Department, but the lift did not receive the appreciation it deserved. For some of the ryots gave up the mhote and reverted to their original Picottah. The chief objections against this were that the buffaloes found it hard to walk backwards up the ramp,—and that buffaloes being slow animals were more difficult to be trained. But there were one or two ryots who persisted in it and found for themselves that there was much to be gained by its adoption. There was the saving of wages to be daily paid to nearly three coolies; the irrigation done was more efficient, as more water was lifted than by the Picottah; this new lift enabled the ryots to find work for their buffaloes in the slack season, when they would otherwise be idle and have to be fed all the same. Other ryots have become aware of this and are adopting the lift one by one. And the number of single mhotes now put up have increased in number. A number of zinc mhote buckets

with the leather tails had to be ordered for from Coimbatore Work Shops, and supplied to the ryots. Some got their buckets made locally but these were not satisfactory. A bucket made of copper by a ryot was unnecessarily heavy, and the leather tails made locally went to pieces within an unusually short time and had to be replaced by those from Coimbatore. As getting the supply from outside cannot go on for ever, it is intended to train the local people in making them during the coming season. As for preparing the wood work of the mhoite, and for putting up the ramp, a carpenter has been trained and he is sent out to applicants on payment of his wages and batta. This introduction has helped the ryots to increase the area under 2nd Paddy crop or their area under Sugarcane or to irrigate their coconut gardens more regularly. These lifts are at present to be seen only in Mangalore Taluk and two have been recently introduced into Udipi Taluk and another arranged to be put up in Kasargode Taluk. These stand a good prospect of being adopted much more largely in course of time in places where the wells or tanks are deeper.

Meston Ploughs. These are being demonstrated for the past 2 years. During the first year, very little impression could be made on the ryots. In the second, i. e., the year just, past the response was more encouraging. Demonstrations of the working of the Meston Ploughs and of the country ploughs, are being made in ryots' fields, at conferences and at important meeting places. The objections raised by the ryots as regards the location of the mould-board on the right side, and about the weight of the plough, are being successfully met in actual demonstrations in fields by having recourse to the 'Gathering' method instead of the 'Splitting,' and by actually working the plough with the smallest pair of buffaloes available in the villages; but a third and their main objection is that the price is too high; and all arguments and explanations as to its durability, its cheapness in the long run, and its greater efficiency are generally lost on the ryots.

At one of the Meston Plough Demonstrations held at Puttur Co-operative Union meeting, 11 Meston Ploughs were sold. At other

demonstrations held in villages, some elicited a response and others did not. Numerous demonstrations have, however, enabled us to sell about 42 improved ploughs within a short period, of which 36 are Meston Ploughs; 4, Monsoon Ploughs; and 2, Konkan ploughs. The task of popularising improved iron ploughs in a wet-land district like S. Kanara is, however, an uphill one. The purchase of one plough, each by the Co-operative Societies for being lent to their constituents either at a nominal rent or free, which has been arranged for to some extent, and the grant of ploughs to certain groups of villages free of cost in accordance with the recent proposals of the Government, may help us a good deal to bring about their popularisation more rapidly.

Intercultivation of Coconut Gardens. The ryots of this district are advised to pay more attention to the cultivation of the coconut, which is a crop next in importance only to paddy, as regards proper spacing of the coconut trees, proper manuring and their intercultivation. Some of the ryots have adopted suggestions in one respect or other. There were not less than about 100 gardens intercultivated last year as we advised. The ryots of Kasargode Taluk are particularly at an advantage because of the location of the coconut station there. Most of the ryots in the other taluks have hardly an occasion to visit that Farm. We have therefore started this year demonstration coconut plots in Mangalore, Udipi and Coondapur Taluks to show to the public the possibilities of raising Coconut gardens even on high level lands by the adoption of the intercultivation method for the conservation of the requisite moisture in the soil.

Our attention is also directed to channels other than those mentioned above such as economic planting, introduction of Tapioca, Pepper, Onion cultivation, etc. But I do not propose to deal with them here, as I fear, I have already taken too much of your time.

In conclusion I might be permitted to say that the S. Canara District is in no way behind others in point of view of the adoption of the Agricultural improvements as advocated by our Department. As one of those engaged in the district directly with this work, I may venture to say that I am very hopeful of many an innovation of today becoming the custom of tomorrow.

Before concluding, I have the very agreeable duty of expressing our gratitude to Mr. R. H. Ellis, late Collector of our District, for the help rendered by him in contributing funds on more than one occasion from his discretionary grant, for the purpose of free distribution of new seeds and manures to some deserving poor ryots for first trials. And I feel we cannot thank him in a better manner than by expressing our acknowledgments in this great assembly.

Discussion.

Mr. Govinda Kidavu—congratulated the writer on his lucid account of work done in South Kanara and said that the introduction of intercultivation in Coconut gardens, besides other items, was by itself a very promising line.

Rao Bahadur J. Chelvaranga Raju—referring to the statement made in the paper as to the beneficial effects of *Bonemeal* stated that his experience with that manure on the East Coast was quite the reverse.

Rao Sahib M R. Ramaswami Sivan—observed with regard to the doubt expressed by the previous speaker that the reaction of the *Bonemeal* to the soil was different on the West Coast because it was invariably accompanied by leaf manuring. Phosphatic manures decomposed more rapidly in the presence of organic nitrogen.

Mr. K. T. Alwa—said that, though the good account given by Mr. Mangesa Rao of improvements achieved smacked somewhat of an annual report, nobody could appreciate them better than he, who was fully aware of the condition 15 years ago when he left South Kanara to join as a student at Coimbatore. Referring to the fields where the new canes had been introduced, he said, it made him sad to think that all those must have been, at the moment of his speaking, submerged in the great floods reported from South Kanara. Speaking about agricultural propaganda work he advised the demonstrators to concentrate on one thing at a time and to do it well. He also dilated on the importance of interesting the landed aristocracy and getting their co-operation, which made matters easy for them to reach the ryots effectively.

Referring to the work done in South Kanara he said he could not pass over without paying a tribute to Mr. M. E. Couchman to whose active and willing help as Collector the initial successes of propaganda work were due. He also remarked that in the successful work recorded he had reason to think that it had become possible because the children of the soil had been employed to work for the betterment of the land of their birth.

Mr. M. Mangesa Rao replying briefly corroborated Mr. Sivan's statement and stated that the application of bonemeal was always accompanied by leaf manuring.

Possibilities of some Agricultural Improvements in the Cauvery Valley.

T. V. SUBRAMANYA KANDER.

The Upper Cauvery valley may be divided into two parts—a tract which has perennial water supply and another where water is available for only 10 months.

Paddy. In the former tract 5 crops of paddy are generally taken in two years. In some cases 3 crops are taken in a year. "Aruvatham Kuruvai" the shortest duration variety of paddy, (60—90 days), plays an important part in this connection. It is no exaggeration, if I say that there is hardly a week where one cannot witness the operation of sowing or harvesting of paddy in the former tract in lands under the "Raja channel" in the Salem District. Three crops taken in a year are as follows:—

From Masi 10 to Ani 5	
February 25 to June 20	Kuruvai
From Ani 15th to Purattasi 15	
July 1st to October 1.	Aruvatham Kuruvai.
From Purattasi 25 to Masi 5	
October 10 to February 20	Samba.

In tracts, where water is available for about 10 months only 2 crops are taken. As soon as water is available in the month of An

(June—July) Aruvatham Kuruvai is sown broadcast as a first crop. When this crop is in ears, samba is sown in the seed bed. After the harvest of the former the land is ploughed, manure applied and seedlings transplanted. After the harvest of samba crop in Masi—Panguni (March—April) the lands are left fallow, as water is not available for most part, although we may see here and there crops of cholam, gingelly etc. As a rule samba is manured with green leaves (chiefly *kolinji*), oil cakes etc. and Kuruvai with green manure leaves and farm yard manure. Individual manuring with margosa (Neem) and groundnut cakes is largely used preferably to Nellore and other long duration varieties of samba. Paddy fertilisers from Ranipet and Calicut etc. have largely come into use during the last 3 years. Green manure crops seen elsewhere may be raised preferably in the latter tract, where land is lying fallow for about two months. Seed rate is 16 to 20 M. M. per acre; and in some places more is used. Seed rate has been decreasing for the last 2 years but economical planting may be introduced. Introduction of superior varieties of paddy may be done. Blast of paddy locally known as 'Kodukku Noi' has broken out for the last 2 years in Kadambankurichy and Nanjai Thottakurichy villages of Karur taluq. This chiefly attacks long duration varieties. Damage is greater in the case of healthy crops and crops grown in 'Valakattai-bhumi'—(fields which had a previous crop of plantain). This disease is said to have been in existence some 10 years ago in Garudan Samba which was a prominent variety at that time. The ryots apply pigs' blood in irrigation water as a curative method, but in vain.

Sugarcane. Sugarcane is cultivated on fairly large areas, 10,000 to 15,000 sets per acre being the seed rate. Groundnut cake is extensively used with very good results. Sugarcane fertilisers are also applied. Red-rot is doing much damage especially in the Pugalur channel area. Where sets are selected with very much care, the condition is better. Introduction of disease-resistant varieties will improve the situation. The Sindewahi furnace, which economises the fuel and which is unknown in these parts may be introduced.

Plantain. This is extensively grown in these parts. Puvan is the main variety and Rastali comes next. The former is the heaviest

yielder known. Its main defect is that it can hardly withstand the heavy winds of the months of Panguni and Chittarai (March—April). (This wind is popularly known as Chittarai (March—April) "Suli" wind). On account of this, bamboos have to be brought for propping at any cost. There are two main diseases that attack the plantain: "Bud-rot" and "Vithaikai disease."

Bud-rot is common in these parts. Well grown-up trees are more liable to its attack. The growth is stunted, a large number of suckers is formed around the stem and leaf sheaths, and leaf petioles become hard to the sickle. Then the central leaf-bud rots so that the interior turns hollow. A careful dissection of the diseased plant shows a number of yellow and black dots. Attack is greater in the case of Rastali and Kulivazai (Dwarf plantain). This disease is considered to get into the plant through the roots.

Vithai Kai disease—விதைக்காய் நோய்—(seed developing disease). This is confined only to the Puvan variety. The diseased plant grows luxuriantly. The bunches are of a greater size. When the development of fruit is going on, some fruits remain thin and pointed chiefly in the upper portions of the bunch. Some of the fruits do not grow more than a finger's thickness. The size of the seeds developed varies from that of chilli seeds to that of "Bendaikai" "Lady's fingers". My attempt to raise seedlings from these seeds was a failure. The number of seeds developing in a fruit varies from 20 to 50. On this account these fruits are unfit for use. This disease is increasing. The attack is greater in ratoon crops. Selection of suckers has diminished the damage to a certain extent.

Chodai disease (சோடைக்காய்) is one that attacks the Pachai Nadan variety. Some of the fruits do not develop well and remain thin and flat. A hollowness is formed with some blackish and reddish matter around the cavity. It is therefore high time to investigate these diseases and find out some preventive methods at this early stage as "Prevention is better than cure."

Some work may be started on extracting the plantain fibre, making plantain flour, converting the milk juice into some dye. (The milk juice is a fast colouring material.)

Turmeric. This is chiefly cultivated in the Karur taluk. Leaf spot disease has broken out for the last three years. The crop grown from "Virali" or side rhizomes is more attacked than that of "Kilangu" (mother rhizomes). "Nurai manjal" is a diseased *virali*, which becomes swollen, its thickness being double that of the ordinary ones. There is a large proportion of moisture in it. It looks somewhat ashy in colour. This is an inferior quality. There are two kinds of furnaces used for boiling turmeric in these parts. One is called "Pial furnace" — திண்ணை அடுப்பு — and the other one is an improved furnace which is called by the name of "Washerman's furnace" — வண்ணன் குளே அடுப்பு.

Ordinary furnace. A pial-like platform is laid with well-mixed mud in wet condition $8' \times 4' \times 2'$ and allowed to dry. 8 holes are dug 4 in a row, each hole to receive an earthen pot. Beneath these rows, trench-like holes are formed to the full length of the platform, one in each row, so that these two rows will receive fuel from both directions. Cut and dried stalks of Sembai (*Sesbania egyptiaca*) and castor are used for feeding. The end pots receive more heat and the middle pots less as the fuel is to reach a long distance and for want of air. Long stalks have to be used and dried leaves etc., are of no use for this furnace. Therefore there is waste of fuel. It is not uncommon to see the ryots going for other fuel in addition to their large stock of *sembai* and castor stalks.

To remedy the above waste an improved furnace has been used for the last two years. This is constructed like a washerman's furnace. There are four holes over a furnace. An open space is formed in a side to feed the furnace and a small hole in the other side for smoke to escape. As the furnace is compact and spacious, dried leaves, plantain leaf petioles etc., which are common in these parts may be fed with a fork. Thereby a large stock of *sembai* and castor stalks is saved. The saving in this method may be taken at Rs. 15 per acre in these days of dearth of fuel. In Kodumudi and Erode small iron pans are used for boiling. It is said that Sindewahi furnace with jaggery boiling pan is well suited for boiling turmeric. Of course this may be introduced by the ryots, who cultivate large areas. I may be permitted to suggest that small ryots, whose number

is large and who are not in a position to buy jaggery boiling pan and to erect a Sindewahi furnace for this purpose alone, may be recommended to construct the improved furnace referred to above and economise the fuel.

Betel vine. Betel vine comes next in importance. The "Raja Vaikal" is the main centre of betel vine cultivation. "Pandamangalam" is the name given to the leaves obtained here in the betel leaf markets. The crop stands for $2\frac{1}{2}$ years. "Sakkai" or "Mattai," "Maru" and "Muthiya" are the names of the leaves obtained in different ages of the crop. "Muthiya" is the crop obtained in the last period. This is thin, white, and small and used generally locally or consumed in towns near by. "Maru" is the crop obtained in the middle period and is sent to distant places. "Sakkai" or "Mattai" is the name given to the leaves obtained in the first period. This is broader, coarser and blacker and is suited to be sent to long distances such as Jaipur, Agra etc. These thicker leaves are sent to the distant places as parcel by sprinkling ragi seeds between every layer of leaves so that they will sprout and prevent decomposition. Betel vine receives a heavy application of manure. It is only owing to this cultivation, that the price of manure has considerably risen in the betel vine tract. Cattle manure alone is applied at present. Oil cakes, fish manure etc., may be tried.

Agathi plants grown for supporting the betel vines are sometimes attacked by weevils which are hand-picked. "Pulli Noi" (Dot disease) appears at times and disfigures the leaves. Dots are formed somewhat yellow in colour on both surfaces of the leaves and get rotten. These may be in some cases of the size of a rupee. Spraying may be tried. "Surul Noi" (curling disease) attacks chiefly the last crop. "Kodi Kaichal" (vine) wilt appears and does damage at times. Some remedial measures may be recommended to the ryots.

Improving the water supply. The channels get their supply from the Cauvery by means of "Korambu" or temporary dams erected across or in a portion of the river as the case may be, with pegs, brushwood, *nanal* grass etc., in some urgent cases with sand bags too. The water supply may be improved by bestowing some more attention

in the Korambu works, improving the padugai which are the main suppliers of twigs and leaves to the Korambu to have plantains or babul, pungam and other trees for the supply of materials to be used.

Improving drainage facilities. Drainage is one of the pressing wants in almost all places. Many lands which are considered very good for cane and plantain cultivation are not cultivated owing to want of proper drainage facilities. Drainage disputes are common in parts especially under the perennial water supply channel. I may be permitted to suggest that early steps may be taken to open drainage channels at reasonable intervals.

Summary. The following are in short some of the agricultural improvements that, in my opinion, can be effected in these parts.

1. To introduce green manuring, economise the seed rate of of paddy and advise the ryots to combat the blast of paddy.
2. To introduce improved varieties of cane, and Sindewahi furnace for sugarcane boiling.
3. To investigate plantain diseases and find out some remedies and to convert plantain milk juice into dye.
4. To demonstrate to the ryots the extraction of the plantain fibre.
5. To find out some remedies and advise the ryots to eradicate spot disease of turmeric and improved furnaces for economising fuel.
6. To investigate the dot disease and curling disease of betel vines.
7. To improve the water supply and drainage.

In conclusion, when the financial position improves, I hope and trust that the question of opening in the near future an agricultural farm, which will be of immense help to the ryots, will not be left unconsidered.

Discussion.

Mr. S. Sundararaman,—Govt. Mycologist congratulated Mr. Kander, on his excellent paper and complimented him on his laudable keenness in practical farming. He observed that his observations on the various

diseases and pests of crops were extremely interesting and wished that there were more students of his type—students that would take to agriculture as a profession.

Mr. T. V. Rajagopalacharya endorsed the encomiums of the previous speaker and remarked that he had visited Mr. Kander's farm personally along with a batch of students and that he could not in any way find fault with the methods of cultivation. He said that Mr. Kander's lands were situated in a very rich and highly cultivated tract—where land was worth Rs. 7,000 per acre any day—and where an acre of plantain could within its duration of three years give easily a total out-turn of Rs. 3,000. He was, therefore, of opinion that lands of the type of Mr. Kander's amply deserved help from Scientific experts like the Mycologist and the Entomologist.

Mr. Kolandaivaram Pillai stated that the Govt. was making endeavours to start a farm in the Cauvery Valley in order to study the problems mentioned by the writer of the paper and that finances were the only consideration that stood in the way of its realisation.

Ridicule.

A little ruthless laughter clears the air as nothing else can do: it is good for us, every now and then, to see our ideals laughed at, our conception of nobility caricatured; it is good for solemnity's nose to be tweaked, it is good for human pomposity to be made to look mean and ridiculous.

From "Great Thoughts."

Aldous Huxley.

The King and Agriculture.

The agricultural industry is of vital and universal importance, for it provides not only the actual necessities of life, but a firm foundation of social and political stability, while ensuring to a thrifty and industrious population a life under the healthiest of natural conditions. Hence the welfare and prosperity of the Agricultural community is a matter of deep concern to the Government and people of every country.

His Majesty The King-Emperor at the International.

Institute of Agriculture—Rome June '23.

Extract.*Louis Pasteur.*

Lives of great men all remind us
 We can make our lives sublime,
 And departing leave behind us
 Footprints in the sands of time.

LONGFELLOW.

Work was one of his ruling passions, because he believed that properly directed it would bring success. "When one has learned to work" he wrote "he cannot live without it." He loved it, and he gave up everything else for it. To the students at Edinburgh he said "work perseveringly, work can be made into a pleasure, and alone is profitable to man, to his locality and to his country."

"We must never be satisfied with what we have already accomplished, but press forward to other things, for duty ceases only when ability to labour is at an end."

"Let us strive, for strife is effort, strife is life when progress is the goal."

He had little belief in mere chance. To one who suggested it, he replied that "Chance favours only those who are prepared to take advantage of it."

Progress was his constant watchword. He often said "Do not dwell on things already acquired." His career represented the expanding of his mind with each successive step. One discovery paved the way for another. The study of ferments led to the discovery of the Anærobes etc.

Criticism played no unimportant part in Pasteur's scientific career. Exacting in his own work, he expected that of others to stand the same rigorous test. He is described as implacable in his criticism of his own hypotheses, often working for months to

assure himself he was not a prey to error. "In experimental Science," he wrote, "it is always a mistake not to doubt when the facts do not compel one to affirm."

With no lack of courage, he said of himself, "I am the most hesitating of men, the most fearful of responsibility, so long as I am not in possession of the proof. But when solid scientific proofs confirm my convictions no consideration can prevent me from defending what I hold to be true." In cautioning against allowing personal bias to influence conclusions, he wrote, "The greatest disorder of the mind is to allow the will to direct the belief."

"Let us always make application our object," he wrote, "but resting on the stern and solid basis of scientific principles. Without those principles application is nothing more than a series of receipts, and constitutes merely empirical routine. Progress with routine is possible but is desperately slow." Theory was to him a means to an end, in research as well as in relation to practical affairs. He looked upon the test of theories as their fruitfulness.

Of theory in relation to practice, he said "without theory practice is but routine born of habit. Theory alone can bring forth and develop the spirit of invention."

The following are some of the traits in the character of Pasteur that may serve as an example to the investigator of to-day.

1. Pasteur himself modestly attributed his success to "*assiduous work*, with no special gift but perseverance joined to an attraction toward all that is great and good."

2. *Thorough Preparation.* He laid the foundation for his work in thorough preparation and never ceased to supplement it. He continued growing.

3. *Purpose.* He had a definite goal; it was to acquire new knowledge which would not only add to the sum-total but be useful to humanity.

4. *Continuity.* He followed through to a finish, even though he met with temporary failures which made it necessary to go all over the ground again after a failure. He devised new experiments, sought a different method of approach, and he studied the results attentively as he went along to see what they were developing.

5. *Interest in his work.* His devotion to his work was accounted for in no small degree by an intense interest in what he was doing. He was absorbed in it for the time being. This was one secret of success, *for work without an interest which calls forth the best there is in one is likely to go little beyond routine.* He looked upon work as an opportunity, for he had a high sense of duty, and he saw in accomplishment a means of meeting the responsibility for his education and the facilities given him for bringing honour to his country, and for giving aid to humanity. What he had been able to accomplish, instead of resulting in complacent satisfaction and diminished vigour, only opened the door wider to his fertile imagination and stimulated him to further undertaking.

6. *Intensity.* His concentration of effort and close application, the absorption with which he devoted himself to the work in hand, were striking qualities acquired from his youth. He worked on many things but he never scattered. His effort was systematic and thorough to the last degree which his critical attitude and his ingenuity could make it.

7. *Keeness of observation.* Habit made him a keen and penetrating observer. Nothing, however, trivial which might bear on his studies seemed to escape him.

8. *Penetration.* He not only observed and recorded what he saw but he studied over it. He never stopped with the bare fact; it stimulated his further curiosity and fixed his imagination. He tried to make out its significance—what it meant or what it might teach him.

9. *Independence of thought.* He cultivated the habit of independent thinking. He was not led by the accepted belief of others. He demanded clear unequivocal evidence.

10. *Undismayed by circumstances.* He made the most of his opportunities and minimised the handicaps. He had the barest of facilities for work in his earlier days, the most meagre of laboratory accommodation; he was allowed no assistance of any kind—not even an ordinary laboratory attendant and no grants for the maintenance of investigation. Such conditions would have discouraged many with a fainter heart for research, but he had an indomitable will and so accepted them, financed the laboratory from his own pocket or with the aid of friends and in this period laid the foundation for his recognition.

In his forty-sixth year, when his work was going on with the greatest intensity, he suffered a cerebral hæmorrhage resulting in a paralysis of the left side. This was followed by a long and anxious illness. But his soul was unconquered. Recovery left him with a limp in his left leg and a stiffness of his hand, obliging him to leave the carrying out of his experiments quite largely to his assistants. With mind unimpaired “undismayed, and thrice determined,” he continued work for 25 years and made that period one of the most productive of his whole life.

The high idealism expressed in the life of this great man is well set forth in his charge to students on the occasion of his 70th birthday celebration. “Young men,” he said “whatever your careers may be, do not let yourselves become tainted by a deprecating and barren scepticism. Live in the supreme peace of laboratories and libraries. Ask yourself first ‘what have I done to repay my education,’ and as you gradually advance, ‘what have I done for my country’ until finally you may have the immense satisfaction of knowing that you have contributed in some measure to the progress and well-being of humanity. But whether your efforts

are more or less favoured by life, be able to say when you approach the great end 'I have done what I could.'

Extract from Editorial of Experiment Station Record, April 1923.

A Note from a Student.

Physical culture and Field work. Physical culture is often erroneously associated with exercise taken for purposes of recreation or mere physical exercise. Physical exercise is simply mechanical in its performance. When one desires to develop his muscles and his physical powers, it becomes a question of putting his will into the exercise. Physical exercise wherein the application of the will is utilised for bringing about the development of great muscular power is termed physical culture.

A blacksmith wielding his ponderous sledge hammer almost every day but only mechanically does not make rapid progress in the building of his muscles, though they may grow big and knotty enough in the course of a few years. Another man who would put his will into each of his sledge hammer blows though working only for a short time daily, would develop his muscles better and in a shorter time too. The workman in the fields, mechanically using his mammatti throughout the 8 hours of a working day, does not gain any material physical advantage beyond earning a few annas. But another working for a short time daily with the same implement, but with the application of will power, though he may get tired soon, has the satisfaction of having developed the muscles of his arms and abdomen. It is this kind of physical training with the will brought into play that develops not only the physique of an individual but also his will.

If, during the 3 hours of allotted field work, a student, taking pleasure in his work, and bringing his will into action, works steadily and energetically, he will in a few months find to his great satisfaction how much he has developed his will and muscles. Three hours of hoeing develops to a wonderful degree the abdominal muscles of one who works with such a view. In the same manner, harvesting goes a great way in the building of the muscles of the arms. If ploughing is done with a view to one's physique, during the 3 hours of steady walking behind

the plough, with combined regular breathing exercise, the leg muscles will be developed as also the muscles of the chest. When such is the decided advantage to be gained by the application of will in daily field work, one should feel immensely delighted to have the opportunity of going to the fields and working, and as the saying goes,

"Love labour, for, if you want not for food,
You may for physique."

Aubell.

Gleanings.

Cultivation of Tamarind in Mexico. Mons. G. Canedo has found a wild Tamarind in the state of Jalisco yielding abundant fruit and recommends the cultivation of the Tamarind for commercial purposes in Mexico, as it needs so little attention and yields well. (International Review of Agriculture—Jan.—March 1923.)

[The readers may be interested in noting that the word "Tamarind" is of Arabic origin—it being literally "Tamr-hind" or Indian Date. (Ar. Tamr = Date-fruits, and Ar. Hind = Indian).
Editor.]

Sugarcane Wax. On account of the hardness and high melting point of the white powdery substance on the surface of the stalk, methods have been evolved of producing it on a commercial basis. The substance obtained is hard and can serve as a substitute for "Carnauba" and beeswax.

(International Review of Agriculture—Jan.—March 1923.)

Codliver oil for cows. J. C. Drummond and others have recently made an investigation of the value of codliver oil in the winter feeding of cows and have obtained a certain amount of evidence that by feeding with two ounces of it per day in addition to other ordinary foods, the concentration of vitamin in the milk can be maintained at a high level. Cows appear to like the oil and it was also found that milk had no taint or flavour.

Extracted from the Journal of Agricultural Science, April '23.
K. K. Rao.

[In this connection may be mentioned the practice of feeding cows with fish on the West Coast—where it is believed that this feed will bring them into heat.—*Editor.*]

Cuba's Sugar out-put for 1923.—We learn that, as the harvest of this year's crop was nearing completion, the number of centrals operating was only 11 as against 51 at this time last year. The output is below the original estimates which ranged from 4,000,000 to 4,260,300 tons. Latest estimates given range from 3,500,000 to 3,750,000 tons. This is due to several causes. Last year's conditions were ideal for harvesting, but they were not favourable for the growing of this year's crop. Low prices last year and the financial burdens which Cuba was burdened with and a surplus of 1,200,000 tons in the islands were other factors which contributed to this result.

(Louisiana Sugar Planter, 9 Jan. 23.)

Tariff and Sugar Consumption. How an increase in the tariff rates does not reduce imports is furnished by a mass of figures given by the Louisiana Planter in its issue of June 9th last. In the United States of America, since September 1922, the tariff had only increased 16 cents a hundred pounds, while the price of sugar had advanced 300 per cent. When the women at home had been complaining of high tariff, the bakeries were consuming 290,000 tons, soft drink manufacturers 135,000 tons, condensed milk people 100,000 tons, manufacturers of

Chewing gum	20,000 tons.
Tobacco men	20,000 "
Soap makers	1,000 "
Chemists	13,000 "

out of the total annual consumption for the country of about 5,000,000 tons.

V. M. A.

Java's Sugar crop 1922. During 1922, 182 mills were in operation. The sugar estates had planted 397,443 acres and the amount of canes reaped from that area was 16,759,106 tons or 42 tons to the acre. The total output was 1,779,557 tons equivalent to 9950 lbs. to the acre.

The International Sugar Journal—June 1923.

The Mexican Poppy—Argemone Mexicana—known as "Brahmadandi" (Tel.) This is a Mexican plant that has been introduced from Mexico into all tropical and sub-tropical countries. It is abundantly found in waste places—usually in sandy soils—in many parts of South India and the seeds are used medicinally for skin diseases, and it would doubtless be productive of good if the abundant supplies of this uncared-for plant can be made use of. Analyses of the seeds made in the Imperial Institute, London, and independently by Mons. M. Brambila in San Jacinto—Mexico, indicate that the oil content is about 39% but only 26.7% of oil was obtained by Mr. Brambila by the cold pressure method. "Drying tests indicate that the oil does not dry readily, but that it might be employed in admixture with linseed oil as a cheap substitute for the latter for the preparation of paints etc. It is used as a lubricant and illuminant in Mexico and the West Indies and is said to possess a medicinal value. It seems probable however that the only important commercial use for the oil would be in the soap-making industry. The meal should not be used as a cattle food owing to its alkaloid content and purgative action. The material could be used, however, as a manure, which would be of value on account of the large proportion of nitrogenous constituents. It is easily saponified with soda and forms a soap of good quality.

(International Review of Agriculture—Rome, Jan.—Mar. '23).

[We are informed that in parts of the Tinnevely District, oil extracted from the seeds of this weed is regularly used as an illuminant by the poorer classes.—*Editor.*]

The Cinema in Agriculture in different countries. The use of the Cinema in Agricultural Education among farmers is suggested in Great Britain, and a society is understood to be preparing a set of films. In France, the Ministry of Agriculture has submitted to the President of the Republic an order authorising an annual grant of 500,000 frs. for the purpose of installing in agricultural colleges and schools and in the rural communes, cinematographic apparatus which would be used for the popularisation of scientific agriculture. In Italy, the use of the cinema for agricultural propaganda has been largely developed through the National Institute "Cerere," Rome, Via delle Finanze, 15-21. This Institute is concerned with technical agricultural instruction and the intensification of crop yield; the films are lent free of charge (except for cost of carriage) to all agriculturists who make an application to the Director of the Institute.

The "Schlesische Landbund" in Germany has organised a Committee which will deal with agricultural films under two groups, one of which will deal with the photography and the other with the exhibition of the films in Agricultural Colleges and Societies. The subject of the first film is the treatment of potato tubers in the control of diseases.

(International Review of Agriculture, Rome, Jan.—March 23.)

Estate News.

July 1923.

The months of July and August proved to be specially prolific in dinners and Tea Parties on the Estate.

The season began with a farewell party arranged on Thursday the 5th July by the "Research Chemists"—the staff of the Government Agricultural Chemist—to meet and bid farewell to Dr. R. V. Norris and Mrs. Dorothy Norris. Dr. Norris was to proceed home

on leave for one year and eight months and Mrs. Norris who was on leave at the time was expected to resign her post as Agricultural Bacteriologist and take up an appointment under the Lac Committee at Ranchi. The party was well attended and enabled many to meet and take leave of Dr. and Mrs. Norris.

The *College Day* was as usual an occasion when the estate members could meet and entertain old friends after long absence.

On the 14th the Union was "At Home" to all the visitors on the occasion of the sports on the College Day.

On the 15th, Mr. K. Krishnamurthi Rao—Assistant Sugarcane Expert—stood Tea to all the visitors on the occasion of the demonstration at the Sugarcane Station arranged on that day. Several distinguished visitors—among whom were the Development Minister and Development Secretary—attended the Demonstration.

On the 15th at 9 P. M. the members of the Indian Agricultural Gazetted Officers' Association had the honour of giving a dinner to Sir K. Venkata Reddi Nayudu, Minister for Development, in honour of the distinction bestowed on him.

Mr. Sriramulu Nayudu, Public Works Overseer, who had been for nearly two years in charge of the New Works at the Agricultural College left Coimbatore on promotion for Madras on the 19th July and in his honour Mr. C. Sundararama Ayyar gave a farewell party at the Mycologist's Pot culture house in the company of a few select friends.

Rai Bahadur K. Rangachariar visited the Agricultural College in connection with a meeting of the Board of Studies and the Officers' Club took this opportunity of entertaining him at dinner at

9 P. M. on the 25th July. Most of the Club members were present and several speeches were made in honour of the guest of the evening—which all bespoke his great popularity among the members of the Estate. Rai Bahadur K. Rangachariar was President of the Club for three years continuously and was one of the original Life-members. He is on leave prior to retirement which is to take effect in September.

The next day the staff of the Government Lecturing Botanist gave a farewell party at the Botany Lecture Hall in honour of the retirement of their chief.

On the 30th July, Dr. Clouston, the Acting Agricultural Adviser to the Govt. of India and Mr. J. Smith, Imperial Dairy Expert, visited the Sugarcane Breeding Station and the Central Farm. Rao Sahib T. S. Venkataraman arranged an evening party on the 31st, at the Sugarcane Laboratory at Chettipalayam to which all the heads of sections had been invited. This enabled them to meet and make the acquaintance of the guests of the evening. The guests left by the night train for Bangalore the same evening.
August 1923.

Visitors. Mr. W. McRae, Imperial Mycologist arrived at Coimbatore on a visit to Coimbatore in connection with the Godavari Palmyrah Palm Disease. He stayed about three days and then left for Kotagiri.

Mr. P. V. Isaac, Imperial Dipterist, visited Coimbatore in connection with the investigation of Tabanid Flies.

Mr. Seetharama Pathrudu visited Coimbatore in connection with his enquiry regarding Sugarcane cultivation. Having finished his enquiry in the Tanjore Delta, he proceeded to the Agency tracts from Coimbatore.

The College Flag was at half-mast for a week from the 10th instant to express the sense of grief for the death of President Harding of the United States of America.

On Sunday, the 12th August, Mr. V. K. Krishna Menon, Assistant Scout Commissioner delivered a very impressive lecture at the Indian Officers' Club before an audience of students and officers, dealing with the objects and methods of scouting in a simple and lucid style. The fathers of the scouts of the estate are beholden to him for his kindness in explaining to them the principles of scouting.

The Officers' Club gave Mr. K. Unnikrishna Menon a hearty send-off on the 22nd instant in view of his departure for Tellicherry on transfer as Assistant Director of Agriculture, VII Circle. Felicitous speeches were made on his various traits of character which had served to make him popular on the estate.

Mr. P. H. Rama Reddi, who in spite of the shortness of his stay among us on the estate, won the good will and esteem of all he had dealings with on the colony by reason of his pleasant and courteous manners, was entertained at Tea or dinner by his friends, and by the students. On the 1st September, the Agricultural Section arranged a Tea in honour of his departure, at which he was able to meet and take leave of many of his friends. He left Coimbatore on the 2nd September for Bellary.

Mr. D. Balakrishnamurti who was on 4 months' leave since April, rejoined duty and assumed the duties of Professor of Agriculture and Superintendent of Central Farm, on September 1st.

Students' Corner.

Sports. In spite of the unusual wet weather that prevailed during the greater part of this month, our Team Captains and the Games-Secretary displayed no lack of zeal in conducting the games. On the 11th instant, the Government College, Coimbatore met us on our ground at Hockey and left us winners by four goals to nil.

The usual tradition of the officers of the Estate playing against the students was kept up. Two matches in Hockey were played between the two parties and the young blood signified respect to their elders by allowing them to win on both the occasions. Another Hockey match was played on our grounds with the 'Auxiliary Force' when bad luck attended the College team.

The first match played by our College in the Rony Cricket Tournament, this year, was against the 'Gymkhana' in Mr Narasiah's grounds, the absence of Mr. Anstead in the team was keenly felt once again. In the first innings the Gymkhana secured 77, the bowling honours being shared by our Captain Pattathan, Sundara, Karunakaran and Krishnamurty: while our College scored a century, half of this being contributed by Mr. K.T. Bhandary, the oldest cricketer of the team. Mr. K. T. Bhandary displayed a very lively game hitting every ball of the opponents. In the second innings the Gymkhana took 76 for eight wickets, while our College had 61 for one wicket with Messrs. Shiva Rao and Bhandari not out. The two latter had to their credit 31 and 23 respectively for the time they played. The match ended for the day with a win for the College.

In the second match in the tournament played by our College with the Foresters on their grounds, our team fared badly and sustained an innings defeat. Mr. S. N. Venkataramanan with 25 topping the list in the first innings and Mr. Parnell with 22 in the second innings.

Literary Section. A lecture on 'Student life at Oxford' was delivered on 31st instant in the College Hall by Mr. D. Sadasiva Reddy, B. A., (Oxon), Principal, Government College, Coimbatore, with Captain Dyson, I. F. S., Principal, Madras Forest College, Coimbatore in the chair. Mr. Reddy narrated at length some of the funny incidents connected with his college life at Oxford, bringing out the boisterous nature and animated spirits of the students in general. What with the de-bagging and the mock

funerals the sconcing and the scripture test mentioned by him, not to speak of the burning of furniture and the flooding of rooms, the entire hall was ringing with peals of laughter and the whole audience had to hold their sides till the end.

Professor P. H. Rama Reddi. Our Professor of Agriculture, M. R. Ry., P. H. Rama Reddi. Garu was "at home" to the students of B. Sc., I, II and III on different occasions and discussed freely with them about their present difficulties and their future. He said that he would give a helping hand to them in drawing the attention of the authorities concerned to the idea of the recruitment of Agricultural graduates into service in other departments allied to agriculture.

On the eve of his departure Mr. Rama Reddy was the guest of the students at a dinner party. M. S. N.

HOUSEHOLD HINTS.

First aid for clothes. Nothing is more annoying at holiday time than to find that one's smartest clothes have been disfigured by a stain of some kind. If the wrong methods are used matters will become worse, for the stain may be increased in size and made permanent.

Sea water has a staining action on account of the chemicals it contains. Any fabric that has been wetted by it should be placed as soon as possible in fresh water and steeped for a short time. If this is done there will be usually no stain.

Do not use soap for dealing with fruit stains. Use hot water, and if this does not remove the discoloration, try sponging with acetic acid afterwards rinsing well.

Ink stains should never be sponged with water, for this causes them to spread. Place the stained material in a saucer of milk. A subsequent sponging with cold water will take out any marks made by the milk.

If a spot of grease is dropped on clothing it should as much as possible be removed by gentle scraping. The material should then be placed under a sheet of clean blotting paper and a hot iron applied. The heat melts the grease and the blotting paper soaks it up.

(Extracted from the "Hindu"—June 1923) U. L. S. Rao.

Departmental News.

1. Mr. Bachina Ramayya Chaudhuri B. Sc., (Edin) who was in training at Pusa for one year, was appointed acting Deputy Director of Agriculture in the vacancy caused by the absence on leave of Mr. H. C. Sampson, C. I. E. Mr. Ramayya arrived at Coimbatore about the third week of July and is now undergoing the usual six months' training at the Central Farm. We welcome him heartily to our midst.

2. Mr. Y. G. Krishna Rao Nayudu, who was also at Pusa on one year's training has been appointed Assistant Director of Agriculture, I Circle, under Mr. A. C. Edmonds.

3. Mr. Percival Venkataramiah, having finished his training in Agriculture on the Central Farm, is now back again as Assistant Lecturing Chemist.

4. Mr. R. N. K. Sundaram was posted early in July Assistant Director of Agriculture, VIII Circle, at the end of his training at the Central Farm.

5. Mr. Broadfoot returned from leave and joined duty early in August and in consequence, Mr. K. Gopalakrishna Raju has been transferred as Assistant Superintendent, Central Farm, Coimbatore in the place of Mr. Unnikrishna Menon, transferred as Assistant Director of Agriculture, VII Circle.

Editorial Notes.

The Mettur Irrigation Project.

Since the Irrigation Commission toured the several provinces and submitted their stupendous report 20 years ago, no large project has been sanctioned or undertaken calculated to bring relief to the needy Madras cultivator or to expand the usefulness of the existing systems of irrigation. The Kannambadi project which was thought out by the skilful Engineer-Statesman Sir M. Visvesvaraya has been the cause of considerable excitement amongst a portion of the Madras ryot population and the recent settlement of the question between the Mysore Government and the British Indian Administration has, we are glad to note, cleared the way for the Secretary of State to sanction a scheme for bringing the enlivening waters of the Cauvery to the barren wastes in the southern portions of the Tanjore District,—once reputed to be the "garden of South India." Though the idea was as old as 1834 and originated from the Engineer-philanthropist, Sir Arthur Cotton, several investigations made subsequently by several Engineers from time to time have served to confirm the soundness of the scheme.

In its sanctioned form the scheme provides for the construction of a "dam" across the Cauvery at Mettur, 24 miles from Erode Railway Station, to form a reservoir of 82,000 million cubic feet capacity. The dam will be 6200 feet long and 260 feet high and the reservoir will extend 30 miles upstream. The construction of a canal and distributory system 88 miles in length from the right-side of the Cauvery to supply water to 22,000 acres at present unirrigated and to supplement the supply to 80,000 acres of existing wet land cultivation under tanks, the extension of the Vadavār—a branch of the Cauvery—to irrigate 43,000 acres and the improvement of supply in the delta and extension of second crop by 70,000 acres, mark a definite step forward in the development of the natural resources of the country, for which we have to congratulate ourselves.

It is only recently that His Excellency Lord Willingdon opened the smaller but none the less useful dam at Toludur in South Arcot which has been designed to water about 25,000 acres. We hope that under the guidance of Dewan Bahadur Mr. A. Ramalinga Ayyar, our talented Chief Engineer, the Mettur Project will see its completion at a cost well under the estimated total of Rs. 3.5 lakhs and much earlier than the projected period of ten years.

Annual Visit at Rothamsted.

Our readers may be interested in learning that, at the invitation of Lord Bledisloe—Chairman of Lawes Agricultural Trust Committee—a number of guests representing various Agricultural interests visited the Rothamsted Experiment Station on Wednesday, June 13, for the annual inspection of the fields and laboratories. In the morning Broadbalk and Hoos Experimental fields were visited, and after luncheon Lord Bledisloe briefly reviewed the purpose and recent progress of the station, laying stress on the care taken to avoid the erection of water-tight compartments between the Scientific worker and the practical farmer, without in any way limiting the work of fundamental investigation on which the application of Science to Agriculture is of necessity founded. Lord Bledisloe also referred to a number of the external activities of the station, as indicative of the efforts made to keep in touch with the whole life of the country side.

Sir E. J. Russel, then, gave a statement on the work of the station during the year, the main items to which attention was devoted being (1) the cultivation of the soil, (2) the feeding of the crops and (3) the maintenance of healthy conditions of plant work.

Sir Mathew Wallace, Principal M. J. R. Dunstan of Cirencester Royal Agri. College and Mr. George Dallas of the Workers' Union were among those who spoke on the occasion. In the afternoon the visitors made a brief inspection of the work in progress in the Laboratories.

In this connection we may make a comparison of our Institute, however humble it may be, with the Rothamsted Station and suggest the institution of a regular annual visit by a body of visitors headed by the Minister and the Secretary of the Development Department. It is true this year both the Minister and the Secretary and some of the Legislative Council Members graced our Institute with their presence at the time of the College Day, but, we are doubtful whether, owing to the crowded functions of that busy time, they had any leisure to inspect the laboratories or the Farm. What we would suggest particularly is the arrangement of a day which should be fully devoted to an annual inspection by such a body of Visitors interested in Agriculture, so that they may have the opportunity of seeing personally what is being done in the various sections, satisfying themselves as to the usefulness of the lines pursued and, where necessary, of suggesting fresh lines of work or new angles of vision. Such annual visits would obviate the possibilities of uninformed criticism at the Legislative Councils and perhaps favour the grant of funds to carry on the present useful lines of work of our Department.

Promotions.

We are glad to note that two of our members, Messrs. P. S. Jivanna Rao and P. A. Raghunathasami Aiyangar, have been promoted to Provincial Service. We offer them our hearty congratulations and trust they will, in due course, be confirmed therein. We trust similarly that more of our younger members will receive a recognition of their services as opportunities occur.

Brief Thoughts.

Motives determine manners.

We can be busy without being useful.

Words are the only things God never hears in a prayer.

Blinding our eyes to our own mistakes is blinding failure with folly.
(From *Great Thoughts*.)

Departmental Notes.

Appointments, transfers etc. :—

1. Mr. P. A. Raghunathswami Ayyangar, Upper subordinate, Science Section, to act as Assistant Agricultural Chemist, vice Mr. B. Viswanath, on other duty.
2. Mr. T. Rangabrahma Rao, B. Sc., (Agri) to officiate as Assistant in Chemistry, V grade, vice Mr. P. A. Raghunathswami Ayyangar on other duty.
3. Mr. N. Parathasarathy, B. Sc., (Agri.) to officiate as Assistant in Economic Botany, V grade, vice Mr. K. Venkataraman, on deputation or until further orders.
4. Mr. K. Gurnamurti, B. Ag., Upper Subordinate V grade on probation, (provisional) from the II Circle to the Millets Specialist's section to join on relief.
5. Mr. K. Ramanadha Ayyar, Agricultural Demonstrator, from the VI Circle to II Circle.
6. Mr. P. Gopalaratnam, L. Ag., lower subordinate, V grade on probation in the Cotton Specialist's section.
7. Mr. Chengappa, a holder of Certificate of Proficiency in Agriculture lower subordinate, V grade, on probation, in the Govt. Mycologist's section.

Leave :—

1. Mr. C. M. John, Assistant in Economic Botany, leave on average pay for 22 days from 15th September 1923.
- Mr. R. Narasimhachari, Sub-Assistant in Entomology, leave on average pay for one month from 11-9-1923.
3. Mr. K. Ramanadha Ayyar, Agricultural Demonstrator, extension of leave by two months on medical certificate.
4. Mr. V. Ramachandra Ayyar, Agricultural Demonstrator, extension of leave by 12 weeks on medical certificate.
5. Mr. W. Raghavachari, Agricultural Demonstrator, leave on average pay for 20 days from 25th August 1923.
6. Mr. T. V. Anantaramayyar, Upper Subordinate, leave on average pay for 18 days from 30th August 1923.
7. Mr. V. Ratnaji Rao, Agricultural Demonstrator, Gudur, leave on average pay for 17 days from 25th August 1923.
8. Mr. M. Raghavulu Nayudu, Agricultural Demonstrator, leave on average pay for four months on medical certificate from 3rd August 1923.

9. Mr. S. Sithapathi Rao, Assistant Agricultural Demonstrator, leave on average pay for 18 days from the 2nd to 19th September 1923.
10. Mr. S. Vijayarajha Raju, Assistant Agricultural Demonstrator, extension of leave by two months.
11. Mr. V. V. S. Varadarajan, Assistant Agricultural Demonstrator, leave on average pay for three months from or after 25-9-1923.
12. Mr. M. V. Kondal Rao, Assistant Agricultural Demonstrator, Kurnool, leave on average pay for 2 months from or after 8-10-1923.

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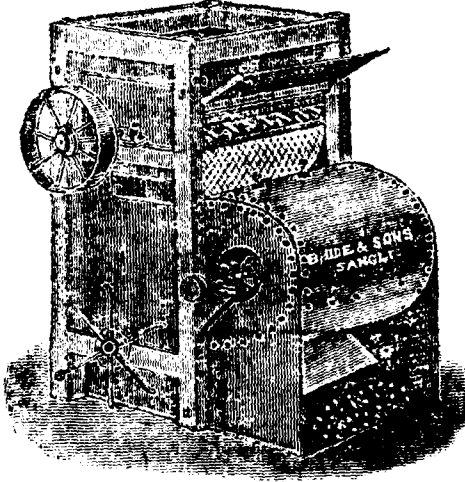
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Pollen Sterility in relation to Vegetative Propagation.

P. S. JIVANNA RAO, M. A.

The subject of pollen sterility in plants has received prominent attention in recent years from the evolutionary standpoint. It formed the basis on which the mutation theory of DeVries was attacked by Jeffrey (1915) and others on the ground that sterility under normal growth conditions is indicative not of mutability but of hybridisation. In the discussion that has taken place on this theme the statement was often made that as hybrids of a fluctuating nature are characterised by a varying amount of infertile pollen the converse is also true, namely, that the presence of such sterility is always a criterion of previous crossing, except in cases where the percentage is very low and may be accounted for by unfavourable conditions.

Gates and Goodspeed (1916) have recently made it clear that pollen sterility is a physiological condition which may be due to a variety of causes, hybridisation and mutability being only two of them.

Pollen infertility and fruit abortion:—

The most marked feature of pollen grains is their variation in size. This is indicative of a difference in the quantity of those substances present in them of a colloidal or crystalloid nature upon which their powers of effective germination largely depend. Between the most perfect grains which are characterised by a high hydration capacity or osmotic pressure and the impotent ones with a poor capacity for growth, there are pollen grains of different strengths which are variously suited (or not) for the fertilisation of the different sets of ovules in flowers. The grains in certain cases are definitely sterile and are marked off from the rest by their smaller size, their distorted form or by the absence of contents in them. The percentage of such sterility in digenic plants is generally very small and instances may be had in *Cassia siamea*, *Cocos nucifera*, *Crotalaria juncea*, *Dolichos Lablab* and in many others.

Though sterility is more easily observed in pollen grains, it is only symptomatic of a degeneracy from which the ovules are not exempt. With the occurrence of sterility and the haphazard way in which pollination takes place in nature, four kinds of combinations are possible viz., (1) fertile pollen with fertile ovules, (2) fertile pollen with sterile ovules, (3) sterile pollen with fertile ovules, and (4) sterile pollen with sterile ovules. It is natural that except under the first condition the failure of effective fertilisation will result in the abortion of fruits and seeds to a varying degree, but this difficulty is obviated to a large extent by the production generally of a liberal quantity of pollen of mixed grades of strength the best sorts of which rarely fail to reach the stigmas. East (1915) counted from 1,200 to 2,000 pollen tubes in the style of *Nicotiana*.

Increased sterility of pollen and ovule or their reduced strength thus leads to the abortion of flowers and fruits in different stages and the matter is of great importance economically because serious loss sometimes results due to shedding which has been reported in a large number of instances. Of these mention may be made of the following:—

<i>Achras sapota</i> (Sapota) ...	Immature fruits.
<i>Citrus sinensis</i> (Washington navel orange) ...	Buds and fruits (Coit and Hodgson).
<i>Cocos nucifera</i> (Coconut)...	Nuts.
<i>Gossypium herbaceum</i> and other species (Cotton) ...	Buds and bolls.
<i>Juglans californica quercina</i> , mutants (Walnut)...	Nuts (Lloyd).
<i>Mangifera indica</i> (Mango).	Flowers and young fruits.
<i>Mirabilis jalapa</i> ...	Buds and fruits. (Lloyd)
<i>Nicotiana tabacum</i> (Tobacco) ...	Buds and flowers (Kendall).
<i>Piper nigrum</i> (Pepper) ...	Berries and spikes.
<i>Prunus</i> sp (Plum) ...	Fruits (Dorsey).
<i>Solanum tuberosum</i> (Potato) ...	Flowers (Dorsey).
<i>Thespesia populnea</i> (Portia) ...	Buds and fruits.

Summary of investigation:—

The list below shows the extent of sterility in some common plants that are vegetatively propagated and it may be considerably enlarged so as to include a very large number if that were necessary. The flowers were obtained either fresh or from spirit or herbarium material and the pollen grains were examined in chloralhydrate iodine in all cases as, otherwise, examination in mere water or glycerine gives only an idea of their morphological perfection which cannot be taken as evidence of their ability to function. It was an advantage that in several instances the fertility of the grains was indicated by a copious amount of starch.

Scientific name.	Common name	Percent- age of sterility.	Size of pollen grains each divi- sion — 1.66 μ .	Remarks.
		Fertile	Sterile	
<i>Achras sapota</i>	Sapota	20	30	23
<i>Adhatoda vasica</i>	Adhatoda	10-20	30	20
<i>Andropogon pertusus</i>		10-15	25	19
<i>Aristolochia bracteata</i>		5-6	40	24
* <i>Cassia siamea</i>		80	32	28
<i>Citrus aurantium</i>	Orange	3	19	14
* <i>Cocos nucifera</i>	Coconut	90	36	
<i>Convolvulus arvensis</i>	Field bind-weed	75	40	40
* <i>Crotalaria juncea</i>	Sunn Hemp	5	15	11
<i>Cynodon dactylon</i>	Hariali grass	3-5	19	13
<i>Cyperus bulbosus</i>	Bulb grass	15	23	20
<i>Cyperus rotundus</i>	Nut grass	80	13	16
* <i>Dolichos Lablab</i>	Field bean	5	23	23
<i>Eichhornia speciosa</i>	Water hyacinth		30	20
<i>Hibiscus Rosa-sinensis</i>	Shoe-flower	98	75	65
<i>Ipomæa carnea</i>		95	53	63
<i>Mangifera indica</i>	Mango		17	20
<i>Millingtonia hortensis</i>	Indian cork tree	70-80	30	35
<i>Musa paradisiaca</i>	Plantain		80-130	40-60
<i>Opuntia Dillenii</i>	Prickly pear	3	80	74
<i>Panicum maximum</i>	Guinea grass	50	23	18
<i>Piper nigrum</i>	Pepper		7-8	7-8
<i>Psidium gnyava</i>	Guava	5	13	11
<i>Rosa damascana</i>	Rose	25	24	19
<i>Saccharum officinarum</i>	Sugarcane	50	30	20
<i>Thespesia populnea</i>	Portia	90	74-95	95-131

The figures in this table are not intended to give more than a rough estimate.

The plants marked with asterisks have been included to show that fertility is not absolute for digenically reproduced plants just as even sterility is not absolute for a plant like *Hibiscus Rosa-sinensis* which has come through several generations of cuttings.

The pollen grains are of most varied sizes ranging from 10.85 μ in *Piper nigrum* to about 200 μ in *Musa*. They are smooth in all cases except *Hibiscus*, *Ipomæa* and *Thespesia* where they are covered with spines and their shape varies, being triangular in *Psidium*, oval in *Adhatoda* and more or less rounded in others.

Aristolochia bracteata, *Convolvulus arvensis*, *Eichhornia speciosa* and *Cyperus* and the grasses, *Andropogon pertusus* and *Cynodon dactylon* show various degrees of sterility and this fact with regard to grasses has to be borne in mind when attempts are made to introduce them in new places by means of their spikes instead of by slips.

Determination of the extent of sterility was a difficult matter in certain cases. In *Piper*, for instance, spikes of undoubted seed-raised plants were not available for comparison, but a male plant collected by Barber (1903) among the cultivated peppers in Malabar and supposed to be the indigenous *Piper nigrum* showed a good percentage of starchy grains whereas pollen from the hermaphrodite flowers of a presumably vegetatively raised plant showed a mixture of reddish brown and yellow grains but not the fertile starchy ones.

It is interesting to note that in grafted plants a certain amount of infertility occurs and this perhaps explains the fruit-fall in the case of Mango and Sapota and may set limitations to the methods of propagation adopted in these and in several other cases e.g., Apples, Plums, Oranges, Grapes etc. The occurrence of such sterility in Mango whose androecium is already reduced to a functionally unistaminate condition is of special significance.

Shedding is infrequent in the case of some fruits resulting from inferior ovaries e. g. Guava, Plantain, Cucurbitaceae etc., though abortion is a constant feature. It is also more common in old trees than in young ones, for instance in *Thespesia populnea*.

Conclusions :—

Sterility of pollen is a physiological condition which seems to be a regular feature of plants that are vegetatively raised. Whether the higher plants can at the present stage of evolution maintain themselves successfully by vegetative propagation as well as by seeds is a problem which is open to doubt but there is certainly no denying that to a large number of them their being of use to man means for them a valuable asset in the struggle for existence. (o.f. D. H. Scott).

In the process of cultivation, methods of propagation have been evolved according to the particular product derived from the crop

and it cannot be said that the best principle has always been adhered to. There is, for instance, not enough justification for vegetative propagation in the case of Pepper, Cardamoms, and other plants valued for their seed or fruit, whereas on theoretical considerations alone Tobacco, Indigo, Sunn-hemp, Dekkan Hemp, Tea, Rubber are perhaps better raised from cuttings. Propagation by cuttings may likewise be suggested for the useful family of Cucurbitaceae as at any rate one member of the order, the dioecious *Cephalandra indica* (cult.), matures its fruits by parthenocarp which is known to be a peculiar feature of the order (c.f. Lotsy). Considerations of economy and the tendency to quick exploitation are of course among the reasons for the apparently inconsistent methods adopted in some of these crops, though in the case of some there is the difficulty that regeneration by a particular method is attended with doubtful results. This is the case, for instance, in pepper where propagation by seed may result in male vines which are of no use or in the loss of valuable fruiting strains, but it is necessary to remember that as vegetative propagation brings about a certain deterioration in the plant occasional rejuvenation by seed propagation must restore its lost strength. What Ridley (1912) suggested for this crop may apply to other similar asexually reproduced plants viz., "that planters while continuing their cultivation by cuttings, might at the same time raise seedlings from a good stock in order to replace at a later date the cuttings derived from a sexual reproduction carried on perhaps for many centuries". Failure to recognise this seems to be the cause of the present confusion regarding the barrenness or unproductiveness of those plants that are raised by vegetative means.

Below is given a scheme of classification of South Indian crops according to the methods of propagation adopted in them and it is suggested that in the case of those that are vegetatively raised some modifications in the current practices may be introduced so as to prevent further loss of vigour in them.

<i>Vegetative propagation.</i>	<i>Propagation by seeds.</i>	
	All	Cereals.
	All	Pulses.
	All	Oil seeds.
Agave	Cotton, Sunn Hemp, Dekkan Hemp	Fibres.
Sugarcane	Date, Palmyra	Sugar.
Onion, Garlic, Turmeric, Pepper, Ginger, Cardamom.	Chilli, Coriander, Cumin, Mustard, Tamarind, Fenugreek	Condiments and Spices.
Plantain, Mango, Orange, Guava, Grapes, Pomegra- nate, Sapota (all cases of grafts).	Jack, Melons, Cashew	Edible fruits.
Potato, Sweet potato, Colocasia, Yam	Beans, Egg plant, Cucumbers, Gourds, Pumpkin.	Vegetables.
Betel	Tobacco, Indian Hemp, Carum, Senna, Tea, Coffee, Cinchona	Drugs and Narcotics.
	Indigo, Safflower	Dyes.

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The Right way to work:—

"When men are rightly occupied," says Ruskin, "their amusement grows out of their work, as the colour-petal out of a fruitful flower." Whenever we are tempted to hurry from our work to seek artificial entertainment, we should stop and investigate ourselves. The trouble is that we have not found the right employment. When once we have entered upon a work to which we have had a divine call, our minds will glow, our interests will be aroused, and we shall experience a thrill which nothing else can give.

"Great Thoughts."

Care of Seed.

D. ANANDA RAO, B. Sc.,

Dy. Director of Agriculture, IV Circle.

Those who are working in behalf of the cultivator or engaged directly in increasing the outturn of crops cannot ignore the rôle that proper preservation of seed plays in the farmer's economy. One can quite easily understand that good seed is the bed-rock of all good farming. *Unless we sow good seed, we cannot expect to reap a good harvest.* All the time and energy bestowed on field operations like ploughing, harrowing, intercultivating and irrigating are useless if the seed you sow is not of the best kind. Even from the point of view of those who collect and preserve seed for its sale or distribution, the care of seed is of utmost importance. For if indifferent seed is sold with a view to ensure a clearance of old stock, their reputation is at stake, as when once reliance is shaken it would be extremely difficult to effect further sales. Therefore every care must be taken to see that only good seed is collected and that till sowing time it should be preserved carefully. *The problem of proper seed preservation resolves itself into three aspects: care in its sowing, collection and preservation.* A distinction should at the outset be made between grain and seed. Although the former is also seed, the latter term is confined to that which is kept for purposes of sowing, while the former for consumption. It often happens that owing to want of sufficient thought and care on the part of those held in immediate charge of the preservation of seed, valuable strains which have been the outcome of much thought, time and scientific skill have been allowed to deteriorate; the result is that a strain once reported to have given 15 or 20 percent more outturn than the local variety, cannot under these circumstances be guaranteed for all time. It is the earnest wish of the writer to impress upon young workers the paramount importance of the proper preservation of seed whether it is looked at from the point of view of the cultivator, seedsman, or even the scientific worker.

There are many ways in which the seed loses its vitality. *The commonest cause of bad seed is insect attack.* This might happen in the field itself, e. g., pulses like Red gram, oil seeds like Castor, green manures like Dhaincha suffer badly from the ravages of insects in the field itself, but more generally they are attacked in the store house. The object of the note is not to narrate the various kinds of insects that attack different stored products, but recognising the evil, to invite the attention of the reader to the necessity of keeping the utensils in which the seed is preserved and seed stores clean and dry. This means that the seeds are frequently dried directly in the sun for several hours at a time. The frequency of drying depends on the nature of the season, cloudy and wet weather demanding more urgent attention. At the same time the seed bins should undergo the same process. The stores should also be whitewashed and disinfected if necessary with insecticides like carbon bi-sulphide or formalin. This last operation requires personal care and attention and should not under any circumstances be left into the hands of servants and farm hands. Having done this, it will not do to keep the grain in open vessels to permit the entry of insects from outside. A very clean and yet an efficient method has been described in the Villagers' Calendar for 1922 on page 64.

This is a commendable practice and is worth being copied by every one concerned. Besides insect damage which is to be contended against throughout the year, moulds form a frequent cause of bad seed in the wet weather. The initial cause of this may be the improper drying of the newly threshed seed. The air, at that time being moist, encourages the formation of moulds on such seed. Opportunity should be taken of all spells of dry weather and the seeds should be sun dried : otherwise they will be unfit even for eating.

Another frequent cause of bad seed is the result of damage by rats, squirrels and other animals which frequent the stores. All seeds so damaged are unfit for sowing as they will germinate poorly having lost in many cases the vital portions of the seed. The best way of minimising the damage is to possess rat-proof stores, the keeping of rat-traps, or maintenance of cats etc. More than this, if the seed is

preserved in bins which can be closed, such damage can be considerably reduced. As storing seed in bags is one of the sure ways of getting the seed damaged in this way, such a practice ought always to be deprecated. *Akin to rat destruction, is the human damage* which assumes serious proportions if the owner does not pay sufficient personal attention. What is intended for seed purposes would be stolen and the cultivator has to take recourse to ordinary grain when the sowing season approaches. It is therefore extremely necessary not only to have the bins closed, but also to keep the stores under lock and key. Above all it is obvious that the man put in charge of the stores must be a careful and trustworthy man on whom implicit reliance can be placed. Mixing of seed of one variety with another is still another very fruitful source of getting impure seed. The chief sources for such mixing is the threshing floor, where several varieties are heaped together for threshing. Even though precautions may be taken to thresh the various varieties separately, the floor, unless made of cement or is paved and no spaces allowed in between, is sure to collect some seed which would help in the mixing. *Even granting that these difficulties are got over, it is quite possible that mixing can take place in the stores by careless handling of seed,* e. g., in not seeing that the bags in which seeds are stored are scrupulously cleaned before a fresh lot is measured into them. The measures or the balance even might help in the admixture. Of course rats or squirrels hopping from one seed bin to another assist in the same process. Recently a most astonishing instance where there was the possibility of promiscuous mixing taking place came to the notice of the writer. It seems that there has existed for some time past in a Government farm a practice which permitted the coolies to take different varieties of seed overnight to be dressed and brought over the next morning fit for sowing. In this instance not only was there the danger of the varieties getting badly mixed but the still greater danger of an inferior seed being palmed off for the one issued not to mention the opportunity for stealing being taken full advantage of unless it could be proved beyond doubt that they were above all suspicion. This should never have happened if the farm authorities had bestowed a little thought, a little consideration as to the result that their action

would lead to; one would have expected that the training that they had received in their College career would have stood in their way should not to tolerate such a pernicious practice. It is also bad practice to keep grains and seed in the same room. The former may have to be kept for a long time as it would be needed in small quantities for consumption. In such cases where space is the limiting factor, it is most desirable to dispose of all grain that is not absolutely essential and thus minimise the insect ravages.

Such then are the various causes that would contribute to the production of poor crops, and the reasons why we should bestow utmost care on the seed. Experienced people will spot a good sample from a bad one even by looking and feeling. This is, however, rather empirical. *The best way of testing grain is by making germination tests*, by taking a definite number, say 100 of an average sample of the seed and making a duplicate test of the same by growing them in flower pots. The number of days necessary for carrying on the test depend on the variety of seed. The total number germinated during a definite period gives the percentage of germination of the variety. *The advantage of this method is twofold: firstly if the sample is poor, it would at once warn the owner against sowing the seed and it would enable one to get better seed from elsewhere. Secondly it would help one to take a lesson from it and bestow better care on the preservation of seed in future from the field and threshing floor to the store room and the measuring vessel.*

Maxims of La Rochefoucauld:—

Hypocrisy is the homage which vice pays to virtue.

We are so used to disguising ourselves from others that we end by disguising ourselves from ourselves.

Great Thoughts. February 1923.

Small Jaggery (Unrefined sugar) Factories.

K. KRISHNAMURTHI RAO,
Assistant Sugarcane Expert.

In a paper which Mr. G. Ganapathi Ayyar and myself submitted to the Agricultural Conference of the Madras Agricultural Students' Union in July last, it was stated that jaggery (unrefined sugar) industry was one of the most important cottage industries of India and that it deserved encouragement and development. For developing this industry, the Indian Sugar Committee on page 289 of their report suggest "Small *gur* (unrefined sugar) factories in present conditions", as "the best and indeed the only practical line of development for the *gur* industry". Pallapalayam Cane Crushing Station in Coimbatore Taluk is one such small institution working under the control of the Assistant Industrial Engineer, Coimbatore and the information I was able to obtain about it, through my own observations, is recorded herein as it might be helpful in furnishing some data to those desirous of establishing similar factories in other parts of India.

This station neither cultivates nor purchases canes. Its object is solely to prepare jaggery for the ryots who bring their canes to it. It charges Rs. 3-5-0 per pothi (260 lbs.) of jaggery so prepared. *Pooran*—a thick juicy cane with about 12 percent fibre and 16 percent sucrose in juice—is the main variety brought into this factory. A three-roller mill with two splitting roller-crushers extracts 66 to 72 per cent of juice on the weight of cane and crushes about 1.1 tons of cane per hour. The present 12 B. H. P. oil engine while suitable for 18" x 12" three-roller mill is not powerful enough to work the present (commercially known) five-roller mill. The mill is therefore not being worked at full capacity but is limited to the engine power available. The juice is boiled down to jaggery in rectangular iron tanks. Liming is in practice, but the scum is not generally removed. There are four series of furnaces each consisting of three pans and on an average six charges

are taken daily per series. They get per charge about 150 lbs of jaggery and the total daily output is thus roughly 1.6 tons. The percentage of jaggery to cane is about 12.

This installation was not a paying concern when the Sugar committee visited it in 1920. But during 1921-22 and 1922-23 it appears to have worked at a profit.

The cost of fixing and running an installation of this kind would approximately be as under :—

<i>Capital or fixed charges.</i>	Rs.
16 H. P. Oil engine complete fitted up ...	4,000
One three-roller mill with a pair of splitting roller crushers ...	5,000
Furnaces with a zinc shed ...	2,000
Engine shed with enough room for storage of canes ...	1,000
Storage tanks, pipe connections, tilting arrangement, grating and chimneys etc. ...	1,000
Boiling pans, wooden mould boards, cooling troughs and other miscellaneous articles ...	1,000
Cost of site with a well and a temporary fence all round—total extent about 2 acres ...	1,000
Jaggery store, watchman shed, megass store and a temporary building for office and mechanic's quarters ...	2,000
Total Rs. ...	17,000

Recurring charges

Interest at 8 per cent on 17,000— (Mr. Padshah of the Sugar Committee puts this down at 10 per cent). ...	1,360
Depreciation at 10 per cent on the cost of machinery etc. ...	1,100
Depreciation at 4 per cent on the buildings etc. ...	240
Total Rs. ...	2,700

Note.

Number of working days per season being taken as 120, the daily charges would amount to ... 22-8-0

Daily running charges.

Wages of 1 Mechanic ...	2-8-0
Wages of 1 Driver ...	1-0-0
Wages of 1 Jaggery Maistry ...	1-0-0
Furnace feeders and other men-coolies (8) at 0-12-0 each ...	6-0-0
Women-coolies (8) at 0-4-0 each ...	2-0-0
Liquid fuel, lubricating oil etc. ...	8 8-0
Total Rs. ...	21-0-0

In addition to the above daily expenses, on account of insufficiency of megass, cane trash is collected from the ryots' fields and collecting and carting (labour only) cost Rs. 5. Thus the total daily charges would be Rs. 48-8-0.

Of course the expenses would be lower if the engine power is utilised for other purposes, such as irrigation, hulling, etc., during the off season or, if the installation is worked in the nights as well, if labour is cheaper, or if there are no stoppages during the crushing season due to inclement weather, labour troubles, etc., or if the capacity of the engine is increased so as to crush two tons of canes per hour.

As noted already this installation manufactures about 14 pothis (260 lbs.) of jaggery daily and gets Rs. 49 at Rs. 3-8-0 per pothi manufactured and this leaves a bare margin of profit; but by working during nights and economising in other directions a profit of over 1,000 rupees is reported to have been realised during 1921-22.

Based on the above data each tract should determine for itself what rates should be charged for a particular unit of jaggery prepared. For example, if in a particular tract the *nanal* cane is the main variety instead of the soft thick cane, *poovan*, the expenses would be at least 25 per cent more as it requires greater amount of

nanal cane to prepare the same quantity of jaggery and as there is greater wear and tear on the mills on account of the hard rind of the *nanal* cane; but this is to a certain extent compensated for by the larger quantity of megass obtained. Again in Hospet Taluk, Bellary District, it appears the ryots are able to crush their canes at a low rate as cattle power is available during the harvesting season at annas eight per pair per day.

The Agricultural Department is, it would appear, the best medium as noted by the Sugar Committee to collect information as regards the cost of crushing, etc., in different localities and it is the failure to obtain data of this kind before starting an installation that has been the cause of failure of many an undertaking in Mysore.

Cane area required for a small factory.

It has been noted above that the mill at Pallapalayam crushes about 2,500 lbs. (1.1 tons) of cane per hour. The average number of working hours per day being taken as 12 and the number of working days as 120 in a season, the quantity of cane crushed would be about 1,600 tons. And if the mill is worked every other night also, it is possible to crush another 800 tons. With 24 tons as average outturn per acre a mill of the above description is capable of dealing with an area of 100 acres of cane. But if one wishes to install one such small factory in the *nanal* cane tract the area commanded should be not less than 150 acres.

Thus it will be seen that before any installation is put up in any one cane centre, the two most important points to be borne in mind are (1) whether the rate to be charged viz., Rs. 3—8—0 to Rs. 4 per pothi of 260 lbs. of jaggery made is cheaper than that actually incurred by the ryots in that locality, and, (2) whether canes from an area of 100 acres if thick canes, or 150 acres if thin canes, can be made available at the factory.

Thanks are due to Mr. Muthuswami Ayyar, the mechanic in charge of the Pallapalayam installation for kindly showing me over the factory and giving me an account of the present prosperous state of this useful concern.

A Short Note on the Cultivation of Lime at Andarpanthi village.

K. SRINIVASAN, L. AG.

Andarpanthi is a village about 4½ miles west of Puthottam Railway station and the whole village is inhabited by a single community viz., Pandarams. The tract round about the village forms part of the Tanjore delta and consists of both wetlands and dry lands, the wetlands being irrigated by the Arasalar. The wetlands consist of both double and single crop lands where paddy alone is grown. The drylands consist of house sites, coconut, banian, bamboo and casuarina topes. The whole village consists of about 60 velies of wetlands and 25 velies of drylands.

The peculiarity noted about this village is, that at the backyard of every house we find a lime garden; each house has a backyard ranging in area between 1 to 5 acres according to the size of the house. The total extent of the lime garden for the village is 12 velies or 80 acres. The produce is sent to the surrounding places viz., Tiruvallur, Nannilam, etc., and sold in the shandy, and merchants also come to the village and take it in lots.

Soil.—The soil of the lime garden is a rich made-up red loam. They cart silt to the garden and hence the presence of the red loamy soil in a tract which contains only clayey soil.

Season.—The seed is sown just after rains i.e., about January—February and the planting in the main field, next year before rains i.e., October-November.

Seedlings.—The citrus seedlings are raised locally by them. They prepare narrow beds which are always 6" above ground level and sow the seed in them. When the seeds germinate hand watering is done carefully whenever necessary. In about two months the seedlings grow to a height of 6 inches. At this stage the seedlings are carefully removed and planted round about the citrus trees in the garden, and they do not receive any special treatment; when the garden is irrigated these also get water. In about 6 to 9 months

these grow up to 3 or $3\frac{1}{2}$ feet. Then these are again removed and planted in pits in the main garden. This double planting not only serves as root pruning but also provides more room for the seedlings to grow, for in the nursery the seedlings are too close:

Preparation of the main field.—In the main field where the citrus garden is to be started pits 3' x 3' x 4' are dug at a distance of about 5 to 7 feet both in and between lines and filled with silt (i.e., fine earth from the padugai lands) and cattle manure mixed together. In pits thus prepared the above mentioned seedlings are planted, earthing up done and channels formed to facilitate irrigation.

Each garden has got a well and the water is lifted up for irrigation either by Picotahs or Mhotes. In wells that are fitted up with mhotes, the mhote bucket used is an iron tilt bucket. In this village there are 13 wells fitted up with mhotes and all these have tilt iron buckets.

After-cultivation.—The garden is given a good hoeing every three months and they do not allow any weed to grow. The citrus trees begin to bear in about three years after planting in the main field. The trees are heavily manured about 3 or 4 times a year with village manure and each tree receives about 4 to 5 baskets per time i.e., a tree receives on the whole one cart load per year. Of course, all the garden owners do not manure so heavily.

Yield.—Each tree bears between 5 to 8 thousand fruits per year depending on the manure and care bestowed on the garden. To a certain extent the yield also depends upon the quality of seed sown.

General.—Each garden is fenced carefully and a strict watch is kept. The condition of the lime garden in the village is good. The owners themselves take much pains and look after the cultivation very carefully though most of them own wetlands and dry lands. The trees bear throughout the year and the produce is marketed for sale to the important surrounding places. The fruits that are plucked during July-August are considered to be the best and they are well filled and contain much juice.

Extracts.

Note on the Agricultural Situation of the Year 1923-24 up to the middle of October.

The South West monsoon commenced on the West Coast in June later than usual and became strong only after the middle of the month. In July, about forty inches of rain fell in Malabar and sixty in South Kanara. The continuous rains caused the rivers in South Kanara to rise in flood and inundate vast areas, damaging houses and crops. There was a fair amount of rainfall in the Circars and Deccan in the month of July, but the monsoon was very feeble elsewhere, especially in the Central districts. Heavy freshes were received however in all the principal rivers. In August, the rainfall on the West Coast was again excessive, amounting to about fifty inches, and there were floods in North Malabar and for a second time in parts of South Kanara. The monsoon was insufficient elsewhere, the deficit being largest in Vizagapatam and North Arcot. Unusually heavy freshes were received in the Cauveri, the Periyar and the Tambraparni.

There was a break in the monsoon on the West Coast about the end of August, and the monsoon continued weak throughout September, giving much needed respite to men and cattle, and enabling crops to recover. The monsoon travelled inland and good rains were received throughout the Presidency, except in Coimbatore and the South.

Supplies were received everywhere in tanks. Irrigation water is now generally sufficient except in Ramnad and in tanks in parts of the Deccan, Carnatic and Central districts.

The rainfall in October up to date has been below average except in the Circars, South Arcot, Tanjore and Trichinopoly.

On the whole, the South West monsoon was considerably below the average except on the West Coast, where the rainfall exceeded the average by 20 to 30 per cent. The monsoon was better than last year, though below the average, in Godavari, Kistna, the Deccan, Nellore and Chittoor, and the rainfall in the Deccan was

so timely and well distributed that the season was very much better than last year.

(2) The progress of agricultural operations was very much affected by the lateness and the comparative failure of the monsoon.

Sowings on dry lands from April to June were restricted everywhere. There was also a reduction in wet land sowings in the Circars and on the West Coast, but sowings elsewhere were not affected as tanks had received good supplies in the previous North East monsoon. In July and August the sowings on dry lands in the Deccan exceeded those of last year by 35 per cent on account of the timely rains in July, but elsewhere sowings were restricted, the decrease being largest in the Circars and Central districts. Wet land sowings came up to the average on the West Coast, on account of the heavy rainfall and exceeded the average in the Godavari and Kistna deltas, the Periyar tract and the Tambraparni valley, on account of the heavy freshes in the rivers. In the Tanjore delta, the usual area was not sown as freshes were received late in the Cauveri, but the prospects are quite good as the freshes since July have been heavy and well maintained.

On the whole, the total area of dry lands sown up to the end of September was about 10 per cent less than the average and last year and that of wet lands sown was not much below the average and last year.

The total areas sown from April to September in the Government villages (including minor inams) of the Presidency except the Agency Division and Vizagapatam are given below.

Year	Dry land sowings acres.	Wet land sowings acres.
1923-24	8,737,100	3,881,100
1922-23	10,038,000	4,083,100
Average	9,684,500	3,968,300

The deficiency in the sowings on dry lands occurs mainly in Guntur, and the Carnatic and Central districts. The deficiency in wet cultivation is largest in Ganjam, North Arcot and Salem.

(3) Standing crops have been benefited by the September rains and are generally fair. The yield of paddy in the Circars will be affected by late transplantation. The yield of crops on lowlying lands near rivers in the Coastal taluks of North Malabar and South Kanara will be reduced to some extent on account of damage by floods.

(4) Early crops of paddy have been harvested on the West Coast and in Trichinopoly and the yields are normal. The yield of dry crops in Vizagapatam is poor. The yields of gingelly in the Circars and of ragi in the Central districts are generally fair.

(5) Prices of food grains are generally lower than those of last year especially in Chingleput, South Arcot, Chittoor and North Arcot. The prices of all grains have been rising since June in the Circars owing to the unfavourable season and the price of rice has also risen in Chingleput, South Arcot, North Arcot and South Kanara. Prices in the Circars are however showing a tendency to fall as a result of the improved situation since September.

(6) Employment is generally available. More than the usual number emigrated to Rangoon from Ganjam and Vizagapatam owing to want of work in agricultural operations.

(7) Pasture is generally sufficient except in parts of Salem and Coimbatore and fodder is available except in parts of Vizagapatam, Kistna, Guntur, the Deccan, and Nellore.

Director of Agriculture, Madras, 15 October 1923.

Gleanings.

A Record Fat Content in Milk. In Manchester Mr. T. R. Hodson, recently, analysed a sample of milk from a private farm, which gave the following extraordinary analysis:—Fat 19.50; Lactose 4.78; Protein 3.77 and ash 0.82 per cent. Mr. Hodson vouches for the genuineness of the milk as he has known the farm and the farmer for the last 35 years. This farmer, it will appear, has always been noted for the richness of the milk sold by him. The highest per-

centage of fat recorded in any sample of milk is only 12.52 per cent (Dairy Chemistry).

(From The Analyst, September 1923)

It may be mentioned here that the record in the Central Farm Coimbatore, is only 7 per cent or thereabouts.

T. S. R.

Sugarcane in Mauritius, 1921. The agricultural bureau of Mauritius has published a report of the sugar production for 1921 in which it declares that the weather conditions were really unfavourable during the year, the storms depleting the sugar cane tonnage by 9 per cent. This meant that the sugar tonnage was reduced by 20 per cent below the normal and amounted to 206,150 metric tons for 1921-22. This is the lowest production the country has had since 1909. The average extraction amounted to 10.2 per cent. There are 54 sugar factories and this number has not changed since 1918. The labor market has been unsatisfactory and therefore every labor saving device is welcomed. The area planted to cane in 1920 was 179,200 acres or 39.1 per cent of the total area of the colony. No such area has ever been planted to cane in the history of the industry. Irrigation is coming to the fore because of the extreme droughts that have prevailed and it is believed some distinct advances will be made along this line.

(The Louisiana Planter, Vol. LXX No. 20, p. 391).

Treating seedcane for borer. The Entomological department's investigations as to methods of destruction of borers in seed cane have resulted in securing a practical method easy of operation; this consists in soaking cane infested with borers in water at a temperature of 122°F, for twenty minutes. This kills all of the borers without injuring the germination of the cane, in fact, germination was hastened by the soaking in water. This method offers great promise to sugar planters not only in the controlling of the cane borer, but in aiding the growing season and in securing a better stand of cane.

Louisiana Planter, 1923.

Wood protected by sugar. A new process has been discovered whereby wood is ensured against dry-rot. This is done by impregnating it with a hot solution of sugar, which soaks into every cell, destroys all germs, and strengthens and hardens the substance of the timber. Treated in this way new wood does not require to lie for years to be "seasoned", as the sugar combines with the sap and fills the pores to such a degree that after the wood is dried in a kiln it can no longer swell with damp, nor shrink through slow evaporation. This treatment is also said to ensure the wood against the attacks of insects.

(The Scottish Farmer, dated 25th August 1923).

Encouragement to Research men. Research is terribly expensive. We have always had men of the highest scientific originality who in the past have been pioneers in the advance of knowledge; we have them still, but somehow we fail to estimate their value; we are reluctant to furnish them with the means alone by which their natural gifts may be utilised. The application of science can be organised and many steps have been taken in recent years to improve its organisation, but if we wish to utilise scientific progress to prevent waste and to increase the efficiency of industry we must support the solitary genius working often for a mere pittance in some university or college laboratory and devoting all his powers to unravelling a little further the tangled skein of Nature's mysteries. *Success in the struggle depends on finding the right man and in affording him full facilities.* We have the men; will our legislators who control the nation's purse see that facilities are not wanting for their work?—(Extract from an article on "Large Scale Research in Abstract Science" by R. T. Glazebrook, from "Nature" of 28th July 1923).

Germisan. During the progress of this research work it was early apparent that mercury compounds were very valuable in fighting fungus diseases of grain and plants. Purely inorganic mercury compounds like corrosive sublimate (mercuric chloride) were found very satisfactory, but unfortunately their general use could not be advised owing to their being exceedingly poisonous. It became obvious, therefore, that, if success was to be achieved at

all, it was in the production of a suitable organic mercury compound, especially when it was found that mercury in organic combinations actually promotes the germinating power of the seed and the growth of the crop, and is also equally effective against any plant disease which is at all amenable to chemical treatment.

Germisan is a complex organic compound of the formula,



It is actually marketed with the incorporation of a filler, and, with an aim to safety, is tinted with a red dye to give it a distinguishing appearance and prevent confusion with other products.

It is completely effective against all fungus diseases of grain. It is equally powerful in its action on external fungus germs adhering to the seeds of other cultivated plants—e.g., hemp, flax, linseed, turnip, and vegetables of all kinds. It is likewise applicable against cabbage blight and diseases encountered in hothouse plants and beds.

Germisan has been used successfully in the following cases:—

Wheat.—*Tilletia Tritici* and *Fusarium*.

Rye.—*Uroscytis occulta* and *Fusarium*.

Barley.—*Ustilago hordei* and *Helminthosporium gramineum*.

Oats.—*Ustilago avenae* and *Kollerii*.

Maize.—*Ustilago maydis*.

Turnips.—Diseases resulting from *Phoma*, *Pythium*, *Leptosphaeria*, &c.

Cabbage.—*Plasmidiophora brassicae* (Cabbage Blight), &c.

Germisan has received the most thorough examination in agricultural colleges and institutes in Germany.

It is applied either by a process of dipping or sprinkling, and both have been equally successful. [The Scottish Farmer, August,

4, 1923]

Don't Waste Soot. Not an ounce of soot should be wasted, it is a most valuable commodity for garden purposes. It is not only a good fertiliser for the garden but in solution is splendid for house plants, giving their foliage a beautiful greencolour not attainable by any other means.

Mixed with lime and added to the soil it will, if used at the time of planting, prevent maggots which attack some of the Brassicas at the root.

Sprinkled over young onions, leeks and carrots, it helps to keep off the "fly".

Dusted frequently over the foliage of celery, the celery fly will be scared off from depositing its eggs there, while an application of it on the gooseberry bushes, after rain or in the early morning while the leaves are still damp, will stop the ravages of the caterpillar.

[The Scottish Farmer, August 4, 1923].

Jute. Besides Dundee, Bengal has another powerful rival in Italy in the manufacture of Jute. In Italy, we learn from the Indian Trade Journal for August 30th, 1923, there are about 30 jute mills with 70-80 thousand spindles and 4,500 to 5,000 looms. For the quarter ending March 31st 1923, 95,627 quintali (1 quintal=100 lbs. of raw jute was imported, the value of which was 28,919,280 Lire (1 Lire=10 annas), and during the same quarter 175 quintali of raw jute were exported, 8,715 quintali of textiles with a value of Lire 5,463,914 similarly exported, the chief destinations being the Near East and South America. Has India any lessons to learn?

Principal crops in India 1922-23.

Preliminary Statement.

Crop.	Estimated yield		Acreage		Average yield	
	Tons.		acres.		per acre	
	1922-23	21-22	22-23	21-22	22-23	21-22
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Rice	...	33,167	33,235	81,533	81,662	911
Wheat	...	9,891	9,830	30,835	28,207	719
Sugarcane (gur)	...	2,989	2,599	2,721	2,395	2,461
						2,431

Sesamum	...	486	518	5,014	5,746	217	246
Groundnut	...	1,161	959	2,530	2,144	1,028	1,002
Indigo, cwts.	...	55	61	297	320	21	22
Cotton (400 lbs., bales).	5,196	4,479	21,154	18,451	98	97	
Jute do.	...	4,159	3,986	1,456	1,518	1,143	1,052

N.B.—Figures in columns 2 to 5 in thousands of tons or acres.

(The Indian Trade Journal, August 30th 1923).

Distribution of Insecticide by Aeroplane.

Mr. R. O. Wahl, Lecturer in Entomology, who recently returned from America, reports that when visiting the State Experiment Station at Wooster, Ohio, during the last year, his attention was drawn to an experiment carried out by that Experiment Station and the City of Cleveland, in co-operation with the United States Air Service, in combating an outbreak of the catalpa sphinx (*Ceratomia catalpas*, Bvd.) in a catalpa grove by distributing the insecticide from an aeroplane. The section of the wood sprayed was a dense grove containing trees of different kinds, elm, spruce, maple, etc., varying in size from 60 feet down. There was considerable thick undergrowth as well as much bracken and large plantings of rhododendrons. The penetration of the dust was remarkable and the killing very successful. Unfortunately, a heavy thunderstorm and torrential downpour occurred a few hours after the completion of the dusting and robbed it of much of its value. A portion was redusted the following day, resulting in a practically total killing of the caterpillars.

Much more experimental work is necessary, but a new field of investigation in this direction is opened to the entomologist and other scientists and one that appears to have great possibilities.

Jour. of the Dept. of Agr.,—South Africa—Page 389 May 1923.

German Research on the Manuring of Forests:—

“The utility of manuring forests by means of mineral manures is still an open question, possibly because the matter has been

tested from the wrong standpoint. In general the soil is chiefly deficient in Nitrogen, so that the addition of potash and phosphates would be useless, whereas as soon as nitrogen is provided in an assimilable form astounding results are obtained. Comparison of pine trees grown for twenty years with and without nitrogenous fertilisation showed the growth of the manured trees to be on the average nearly three times that which had not been manured. The manuring was effected either by lupin plants or by surrounding the trunk with brushwood of broom or pine. The question of stimulating the growth of trees deserves attention in consideration of the present timber shortage.”

(Chemistry and Industry).

B. V. N.

Reviews.

Prickly Pear as a source of Alcohol—Gilbert J. Fowler & B. Gopalakrishnayyah—*Journal of the Ind. Inst. of Science*—Bangalore—Vol. IV Part 9.

The problem of the utilisation of Prickly Pear as a source of power alcohol has been under investigation for a long time in various parts of the world. No such investigation seems to have been undertaken in this country till very recently. In 1912 certain samples were examined in the Laboratory of the Government Agricultural Chemist, Coimbatore, for its value as a cattle food and a cursory examination then made showed that it contained only a very small amount of fermentable materials. Whether this small amount would be a sufficient inducement for attempts at alcohol production or not was not further investigated.

There were always two opinions—one positive and one negative—in India in regard to the utilisation of Prickly Pear for the production of alcohol but neither opinion was based on experimental facts.

In these circumstances it is very gratifying to note that the subject has now been investigated by Prof. Gilbert J. Fowler and Mr. B. Gopalakrishnayyah at the Indian Institute of Science. The authors are of opinion

1. That sufficient material fermentable by yeast is not present in Prickly Pear, nor can be produced from it by acid hydrolysis to make it of any value as a source of power alcohol. The fruit, on the other hand, contains fermentable sugar but successful fermentation of the fruit will largely depend on its actual sugar content and the cheapness with which it can be collected and transported to the distillery. At any rate it is very unlikely that it will compete with other cheap raw materials as a source of alcohol

2. That while prickly pear readily ferments spontaneously both under aerobic and anaerobic conditions yielding butyric acid, hydrogen and marsh gas, no success has attended attempts to produce acetone from it by a pure fermentation with the acetone bacillus.

3. That prickly pear is a valuable source of energy for the nitrogen fixing organism, provided sufficient carbonate of lime is present to neutralise all acid formed.

4. That several varieties of 'spineless' cactus can be readily grown in Southern India with a very small provision of water or manure, and they contain a higher percentage of water soluble material and of nitrogen than the wild spiny species.

B. V. N.

Estate News.

Gana Sabha. On the 3rd September, the Agricultural College Gana Sabha, which was formed on the Estate with the object of arranging for periodical musical entertainments, was inaugurated by Brahmasri Palni Subrahmanya Bhagavathar who gave a Harikatha

performance, the Katha selected being "Rama Das Charitram". The President of the Sabha, Mr. C. Tadulingam, on this occasion explained in an appropriate speech the objects and aims of the Sabha.

Krishna Jayanti. In honour of Krishna Jayanti, Brahmasri Rama Bhagavathar of Palghat gave a learned exposition of portions of Bhagavatam on four successive nights.

Magic. Professor Peethambara Sastri, the renowned master of leger-de-main, visited the colony on Sunday the 9th September and gave a fine performance of sleight of hand and various wonderful feats before an audience of students and officers at the Officers' Club. His clever tricks and humorous talk were very much appreciated.

A Send-off at the Officers' Club. On September 15th '23 a tea-party was held at the Officers' Club in order to bid farewell to Mr. K. Venkataraman, M.A., of the Government Economic Botanist's section in honour of his departure from Coimbatore to take up the appointment of Assistant Economic Botanist in the Burma Agricultural Department, at Mandalay. Several of his colleagues and friends made felicitous references to his various amiable traits of character and wished him success in his future career.

Processions. Several processions accompanied by Bhajana and music were arranged in connection with Vinayaka Chaturthi.

Mr. D. Balakrishnamurthi occupied the Imperial Bungalow vacated by Mr. P. H. Rama Reddi on his departure to Bellary.

Indian Officers' Association: Agricultural Section. At the request of several members of the Indian Officers' Association, an agricultural section of the above Association was formed with the formal sanction of the Indian Officers' Association, Madras, with Coimbatore Agricultural College as headquarters.

Quarters. Of the four Provincial quarters on the southern portion of the Estate two were handed over and have been occupied, while the other two are expected to be ready by the end of the year.

Visitors. Dr. Narasimha Ayyangar, Mysore, delighted the members of the Officers' Club with a conversazione on "A Student's Life in Germany."

Drs. K. Kunhikannan, Sampatkumaran and Narasimha Aiyangar of the Mysore State visited the colony to attend a meeting of examiners in connection with the B. Sc. Ag. Examinations, 1924.

Students' Corner.

Literary Section.—2nd September. Under the auspices of the Students' Club, a lecture was delivered by Mr. S. Sundararaman, Government Mycologist, on "Fungi and Diseases of Plants."

29th October. An interesting paper was read by P. Narayanan Nair, student B.Sc., class III, on his impressions of the North and the South with Mr. D. Balakrishnamurti in the chair.

Games.—8th September. The second match with the Foresters in the Father Rony's Cricket Tournament was played on the 8th on the Agricultural College grounds. The weather being fine, the Agriculturists on winning the toss entered for batting and got 101 runs. Mr. Bhandary as usual displayed a very lively game for his 48 and Mr. Shiva Rao scored 23 with his faultless game; unfortunately the latter was run out so that he could not score more. The Foresters got 89 runs in the first innings. The bowling honours were shared by Captain Pattathan and Sundara, three and two wickets being respectively taken by them.

At 3 P. M. the second innings commenced, Messrs. Shiva Rao and Venkataramanan from our team, entering the field for batting. Mr. Jayasunder from the Foresters mercilessly bowled out as many as five of our batsmen. Our hopes in Messrs. Bhandary and Shiva Rao were shattered as the former fell a victim amongst others to Mr. Jayasundara's bowling and as the latter was dismissed with a single run, being run out for a second time in a day. Mr. S. N. Venkataramanan topped the list with his 29 and played a very steady game. With all the mishaps a total of 81 had been scored when the Foresters took their turn for batting at 5 P. M. At this juncture the game was very critical: the time was very limited: 6.20 was getting near: the Foresters took the venture, grew desperate and

Messrs. Pereira and Jayasundar seemed as if they were minding the ball more than the wicket: the visitors were more absorbed in the batsmen's striking than in Captain Pattathan's perseverent and ingenious bowling. The bowler was changed once and for a second time too: but the day was not with us. The passing of every minute was noted in the College clock and every minute gave more than one run to the Foresters. In about an hour 101 runs were scored for three wickets and the match thus decided in favour of the Forest College.

30th October. A friendly match in Hockey was played by the Forest College with our team on our grounds. It resulted in a win to the Foresters by three goals to one.

Tours.

(1) *B. Sc. Class III.* The students of B. Sc. Class III, were taken on tour through Coimbatore, Madura and Trichinopoly Districts during the Michaelmas by the Professor of Agriculture. The party left on the 13th September and halted successively at Pollachi, party left on the 13th September and halted successively at Pollachi, Andiur (near Gomangalam), Madathukulam, Palni, Dindigul, Manapparai, Uttathur and Trichi, visiting the surrounding villages and enquiring about the local agricultural practices. In the course of the tour, a number of shandies held at Pollachi, Udamalpet, Dindigul and Manapparai were attended. The innumerable commodities dumped in, the infinite number of stalls and the immense body of population moving as in a labyrinth, naturally make the shandy at Pollachi the biggest in the Presidency. After this, the rest of the shandies appeared like Lilliputs. Besides the usual cereals and pulses, garlic cultivation at Andiur, sugarcane at Bhudhanatham, Betel-vine at Karur, Dindigul and Palni; Chrysanthemums and grape vine at Panjampatti; Jasmines, plantain topos and vegetables at Palni; Pomegranates, limes, oranges and graft-mangoes in mixed orchards at Dindigul; Nanal cane at Uttathur and Turmeric and maize at Trichi were the crops studied.

The tall topos of coconut and arecanut, the lofty jacks and mangoes, not to speak of the green paddy flats satiated with the crystal waters of the Amaraoti, really make that border land of

Madura and Coimbatore very interesting. Spencer's Cheroot Factory and ground-nut decorticators and rice hullers at Dindigul were visited.

The demonstration methods of the Government Mycologist seemed to be extremely popular with the grape vine farmers at Panjampatti.

The Agricultural demonstrators in Dindigul and Trichy taluqs gave full accounts of their demonstrations in their tracts.

Mr. Saadat-ullah-Khan, Deputy Director of Agriculture, took the party to a holding at Dindigul newly purchased by Mr. Ponnuswamy Naidu, M. L. C., and the students were asked to suggest suitable croppings and work out a profit and loss account with its establishment at present and when the orchards would come into bearing.

Though the season sowings had not commenced in portions of Pollachi and Udamalpet taluqs and the Monsoon had failed in the Palni tract, yet what could not be made up by observation of crops was more than compensated by the students inquiring into the economics of big holdings like that of the Manigar at Udamalpet and of smaller holdings of various ryots. The latter part of the tour was with the Assistant to the Professor of Chemistry to inspect the phosphatic nodule area near Uttathur. Mr. Shiva Rao joined the party at Trichy and took them to Kavai, Terani and Uttathur showing the nodules in their natural condition. The party returned to Trichy on the 29th when the class dispersed for holidays, to reassemble again at the College on 16th October 1923.

(II) *Certificate Class II.* The tour for certificate class II commenced on 1st October at Samalkot; the Professor of Agriculture was in charge of the class. The students of B.Sc., Class III also accompanied the party. The places visited were Samalkot, Rajahmundry, Pedavadlapudi and the neighbouring villages, Tenali, Guntur, Ongole, Allur, Kalahasti, Pakala, Katpadi and Bommasamudram. The following crops were studied. Paddy and sugarcane:—the deltas and Pakala; graft mangoes and Batavian oranges—Samalkot; Jasmine, lime, orange, turmeric, maize and red grain—

Pedavadlapudi and the neighbouring villages; Chillies, tobacco, cholan and cotton:—Guntur; Yam, lime, brinjal and other vegetables:—Bommasamudram. Besides the above, a number of factories were also visited:—

- (i) Parry & Co's., Sugar factory : Samalkot.
- (ii) Rice hulling and turmeric polishing factories : Duggirala.
- (iii) Gound-nut oil presses worked by power : Tenali.
- (v) Bell-metal factory : Kalahasti.

The Agriculture of the Kistna Western delta was unique in itself. The system of irrigation and navigation canals, the intensive cultivation carried on in the tract, the small wells with low water-table and perennial supply of water as contrasted with our Coimbatore wells, were all noted. In fact the party spent three days and three nights in boats in the canals of this area.

Next the Ongole cattle in their full majesty were observed in their native home. Photographs of the peculiarities in the local agricultural practices as the transplanting of chillies at Guntur, the old bed and the new ridge systems of planting turmeric near Tummapudi and of the typical cattle of the Ongole tract were taken. The students returned to Coimbatore on 15th October.

(III) *B.Sc., Class I.* The students of this class proceeded on an entomological tour to Madras on 13th September under the charge of Mr. P. N. Krishnan. The Aquarium, the Museum, the Menagerie, the Zoological laboratories of the Presidency and the Christian Colleges at Madras and the Government Fishery Experimental Station at Ennur were visited by the party. The class was dispersed at Madras on 18th September.

(IV) *B.Sc., Class II.* Visited Walayar on an Entomological Excursion on the 1st, 2nd and 3rd September.

(IV) *B.Sc., Class II.* The students of B. Sc., Class II went on a Geological tour on 25th October to the Nilgiris with Rao Sahib Mr. Sivan but the weather was unfortunately far from bright. On the 26th and 27th the party visited (1) Rose and Crown's Brewery

near Ketī (2) The Cordite Factory at Aravankad, (3) Sim's park, (4) the Pomological station, (5) Spring-field, (6) the Pasteur Institute, (7) Brooke-land Tea estate. (8) Fruit-Preserving Institute and (9) the Government Silk-Farm at Coonoor. The Party returned to Coimbatore on the 28th night.

M. Satyanarayana.

Indigo-Vats. Indigo-vats were for the first time constructed on the Central Farm near Field No. 59 and the preparation of Indigo was demonstrated to the students.

Students' Club Accounts. Statements of students' club Accounts for 1921 - 22 and 1922 - 23 duly audited, appear elsewhere (pp. 463 464) in this number. [Editor]

Correspondence.

DEAR SIR,

It may be of interest to some of your readers, to note how people in Australia grow cotton and a comparative study may be of some use. With this view I send this enclosed statement for publication in your valued Journal.

Yours faithfully,

P. KRISHNA RAO,

To the Editor,

M. A. S. U. Journal.

Agricultural Demonstrator,

Guntur. 12th July 1923.

Cultural differences in growing Dry cotton between New South Wales and Guntur District—Extracted from Agri. Gazette of New South Wales, August 1st, 1922.

No. Operation.	New South Wales.	Guntur Dt.
1. Seed rate	15 to 20 lbs.	10 to 15 lbs.
2. Treatment of seed.	(1) Rubbing the seed with clean sharp sand. (2) A dry hollow log which is fired inside and placed in a vertical position over a tub of water. Seed dropped through fire into the water.	Seeds are rubbed with cowdung water or a paste of red earth and dried.

(3) Dip seed in a thin paste of clay or flour and dry.

3. Sowing.

Rows 4 feet apart in rich soils and 3'-6" in lighter soils. Seed is machine drilled. Season is end of September.

Rows 2'-6" apart; sown behind a country plough. Season is September.

4. Manures.

Equal parts of bone dust and superphosphate is drilled or broadcast in the furrow opened for dropping the seed. The manure is sown at the same time as the seed. 2cwt. in medium soils and 1 in rich soils.

No manure.

5. Thinning.

Plants thinned 10" to 12" apart.

No thinning is done.

6. Picking.

First flower buds appear in November. First bolls mature towards end of February: 3 pickings are taken. Picking done by hand. Wages are 12s. per 100 lbs., of kapas or 1½d, per lb.

Wages are Rs. 1 per 100 lbs.

7. Yields.

600 to 1000 lbs. of kapas 300 to 400 lbs.

8. Prices.

1 lb. of lint 13d. Rs. 80 a candy or 1 lb. of kapas 3d. 2½ as. a lb. of kapas. A farmer may get £ 10 an acre. A farmer may get Rs. 60 per acre.

P. K. Rao.

Editorial Notes.

RAI BAHADUR K. RANGACHARIAR.

Scientific men all over the country will be concerned to learn that a prominent Indian Botanist has retired from active service with effect from 3rd September 1923 in the person of Rai Bahadur K. Rangachariar Avergal, M.A., L.T., F. M. U., the Government Lecturing and Systematic Botanist at the Agricultural College and Research Institute, Coimbatore. One of the most distinguished of Indian Botanists, Mr. Rangachariar has built up quite a reputation after a strenuous work extending over 25 years during which he devoted himself heart and soul to Botanical work of a very high order.

Early career. After passing out as a first class Master of Arts in Botany in 1894—a rather unique distinction—he joined as Assistant in the Government Museum at Egmore. He soon distinguished himself under Dr. Edgar Thurston, then, Superintendent of the Madras Museum and a good deal of the valuable and detailed information contained in the pages of his monumental work on the "Castes and Tribes of India" was the result of the strenuous and whole-hearted work of the Rai Bahadur.

Rangachariar—the Botanist. Botany was, however, the subject nearest to his heart and he soon turned his attention to it. He worked at the various sections in the Government Museum, Madras, adding considerably to the specimens and improving their arrangement. On more than one occasion, he acted as Professor of Botany at the Presidency College, Madras, and soon became a familiar figure at University and other examinations.

It may be said, however, that the best part of his activities belong to his work at the Agricultural College, Coimbatore. The facilities afforded by the well equipped laboratories and the skilled staff under him at that College brought out the best in him and gave us the first real Text book on Botany for Indian students. Students of Botany in India had all along laboured under the great difficulty of finding in their text books, mentioned as examples, foreign plants

which are often unavailable in this country. It stands to the credit of the subject of our life sketch that this disability was once for all removed. The book soon passed through various editions and became the text book in various Colleges—both Arts and Professional—in this country. In the production of this book Mr. Rangachariar called to his aid his abundant and detailed knowledge of Indian plants and his thorough mastery of photography and micro-photography. In the year 1913 the title of Rai Bahadur was conferred on him and distinctions began to pour in from all quarters. He was elected President of the Botanical Section of the Indian Science Congress at Bangalore in the year 1917 and of the Indian Botanical Society in the year 1922. Private Colleges and Universities of Indian States eagerly sought his help in matters of Botanical Education.

His career in the Madras Agricultural Department marked a definite stage in its evolution. He was the first Indian to be given a position, till then the preserve of the European in the Department. It is to be regretted he has had to retire so soon after his being raised to such a position. He gave his very warm support to the affiliation of the Coimbatore Agricultural College to the University of Madras and was held in considerable esteem both by Indians and Europeans.

He enthusiastically took to the translation of his Text book of Botany into more than one Vernacular and he is rightly regarded as the "giver" of Botany to teachers of rural schools in this Presidency. He was anxious that Botanical knowledge should spread beyond those who knew English and in this measure he achieved signal success.

Other activities. He was a great lover of music and in the early days—when the phonograph was first introduced—he went to considerable expense taking records of the music of the aboriginal tribes in the Nilgiris and other places. He was a prominent figure in all social activities and was elected as President of the Agricultural College Officers' Club for as many as four consecutive years. He was often selected as the chief factor in entertainments wherever children were concerned.

By nature very simple, always active in habits, generous in disposition and encyclopaedic with regard to scientific knowledge, Mr. Rangachariar was always a source of inspiration to students and teachers that came under his influence and as a Botanist his name will be a landmark in the history of Indian Botany.

We wish Rai Bahadur Rangachariar a long lease of life and peace and happiness in his retirement and we feel certain that his vast knowledge and experience will eagerly be sought after and utilised in various activities, calculated to improve Scientific education in this Presidency.

Pudukota Agricultural Department.

Our readers are perhaps not aware that in the little State of Pudukota the status of which has been recently altered and brought into line with that of other States that have been directly under the control of the Government of India for several years, the nucleus of an agricultural department was formed when the late Rao Bahadur J. Dharmaranga Raju, was drafted from British Service, as Dewan Peishkar. During his tenure of office the department was sedulously cared for, and the heads of administration that succeeded him, continued to evidence the same interest, though largely owing to the peculiar local conditions of the State, the agricultural section has shown no expansion during the past few years. Deficits as elsewhere have also become a matter of anxious concern to the State officials and the Regent Saheb. The matter was brought before the Representative Assembly and the Dewan's statement that this department should not be abolished, or its staff reduced, but that it should be improved by transferring to it certain functions now performed by the Co-operative Department is welcome news and will be endorsed by all interested in agricultural improvement. We hope that under the enlightened administration of the Regent Saheb who is no other than the brother of His Highness the Raja and a native of Pudukota, Agricultural questions will come to the forefront and not suffer in any investigations touching the interests of the State.

Secondary Education in Agriculture.

We do not know whether the Andhra Districts will come to any unanimous decision as regards the location of the Andhra University, but Vizianagaram in the Vizagapatam District owing to the fostering care of the present enlightened Maharaja and his forbears occupies the foremost place in Educational matters in the Telugu districts. With its up-to-date scientific laboratories and its brilliant staff of Professors and lecturers the Maharaja's College is second to none in the Presidency to-day and it is fitting that it should occupy a pre-eminent position, seeing that the former occupants of the *Gadi* have also been liberal patrons of learning, the present Maharaja's grandfather being so enlightened and patriotic as to bear all the expenses of Professor MaxMuller for his first edition of the Vedas which covered several volumes. The same catholic spirit has characterised the administration right through and an agricultural farm has formed an appanage for the past few years. We hope that when agricultural education receives better recognition from the public, the Rajah Saheb's farm will prove a very useful centre for imparting agricultural instruction to the students in Vizianagaram. We are glad to note that the President Founder of Sri Meenakshi College, Chidambaram also has in contemplation the provision of similar facilities for students in the Tamil districts. We congratulate the Dewan Bahadur Annamalai Chettiar in this patriotic effort. Should the scheme materialise Sir Chettiar and other magnates in the Tamil country will, we trust, not lag behind in making it a success. We may add that the name of Sir Chettiar is a sufficient guarantee for the stability of the scheme.

Making an Eden of the Sands of Sind.

Sind lies at the North-Western end of the Bombay Presidency and comprises three well defined tracts:—the hilly country on the west, the central portion watered by the Indus and the region of poor soils on the eastern border. The total area is 52,556 square miles or 34 million acres. Whatever crop is cultivated in Egypt, Arabia and other countries bordering the Persian

Gulf may thrive in Sind also, since these countries are all characterised by high summer temperatures little tempered by rain, great winter cold and similar geological formations. Despite all immigration and extension in cultivation due to the settlers from the Punjab and Baluchistan, since 1843, when this province came into the hands of the British, the total population including the states was, according to the census of 1921, only 3,472,508 persons and they almost entirely depend upon agriculture for their existence and in 1920—21 in the British territories 3,564,365 acres alone were sown the area irrigated being 2,857,054 acres.

The relative position of the main crops and livestock during that year was as follows:—

	Area irrigated acres.	Total including unirrigated acres.
Rice	1,235,073	1,235,073
Wheat	249,442	345,990
Cholam	356,101	408,385
Cumbu	498,763	937,001
Cotton	267,863	269,300
Sugarcane	4,37	4,137
Bulls, bullocks and male buffaloes (numbers)		552,270
Cows and she buffaloes	"	857,510
Young stock	"	390,112
Sheep and goats	"	1,591,784

After very extended investigations and protracted discussions the Secretary of State recently sanctioned proposals for the development of this province. As the result of it, on the 24th October was inaugurated by His Excellency Sir George Lloyd, Governor of Bombay a scheme of irrigation—the largest in the world—to assure to the vast areas in Sind a *regular and constant supply of water*. For the country is at present without such supply, for

as it is but on the fringe of influence of both the Indian monsoons, the rainfall is scanty and irregular averaging about 8 inches and the supply through inundation canals is unsatisfactory.

It was proposed to construct a dam at Sukkur and excavate seven canals above it which will take off and distribute the turbid and silt-laden waters of the Indus, over an area of 8 million acres. The land actually irrigated by the canals will approximate 6 million acres. The dam will cost over 825 lakhs of rupees and the complete scheme including the canals is estimated to cost over 1,800 lakhs of rupees.

This project will when complete provide for the eventual cultivation of the following areas in British and Khairpur territories.

823,000 acres of rice
1,739,000 „ cotton, cholam etc.
3,338,000 „ wheat, oil seeds etc.

The net annual return to Government will be 14.6 per cent or a net profit, after paying interest charges, of 8.6 per cent on the capital outlay.

The addition of an irrigated area of over 3 million acres every year to augment existing food resources and supplies of raw materials, is a gain which cannot be assessed at present and the conversion of this arid tract into a hive of industry, which it is sure to be in a few years, is a matter of sincere congratulation to the projectors as well as the beneficiaries under the scheme.

Our Members.

We welcome back to India Mr. H. C. Javarayya, L. Ag., one of our members after an advanced course of training in Horticulture in the Kew Gardens, London. He was Assistant Superintendent, Lalbagh, Bangalore, at the time of his deputation for training in England, and we trust and hope that he would in due

course be rewarded by a promotion to higher posts which he richly deserves. We understand that Mr. Venkata Rao Badami, L. Ag., also one of our members and now Assistant Botanist in Mysore service is proceeding to Cambridge for a two years, training in Plant breeding work. We are informed that he may complete his training in the Berkeley University of California where he intends to stay for sometime. A winner of all the College prizes—Keess, Robertson and Clogston—in his year, and a man who has already done plant-breeding himself, Mr. Venkata Rao Badami should find it an easy walk-over. In our opinion it is only such people—men with Indian experience already to their credit—that will benefit most by a course of training in England or America.

In this connection we are glad to learn on reliable authority, that Mr. Gururaja Rao, L. Ag. also one of our alumni in Mysore, is likely to be appointed as Personal Assistant to the Dairy Expert, Bangalore.

Union Activities.

The Working Committee met twice during the quarter ending 30th September 1923 when the accounts relating to the College Day and Conference were settled and work was distributed among the seven members so as to secure better efficiency. Resolutions were also passed authorising the Secretary to circulate members employed in the Native States regarding their pay and prospects for concerted action later, and to open correspondence with Native States regarding waste lands with a view to the utilisation of such by unemployed agricultural students as private undertakings.

Union Building.

We are extremely gratified to announce that Government have now sanctioned the lease of the site for the construction of

a habitation for the Union and have graciously made a contribution of Rs. 670/—one-third of the estimated cost. The land has just been handed over by the Principal. Work has been begun. The Committee requests that those members who have already promised may send in their remittances immediately and those whom the Union has not yet been able to approach, will equally interest themselves and contribute liberally to get the building finished before the lapse of one year from the date the site was handed over, which is the express stipulation of Government. The Committee hopes that its appeal, which it believes is but just and reasonable, will have a warm response from its members.

The Journal and Change of Subscription.

Members are reminded that in accordance with the resolution of the General Body Meeting held on the 17th July 1923, the subscription for the Journal has been enhanced to Rs. 4/— The Journal will however be supplied free to all such members as pay their annual subscription ranging from Rs. 3 to 5 according to their pay or status. It is requested that all members will kindly encourage the Journal and help it to expand its scope and usefulness. A circular letter will be sent round in due course advising members of the impending changes in January 1924.

Departmental Notes.

Appointments, Postings, and Reversions :—

1. Mr. D. Balakrishnamurthi on return from leave to be Professor of Agriculture and Superintendent Central Farm, Coimbatore.
2. Mr. P. H. Rama Reddi, Acting Professor of Agriculture and Superintendent Central Farm, to be Deputy Director of Agriculture, 111 Circle, Bellary.

3. Mr. C. Narayana Ayyar, Acting Deputy Director of Agriculture, VIII Circle, Coimbatore, to be Assistant Director of Agriculture in charge of VIII Circle, Coimbatore.

4. Mr. M. C. Cherian, B. A., B. Sc., D. I. O., to act as Economic Assistant to the Govt. Entomologist, vice Rao Sahib Y. Ramachandra Rao on other duty.

5. Mr. P. V. Subba Rao, a holder of the Certificate of Proficiency in Agriculture, to be temporarily acting as a lower subordinate, V grade on Rs. 45-3-75 under the Deputy Director of Agriculture, Livestock.

6. Mr. K. Govindan Nambiar, a Proficiency Certificate Holder, to act as Assistant Farm Manager, V grade, at the Office of the Curator, Govt. Botanic Gardens, Ootacamund, vice Mr. T. D. Easwara Ayyar, on leave or until further orders.

Leave :—

1. Mr. K. Cheriyan Jacob, Assistant to the Govt. Lecturing Botanist, leave on average pay for one month from 1st October 1923.

2. Mr. K. Govindan Nambiar, Farm Manager, Coconut Station, Kasargod, leave on average pay for one month from or after 10-10-1923.

3. Mr. L. Narasimhachar, Farm Manager, III Circle, extension of leave by one month on medical certificate.

4. Mr. S. Kuppuswami Ayyangar, Agricultural Demonstrator, Chingleput, leave on medical certificate for 19 days from 8th to 26th September 1923.

5. Mr. M. K. Nambiar,, Headmaster, Agricultural Middle School, Taliparamba commutation of leave into leave on average pay for 23 days and on half average pay for the remaining period from 30-7-1923.

6. Mr. M. Gopala Chetty, Farm Manager, VIII Circle, extension of leave on average pay by 6 weeks.

7. Mr. V. Ramachandra Ayyar, extension of leave by 1½ months on medical certificate.

8. Mr. A. K. Ganesha Ayyar, Assistant Farm Manager, Millets Specialist's Office, leave on average pay for 24 days from 26-10-1923.

9. Mr. T. D. Eswara Ayyar, Lower Subordinate, V grade, in the office of the Curator, Govt. Botanic Gardens, Ootacamund, leave on average pay for 8 months from date of relief.

10. Mr. K. Krishna Rao, Assistant Farm Manager, Chintaldevi, leave on average pay for 5 days from 30-10-1923.

11. Mr. K. Satyanarayana Gupta, Assistant Agricultural Demonstrator, Chicacole, leave on average pay for one month from 12-9-1923 and leave on medical certificate for 2 months in continuation.

12. Mr. P. A. Kunhiraman Nambiar, Assistant Agricultural Demonstrator, VII Circle, leave on average pay for 10 days from 30-10-1923.

Statement of Receipts and Expenditure of the Students' Club Accounts, Agricultural College, Coimbatore for the year 1921-22.

RECEIPTS:—		EXPENDITURE:—	
Rs.	P.	Rs.	P.
1. Opening Balance.		1. Games section.	
a. at Bank	474 12 6	a. Tennis	64 0 6
b. with Secretary.	15 3 3	b. Hockey	137 12 0
		c. Cricket	86 4 6
2. Subscriptions.		d. Basketball	101 4 3
a. arrears.	142 12 7	e. Entrance fee for tournaments.	20 0 0
b. For the year 1921-22.	624 0 0	f. Conveyance for match players.	17 2 0
c. Donations	100 0 0	g. Establishment.	67 0 0
3. Government grant.	132 10 8		498 7 3
4. Miscellaneous.		2. Literary section.	
a. Sale of old Newspapers	4 14 0	a. Dailies	89 14 0
b. Sale of old Tennis balls.	10 6 0	b. Periodicals	38 2 0
c. From Principal's office.	38 8 5	c. Lighting charges.	1 3 9
d. Fundry Receipts.	11 5 3		129 3 9
5. Interest allowed on current a/c with the Urban Bank Coimbatore	14 11 1	3. Other items.	
		a. Socials etc.	152 2 3
		b. Postage & stationery.	15 4 9
		c. Binding charges & repair	5 4 0
		d. Miscellaneous.	21 10 6
		5. Advances repaid.	197 5 6
		BALANCE:—	20 4 3
		a. at Bank on 1-4-1922.	722 2 3
		b. with Secretary.	1 9 0
TOTAL	1568 13 9	TOTAL.	1568 13 9

Audited and found correct. K. S. Subrahmanya Ayyar, Auditor.
30th November 1922.

P. N. Nayyar, Secretary, Students' Club.

The water-table is at a depth of 32 feet from ground-level and about Rs. 1,000 to Rs. 1,500 is required to sink a well including brickwork and fittings. Full advantage of the Agricultural Land Improvement Loans Act of 1883 is availed of and it is not uncommon to see 2 new wells at least sunk during the year and it may be noted that about 75 per cent of the wells newly sunk are successful. Besides the Government patta land, there is also the Service Inam land set apart for some common purpose or other, such as the serving of drinking water to passengers along the road during the summer, performing puja to God in the temple or church, discharging the duties of village officer or village *thoti* or *talayari*. Such Inam lands are being resumed as the purpose for which they were allotted is no longer served.

A resident pastor is in charge of an old Catholic church built perhaps during the time of the Portuguese. During the time of the last settlement in 1911, the village contained 12 pattadars with an average holding of about 16 acres each. Since then 50 acres of Government waste and Poramboke have been given on patta. From that date there has been a gradual increase in the number of pattadars with a steady decrease per holding, of the 26 pattadars 15 holding less than 4 acres each. Such small holdings are not economical to run on 'own' system and consequently most of them are obliged to lease out their land and take to petty trade, oil-milling, etc., though they are loath to leave their hamlet. Land is their capital and whenever they wish to take up an enterprise, they mortgage or sell their land to find the necessary finances. There has been ample proof that it is beyond the scope of the small ryot to redeem his land when it is once mortgaged. The total liability of the village is Rs. 5,400—Rs. 2,000 of which is borrowed by two ryots from Rev. Bishop Roy of the Catholic Mission at 9 per cent and the rest at rates varying from 12 to 24 per cent from local pattadars or chetties at Tirupur.

The Census record shows that the population of the village during 1921 was 345 for 72 houses and the number of adult males 110, or 30 per cent of the total population. Excluding children under

8 years all the rest except 8 per cent of the population are connected with agriculture as cultivators, agricultural laborers or cattle graziers. Of the rest 34, 10 are oilmen busy with their country mills, manufacturing neem and groundnut oil and cakes during the season; 18 are weavers, who buy their yarn from Somanur on credit system, weave it into cloth and sell; and a carpenter, who is also blacksmith, attends to the repairs of agricultural implements and tools of the ryots for which he receives wages in kind per season per crop. The village barber besides performing his professional duties also attends as musician at marriage and funeral functions. The Andi or priest attends to the puja in the village temple and supplies leaves. The village is thus a self-contained unit but for a dhoby and a potter.

Stock and Pasturage.

In this village	Bullocks and He-buffaloes	number	78
	Cows	...	12
	She-buffaloes	...	9
	Young stock	...	62
	Sheep and goats	...	308

It may be noted that there has been a steady increase in the cattle census by 220 per cent from 1871 to 1921 under the 1st four items, while there is a fall of 37 under sheep. Maintenance of good live-stock for breeding purposes by some of the enthusiastic ryots would prove profitable in the village.

Owing to the increased conversion of pastures into arable area fodder scarcity is great during the months of April, May and June and there is a regular stream of carts for fodder to Thadagam.

Cattle are very well looked after and their condition is good. The cattle in the village are insufficient to do all the work. During the busy season they are purchased in Karavallur shandy in May, retained for 5 or 6 months and sold off in November—December. No cattle can be got for hire during any part of the year. No land is put down for pasturage nor is there any available. The cattle graze on patta land and government waste.

Character of the people.

The Coimbatore ryot is deservedly noted for his industry and the ryots of this village are indeed true to type. All take part in outdoor work, but in most cases, elderly persons of 55 years of age divide their holdings amongst their sons and lead a retired life supervising their work and living on the annuity offered by them. Little distinction in social status is noted between a pattadar and a labourer as they move on an equal footing which is very conducive for agricultural development. The people are stalwart and robust, enjoying homely joys and needing little medical assistance. The surroundings are airy, clean, and well ventilated and the sanitary conditions are therefore good. Education is however very backward.

Trade.—Weekly fairs are held at Somanur and Giddampalayam every Wednesday and Tuesday respectively, and it is in these fairs that, all articles of consumption and requirement such as salt, kerosine oil, sugar, match boxes and leather for mhote are purchased and used during the week. The village being very near the railway line is fully exploited by the merchant and large quantities of tobacco, onions, etc., are sent out, while rice-bran, and tiles are got in to meet the village requirements. Savings, if any, are invested only on lands and never on ornaments. During last March a Rural Credit society was formed here.

Crops.—Tradition has taught the ryot how to raise crops on an economic basis. Competition for land is very great. The high value of land is not commensurate with its productive capacity and the land brings in an interest only of 6 per cent. Full use of the subterranean store of water is availed of, but the process of application of manure requires development. The effect of the conservation of cattle urine has been realised and is being appreciated. The prickly pear in the village is pulled out, heaped and covered over with earth during October so that it might get decomposed and the earth used over as manure for the next *paruvam* crops.

A schedule of some of the principal crops.

Crop.	Area.	Yield per acre.	Value of yield.
Cholam	100 acres.	2 salagais (Dry)	Rs. 20 0 0
	"	8 " (Garden)	" 80 0 0
Ragi.	40 "	8 " "	" 80 0 0
Cotton.	50 "	3 Potthies	" 150 0 0
Tobacco	20 "	1,500 lbs of cured leaf	" 75 0 0
Chillies	5 "		"
Paddy	10 "	20 salagais	" 180 0 0
Sweet potatoes.	20 "	8,000 lbs.	" 70 0 0
Dry Crops	55 "		" 15 to 20

Tobacco, cotton and other industrial crops are grown to order. The other agricultural crops grown are just sufficient for local consumption. Transplanting of Tenai and Kambu in garden lands is only too common here as also the raising of Alpal Paddy in garden lands during *paruvam*. This variety is very good in quality and yields from 20 to 24 salagais per acre and has completely ousted the wheat crop for which Palladam Taluk was once famous.

The following figures give the total grain yield of the village.

Crop.	Area.	Yield per acre.	Total yield.
Cholam	60 acres	2 salagais	120 salagais
"	40 "	8 "	320 "
Ragi	40 "	8 "	320 "
Paddy	10 "	20 "	200 "
Varagu	50 "	1 "	50 "
Samai			
Tenai			
Kambu			
			1010 "

Assuming that every member of the village irrespective of age consumes about $\frac{3}{8}$ Madras Measure of grain per day and that about $\frac{1}{8}$ Madras Measure is used for sundry expenses such as exchange of betel leaves, snuff, barber and Dhobi's fees, etc., we can safely calculate that the annual requirement of the village is $\frac{3}{8}$ plus $\frac{1}{8}$ x 345 x 365/64 Salagais i.e., 1,000 salagais. This supply is just sufficient for the demand. The ryots' requirements other than grain are simpler, less costly and more easily procurable.

The following are the statistics for crops other than grain.

Crops.	Area.	Total yield of village.	Total value of yield.
Cotton.	40 acres	120 pothis	Rs. 6,000 0 0
Tobacco	10 "	" "	" 1,000 0 0
Chillies	4 "	" "	" 400 0 0
Sweet potato	20 "	" "	" 1,000 0 0
Miscellaneous	26 "	" "	" 300 0 0
			8,700 0 0

This is the annual average gross income for 72 houses, (i.e.) each house receives about Rs. 120 per annum or Rs. 10 per mensem. In the 21 houses that maintain cows and buffaloes this income is supplemented by about Rs. 4 by the sale of dairy produce. This is the only amount that is available for the purchase of working animals, marriage expenses, clothing for the family, etc.

The details of earnings and expenditure of two families gathered by me are as below:—Family No 1 consists of 8 individuals—the principal—an adult male of about 45—his wife, his aged father, a son of 25, his boy of 8, his daughter-in-law and 2 grand children, besides which he maintains 3 pairs of work animals, a bull-calf and a he-buffalo. The land cultivated is 8 acres of garden land and 9 acres dry land. During 1920-21 the following crops were raised in his garden land.

	First crop.		Second crop.
Cholam	3 acres yielding 37 Salagais	Cotton	4 acres
Ragi	3 " " 40 "	Sweet potato	2 "
Paddy	$\frac{1}{2}$ " " 10 "	Gogu & Kitchen garden	$\frac{1}{2}$ "
Fallow	$1\frac{1}{2}$ " "	Fallow	$1\frac{1}{2}$ "

Of 87 salagais of grain thus obtained (1) the quantity distributed for *padiyal* for the year at 48 M. M. per month. 9 salagais

- (2) the chuckler at 40 M.M. per month. 7 $\frac{1}{2}$ "
- (3) the boy at 16 M.M. per month. 3 "
- (4) For barber, dhoby, Andy, carpenter, etc. 4 $\frac{1}{2}$ "

Total 24 "

and of the balance 20 salagais were reserved for family consumption and 43 salagais were sold for about Rs. 400. In the dry land 5 acres were sown with horse gram and 4 acres with Salem cholam. The dry crop was very poor and hence the revenue after paying the assessment was almost nil. From the cholam, paddy and ragi straw from his garden and dry lands he maintained his working animals giving them concentrated food purchased. Out of his cotton and sweet potato he realised Rs. 700 and hence there was a gross income of Rs. 1,100 for the year. Out of this amount he has purchased cotton seeds for Rs. 150 and other articles poonac, bran, bucket, etc., for Rs. 100. He was obliged to spend Rs. 200 towards his son's "Muluka Sair"—a ceremony attendant on the birth of a second child to an adult. But he received presents to the value of Rs. 90. The ryot purchased one pair of cattle for Rs. 235 in Puliam-patti Shandy last May and substituted a stronger one by investing an additional sum of Rs. 76 over the weaker one. Out of the net saving of Rs. 429 thus made, he has issued a loan of Rs. 150 on pronote at 12 per cent to a co-villager and with his balance of Rs. 279 is busily sinking a well in his dry land of 9 acres in extent purchased in 1914 for Rs. 500 and I presume he has not contributed anything towards his loan of Rs. 1000.

The second household consists of a man and wife with two children. 7 acres of dry land along the road side constitute the property. The woman maintains a cow purchased for Rs. 33. The food requirement of the family was about 7 $\frac{1}{2}$ salagais, while the net grain production was only 6 salagais and, hence the husband during his off season was obliged to go out for coolie labour. During the year he was only for about 80 days on active service, for which he earned wages of Rs. 50 and the woman during her spare time, tended the cow and contributed Rs. 36 by the sale of dairy produce towards family savings.

The Agricultural Class and Increased Food Production.

S. V. DORAISWAMI B. A.

The problem of increased food production to meet the growing demand of an increasing population is not so easily solved in India as in other countries; for, the agricultural class which is solely in charge of the agriculture of the country has not yet realised to the full extent the necessity for improved and intensive methods of cultivation. It is only when there is improvement in agriculture there is increased production of food. This means that the agricultural class will be, in a way, responsible if there is no increase in the food production of the country side by side with the increasing demand. Apart from this increase in demand, there is also the economic side of it, i.e., the minimising of the cost of living in the country with the much desired industrial progress. But then, the agricultural population lives and works in very unfavourable conditions, and a thorough study of their economic and cultural development at the present day is absolutely necessary before we can expect them in any way, to pursue agriculture on modern lines.

It is interesting to quote what "Economico" wrote in the "Hindu" of 12th January last. "The agricultural class is very poor. Landowners sink into hired labourers. Capital cannot be accumulated by improvements. Yield is uncertain and no cultivator especially in unirrigated land can be sure of earning a recompense in proportion to his labour". Further, Dr. Harold H. Mann shows that "in a typical dry village in the Deccan, the population has increased, the number of landowners has increased and the holdings have become so split up into fragments that not only are the areas now held too small in the vast majority of cases to maintain the family which hold them, but also they now exist in the most awkward form for economic cultivation". He also points out that the average net return per acre of land in the village is about Rs. 14-8-0, but its average debt comes up to nearly Rs. 13 per acre. This shows

that agriculture is no longer sufficient to maintain the cultivators. The result of this is clearly indicated by the steady increase of landless agricultural labourers at each census. Obviously, not only enough new areas have not been brought under cultivation but also the productivity of the soil has not kept pace with the growth of population. It has been shown that in the course of the nineteenth century, the French peasants have nearly doubled the area under wheat as well as the yield from each area. After the outbreak of the war, America was also able to double the quantity of her food production by intensive and extensive cultivation. While the average cereal crop yield all over India comes up to eleven bushels per acre, England produces thirty, France thirty-three and Denmark forty-one bushels. According to one authority, "If an increase of a single bushel per acre over the whole area under cereal crop can be obtained by us, the value accruing from that increase would suffice to pay the whole of the revenue at present needed by the Government".

Apart from other things, an increase in yield implies the application of suitable fertilisers. But enormous quantities of such fertilisers as bones, bone meal and oil cakes are exported to other countries simply because there is no demand in this country, the majority of the agriculturists having not yet realised the great manurial value of such articles. We are sending nearly thirty lakhs worth of bones and bone meal and about one crore and forty lakhs worth of oil cakes every year. Even the Farm Yard manure is not utilised to the full extent, an appreciable quantity being used away as fuel after drying. Thus the ryot is blissfully ignorant of all these important facts and much more so with regard to the possibilities of increased production. The first effort therefore towards the improvement of agriculture would be that of disseminating knowledge amongst the ryots so that they may have firstly, a little more insight into the scientific side of agriculture and secondly, a clearer grasp of the economic side of it on modern lines. To achieve this end, agricultural schools are a necessity all over the country. Then only, they will have sufficient knowledge to influence the members of legislative

councils and assemblies for passing acts prohibiting the export of useful fertilisers such as those mentioned above.

Besides giving them a liberal education there is also the economic side to be considered. The causes for the present low economic position seem to be the defect in the laws of revenue collection, the indifference of the State to the difficulties of the ryots and their utter helplessness in the lands of the money-lenders. The formation of Co-operative Credit Societies and Agricultural Associations with the help of the State will certainly go a long way to improve the state of affairs. Moreover, "as the ordinary ryot has not enough means to take risks on the possibility of tapping water in a well, the State as the biggest landlord ought to constitute a policy of well-sinking throughout the length and breadth of the land. If water is not struck, the loss of the experiment should fall on the State. On the other hand if water is struck, the State should have the power to levy an additional rate on the land that could be benefited by the well. The natural development will be the installation of pumps to distribute water on a Co-operative basis".

It is a pity that in our country, the rich landlords owning hundreds of acres of lands not often care to give a trial to improved methods of cultivation and cropping. Most of them do not yet perceive the rapid and astounding progress that is made in other countries in this direction. They should be made to understand the advantages of introducing improved implements, machinery and manures for the several operations on their lands and incidentally the value of capitalistic farming on modern lines. They can afford to put up with the loss if any at first, but of course, they are sure to profit much in the long run.

Further the system of leasing out lands to tenants or individual ryots is in most cases indirectly doing harm to the advancement of agriculture, though the agricultural class is entirely at the mercy of such a system. Since the lessee is not the owner of the land, he cares very little for the permanent improvement of the land, or for the maximum yield that he can get by improved methods, but is

always satisfied with that amount of his share, either in coins or in grain, which is just enough for himself and his family. The land owners should therefore be advised not only to retain the lessee for a number of years but also to take a personal interest in the cultivation of the lands. They should also be keenly alive to the latest improvements in the art so that, with a national interest, they may try those on their own lands.

Lastly, the greatly split-up nature of the holdings of the agricultural class which are, as Dr. Mann observes, not only insufficient for the maintenance of a family, but also unsuitable for economic cultivation, is another important factor for serious consideration. The work of consolidating such bits of agricultural holdings, in however small a scale at first, has to be taken up at once with the help of the State. This may have the resultant effect of throwing a small number of the population out of employment, but when indigenous industries are developed side by side with this work, these men may find suitable employments in such industries, since they are usually allied to agriculture or have agriculture as their basis.

Thus we see that increased food production is effected by improvement in the agriculture of the country. But it has been shown that there can be no great progress in agriculture if the condition of the agricultural class is not improved. The socio-economic development of the agricultural class, therefore, has a direct bearing on the increased food production of the country.

Brief Thoughts :—

A heated argument chills any atmosphere.

He is ignorant who does not use the knowledge he has.

We never regret the unkind word left unspoken.

There is no happiness in all this world, if there is none in the heart.

Waste of wealth is sometimes retrieved, waste of health seldom, waste of time never.

"Great Thoughts."

Manufacture of Palmyra Jaggery in the Kistna District.

T. LAKSHMIPATHI RAO, ASST. AGRICULTURAL
DEMONSTRATOR, TANUKU.

Palmyra jaggery making is one of the important agricultural industries in the eastern taluks of the Kistna District. It is in the hands of the Edigas and Gavanalas who congregate during the season from different corners of the District in villages where palmyra topes are fairly abundant.

Four or five tappers combine, lease out a palmyra tope on the share system or on seasonal rent. There are no hard and fast rules for payment of rent, as it depends mostly upon the uncertain secreting capacity of the tree each season. During the last season a tope of 800 trees was leased out for fifty rupees for this purpose. Tappers when they have secured the trees, being poor, seek the help of a *sahukar* or merchant for running expenses. The merchant however advances the required amount on condition that all jaggery manufactured should be sold only to him at rates invariably lower than those which rule in the market.

Having secured the necessary assurance for running expenses the tapper applies to the Abkari Officer for a license, provides himself with all implements and settles down his family in the tope, in the early part of January. In the latter half of January he commences the examination of the trees for their secreting capacity. Generally trees eighteen years old and above are fit for tapping but a fair quantity of juice can be obtained only from trees which are very much older, say, twenty years or over. Leaves are not cut out from the trees selected for tapping.

Calm weather, with moderate sunshine, which generally sets about the middle of January, favours secretion and the toddy tapper is busy after 15th of January. Male trees are dealt with in the beginning, as female trees are not ready until after the first fortnight in February. Tapping is always done in the afternoons

i.e., it commences at noon and lasts until sunset. After tapping pots are hung round the tapped spathes to collect the juice. Inside of the pots is coated with *chunam* to prevent fermentation; and the amount used rises with the quantity of liquid secreted. Usually one ounce of lime is enough for one kuncham of palm juice secreted; but more quantity is added to the liquid which is kept over for sometime. From noon to sunset a man can tap 30 to 40 trees. Tapping is completed before sunset every day. At day break, the juice that has been secreted in the pots is collected and from a tree in full vigour, 2 to 4 kunchams of toddy can be realised per day and each big pot holds 6 kunchams; 6 pots of toddy is the minimum for one boiling.

As the men go on collecting the juice the women get the furnace and the pan ready for starting boiling. This furnace resembles the sugarcane furnace though it has no grating and is smaller in size. Dry palmyra leaves and sheaths, red gram stalks, etc., are used as fuel. Iron pans 5 spans in diameter are used and last two or three years. The price of each pan varies from Rs. 6 to Rs. 7. For one charge six to eight pots or 35 to 48 kunchams of toddy is required. Generally two boilings are taken in a day of eight working hours. The work starts at 8 a.m. and stops at 5 p.m. When nearly two big pots of juice have been collected it is poured into the pan and boiling commences to prevent fermentation. This generally takes place at 10 a.m. The juice is filtered through the fibrous leaf base; and removing the scum with the leaf stalk is not uncommon. Boiling continues for four hours. When evaporation is complete and when the syrup is boiled to a semisolid consistency, then the pan is removed from the furnace and contents cooled by stirring constantly with wooden paddles. The mass is then moulded into small cakes being poured into small palmyra baskets and the cakes formed each weigh one viss. From 6 pots of toddy, 12 to 14 viss of jaggery is obtained, one woman is required to feed the furnace, to remove the scum and to prepare jaggery. Juice from the male tree yields better jaggery than that from the female ones and fetches a higher price. Jaggery making continues till the end of May i.e., till the rains commence.

Palm jaggery is generally sold off as soon as it is prepared. In the Kistna District there are two chief markets for palm jaggery, one is Tadepalligudem and the other Nidadavolu. Until recently Messrs: Parry & Co., were the only buyers, but local merchants are now competing with them and purchase large quantities for export to Northern India, for refining purposes. For railing, it is generally packed in gunny bags and each bag weighs 168 lbs. The price of jaggery varies often and during the last season, it was selling at Rs. 35 per putty (504 lbs.) The total quantity of jaggery produced in the tract cannot be accurately estimated, as the secretion and quantity of juice obtained are entirely subject to natural causes, such as copious rain in the rainy season, bright sunshine in dry weather, etc. As the palmyra palm is one of the important sources for the manufacture of sugar in India, it would be well, if the educated classes would interest themselves in this industry and try to improve the quality of the jaggery produced. The Co-operative department also can do some work in this line.

Extracts.

Small Holdings. Dr. Keynes, the eminent economist, is not the only one who contends that the late war was the out-come of over-population. One of the most primitive emotions of mankind is the desire to possess land, and when a nation becomes too large for the area within its command trouble is very apt to arise. There is first of all an extreme sub-division of the land available such as is evidenced in Egypt, China, Japan, and even Belgium, and consequent lowering of the standard of living. In many of the over-populated countries of the world the process of subdivision cannot go any further, and the surplus are driven from home to the new prairie countries. There, there is a field for expansion, and if Dr. Stefansson is correct in his conjectures, even the Arctic regions will yet yield their quota towards the maintenance of mankind.

The late war has caused a great upheaval in the system of and tenure in nearly all the belligerent countries. The peasant has become powerful in the less industrialised countries. He has the largest political influence in countries such as Russia, Czechoslovakia, Roumania, Bulgaria and Latvia. The large properties have been *seized often without compensation of any kind to the owner and have been sub-divided among the peasants.* There is no disguising the fact that the result so far has been disastrous. *Production has had a severe set-back. Amongst the Slavonic peoples the noblemen and estate-owners had the best acquaintanceship with scientific agriculture, and used their knowledge, assisted by capital, to advantage.* The new peasant proprietors are lacking both in capital and education, and as far as can be ascertained it will be some time before these countries will rank once more as exporting areas, i. e., producing a surplus over their own requirements.

It may be argued that conditions abroad are analogous to those in Great Britain, but an examination of the facts does not lend support to this view. There can be little doubt that England and Scotland are over-populated if work can not be found for a million and a half able-bodied men. Trade depression does not wholly account for this large total. All political parties at least pay lip-service to the ideal of a healthy rural population, but meanwhile rural depopulation proceeds at a steady pace. The result has been that legislation has been introduced to facilitate land settlement, to which many are so virulently opposed. The State has deliberately expended, and is expending a few millions on schemes which at present are admittedly uneconomic. It is unfortunate that the need for greatest development coincided with high post-war cost, which emphasised the uneconomic nature of the schemes. The majority of the settlements are too new to be criticised justly. There would seem to be a future for small holdings in Great Britain if production of such commodities as butter, bacon and eggs is pursued.

It may be argued that to constitute small productive units is to oppose the experience gained from other forms of industry. In the latter there is a constant tendency towards amalgamation and mass production, but *agriculture is more of the "domestic" type than any other. No industry calls for more supervision from the head of the concern* and in the words of the old saying, there is no manure like the master's eye. *Small livestock need an individual attention which cannot be afforded in extensive operations, and small livestock and their products are ideal subjects for the small man.* Posterity will decide whether the State has diagnosed the situation correctly or whether it has been vainly attempting to check the operation of an economic law, for, despite the legislation and recently inaugurated schemes the number of small holdings in these islands decreases as steadily as does the rural population. Those may be right who assert that the lack of education defeats the whole movement towards rural repopulation.

(The Scottish Farmer, dated 29th September 1923).

Irrigation Experiments in cotton.

An experiment was started at the Co-operative testing station, Secaton, Arizona, to study the behaviour of cotton plants—the variety used in the experiment was Pima cotton—when different frequencies of irrigation had been applied. The plants were so treated that when the experiment was begun they were 18 inches high with very few vegetative branches and were beginning to flower. The season was, although not normal, favourable for the correct conduct of the experiments. No irrigation was given, up to the commencement of the trials. The maximum temperature was unusually high. 9 plots were laid out in 3 series of 3 plots each. In one series the plots were irrigated when the plants showed any wilting during the midday. In the second series the plants were watered at regular intervals without considering the requirements of the plants. The third series were planned to receive irrigations at intervals intermediate between the above two series. To know how the plants respond to these treatments, the rates of growth, flower production, and boll-shedding were observed on 25 plants chosen in representative sections of rows.

For rate of growth, the heights of plants were measured every week. At the initial stage, the cold weather retarded the growth, but when the weather grew warm, the rate of growth went on increasing up to 1st week of August when it slackened. This phenomenon could not be correlated with any change in the weather. There was not strong evidence to say the different treatments had affected the rate of growth. Hence it is believed that additional water applied was not utilised in making the plants larger.

The number of flowers that opened everyday was recorded for a period of 10 weeks. The results show that differences in the amount of water applied had no effect on the number of flowers produced. There was no appreciable change in the flower-production curve that can be definitely pointed out to be due to difference in treatments of plots. The plants in all the plots produced a large number of flowers on the same days.

The shedding of young bolls was computed by collecting the number of young bolls shed under each plant. The dated tags borne by the pedicels furnished the date of opening of the flower. No wide differences were noticed in either the amount of shedding per day or the total for the season in all the plots, although there was a great deal of variation in the daily rates of shedding. There is a general belief amongst the farmers (the Indian farmer shares the same belief) that excess in watering would cause heavy shedding. The results obtained in these experiments are in direct contrast to that strong belief. There was no higher or lower rate of shedding at any regular intervals after a plot was irrigated.

The interval between the date of flowering and that of shedding has a wide range of fluctuation with its mode and averages at 8 and 10.8 days after flowering. There was not much bud shedding as is the case with Upland cottons.

Again there was no consistency between the yields of cotton in different plots. It may be stated however that more frequent irrigations tended to make the crop later.

(Abstracted from the Journal of Agricultural Research.)

Vol. XXVII. No. 12 (1923)

Gleanings.

Gifts of Science.—‘Remember that every gift of Science is a gift not to one country or to two countries, not only for today or for tomorrow but also to the whole world and for all time, until, as the Poet said, “The future dares forget the past.”’—Sir Ronald Ross, F.R.S.
(Nature, Oct. 13, 1923.)

Free Martins.—When twins are born in the bovine species, and are of different sexes, the term “free martin” is given to the female. It is generally held that the female is sterile, but that the male animal is quite normal as a breeder. If both of a pair of twins are of the same sex, they are normal and will breed normally. This above generalization, however, is hardly true, and a writer in the New Zealand Farmer states the position as follows:—

“If the twins are born in different foetal membranes, they are just as normal as if born at different births. If they are born in the same membrane, then they are really identical twins and always of the same sex. Therefore, a heifer born twin to a bull and in the same membrane is not really a heifer in constitution, but a bull. She may have the accessory reproductive organs of the female in varying stages of atrophy and sometimes some female ducts, but the internal organs are for the most part male.”

(Jour. Dep. Agr. S. Africa, Nov. 1923.)

A touch of Nature makes the whole world kin.—B. H. Hibbard writing to the Journal of Farm Economics, 5, 1923, No. 1, observes that in the “shifting of margins, costs and incomes in recent years, the farmer has been the loser. Certain ways of influencing prices as economies in methods of bridging the gap between the producer and the consumer, changing the price level, changing the demand for the goods in question, eliminating competition by a tariff, establishing a private monopoly, and lowering the cost of production which are sometimes suggested as remedies are dismissed by him as inadequate. A decrease in production and an enlargement of the markets,

by the rehabilitation of the buying power of Europe are recommended to be included in any programme of relief that may be proposed. This counsel was partly anticipated by the planters of Cuba which has tended to arrest the downward trend of prices in Sugar. It is here that literacy plays a most useful part in arming farmers with knowledge and power to resist unfair and ignoble attacks of middlemen and mischief-mongers. Where does India stand in this respect?

V. M. A.

Coffee in India 1922-23: Supplement to the Indian Trade Journal, 8th November 1923.

	Daily labour employed.	Acres.	in lbs.	Number of plantations.
Madras.	13,869	28,752	76,50,655	332
Coorg.	16,594	31,628	75,77,344	712
Mysore.	35,789	68,138	98,35,734	1930
Travancore.	1,031	910	1,32,045	13
Cochin.	620	2,229	2,71,199	11

Exports to	Cwts.	Net imports from	Cwts.
United Kingdom.	57,016	Ceylon	14,917
France	60,705	Straits settlements	25,792
Asiatic Turkey	8,440	Kenya	118
Arabia	8,896	Java	8,233
Bahrein Islands	9,654		
Australia and			
New Zealand.	10,269		
Other countries.	19,076		

A new Green manure plant. Mr. Van der Menlov, Java, in an address before the Rubber Planters' Union, Bendoeng, referred to the superior qualities of *Centrosema Pubescens* which was used by him in an old plantation. Its advantages are stated to be that (1) by the aid of its fine tendrils it is able to twine round the thinnest of grasses and the smallest herbs. Once the tendrils have entwined the victim the leaves on it open and the increasing weight of these brings down and smothers the weeds.

2. it does not shut out the soil from access to contact with the air. It forms a light leafy covering about 10 inches high.

3. It does not die off and in the driest months keeps the surface soil cool and moist.

4. With its adventitious roots when the stems come in contact with the soil the plant grows well and acts as a soil binder.

We hear the seeds of this crop have been received from Java and will be tried at Peradeniya. Will Madras planters care to try?

[*Centrosema pubescens* is a native of Brazil—*Editor*].

(Indian Trade Journal, Vol. LLI, No. 4, page 246).

Spraying not always a blessing. From the American Journal of Botany, Vol. X, No. 3 page 113, we learn that spraying experiments were conducted at Columbia in the Missouri State on Irish potatoes. The object was to increase the yield and prolong the period of vegetation. Four applications with Bordeaux with and without Arsenate of Lead and Nicotine sulphate were given. The plants remained green three weeks longer and gave 34 per cent higher yield than the check plots, but the tubers consisted largely of second growth so that the marketable quantity was lost. These second growths planted elsewhere as seed gave higher outturn than normal tubers.

Aid from Science.—At a meeting held on July 27th 1923, the Agricultural Society of Barbados, West Indies, unanimously carried out a resolution requesting Government to provide a suitable location for the continuance of the excellent work which has largely benefited the sugar industry, says the Louisiana Planter in its issue of October 13.

It was in this island that the first seedling canes in the West Indies were grown and thereby marked benefits have resulted not only to Barbados, but to the whole Sugar World. On this account Dr. J. R. Bowell's statement of the yields during the eight years from 1913-15 to 1920-22 is interesting. The average yield of the original White Transparent variety was 20.45 tons of canes per acre, while the three seedling canes

B H 10 (12) gave 29.05 tons an acre.

Ba 6032 31.76 " "

Ba 11569 26.84 " "

or an average increase of 8.77 tons per acre. Moreover the sugar content of the three seedlings showed a further increase. The White Transparent gave an average of 4878 pounds of sugar per acre while the average from the seedling was 7665 pounds an acre and the value of these increases is self evident. Can any one ever come to a conclusion that science has not benefited the agricultural industry?

Indian Sugarcane forecast, October 1923-24.

Provinces.	1923-24 1000 acres.	1922-23 1000 acres.	1000 acres.
United Provinces (52.1%)	1454	1199	plus 255
Punjab (17.3)	494	424	" 70
Bihar and Orissa (10.6%)	309	325	minus 16
Bengal (8.2%)	210	200	plus 10
Madras (4.3%)	120	126	minus 6
Bombay and Sind (2.8%)	87	80	plus 7
Assam (1.3%)	41	41	"
North West Frontier Province (1.3%)	39	35	" 4
Central Provinces & Berar (0.9%)	21	19	" 2
Delhi (0.3%)	9	8	" 1
Baroda.	3	3	"
	2787	2460	" 327

N.B.—Figures in brackets represent the position of the province in the total area of the country.

Sugarcane crop in Foreign countries.—In Cuba the production for the current season amounts to 3,603 thousand tons as compared with 4,000 thousand tons last year. Hawaii is expected to yield this season 460 thousand tons, the lowest on record during the past ten years. Philip-

Java (1914)	3.84
Hawaii (1914)	4.91
Philippines	0.86

All cane countries except India have a tendency to raise their tonnage. Java has since 1908 increased her area by 37 per cent and tonnage by 45.8 per cent, Philippines, since 1910, 190 per cent, and 250 per cent respectively. Hawaii cannot increase her area any more. Cuba can, but has not the reserve as Java and Hawaii.

(Abstracted from Louisiana Planter, Vol. LXXIX, No. 13, 29-9-23)

The Higher Agricultural Education of the Future.—Under this title Prof. M. Em. Marchal of the Institute of Agriculture, Gembloux, Belgium, writes a very illuminating article to the "Review of the Science and Practice of Agriculture". The following paragraphs are interesting. According to him one school of thinkers assert that Agricultural Education is too theoretical, the training provided at the Agricultural College is much too scientific; it inspires the farmers' sons with too progressive aspirations and instead of preparing them for rural life tends rather to alienate them from work on the land". The ideal function of the College is to *give careful theoretical and practical instruction in the most approved cultural methods to students preferably originating themselves from the classes directly interested in the cultivation of the soil* and thus to train practical scientific agriculturists who will stand out as leaders in the agricultural progress.

This desire to attract students from the country districts (or as is interpreted in our own country from the ryot classes leads to the following characteristics in the arrangement of programme of study:—Comparatively easy conditions of entry, limited duration of the course, a constant effort to give a practical bias to all the branches of instruction including the basic sciences, the predominance of practical work on the farm and in the fields over laboratory and lecture work.

The contrary theory holds that the function of higher agricultural education is to prepare pioneers, research workers, and the moulders of agricultural progress. The courses at the Agricultural College

should accordingly still further develop the scientific side and definitely take their place amongst the recognised higher agricultural studies.

The history of the great discoveries which during the last 50 years have brought about transformations in the art of cultivating the soil hitherto in its rudimentary and empirical stage shows at each step the marks of the direct influence of pure science. In the method of recruiting professors and research workers, it is too often the case that less importance is given to high scientific qualifications than to technical skill on the 'practical' side.

The result is that too often the duly qualified leaders of agricultural progress are not fit to undertake original research even under favourable conditions. No other result could be expected seeing that the nursery where they are trained and whence they are too often exclusively recruited, is often marred by the same fundamental defect.

V. M. A.

Review.

A Glimpse into the Village Administration in the early Nineteenth Century.

The searchlight that Dr. H. H. Mann has directed into the hidden corners of the Mahratta history is revealed in a very lucid account he has given in the pages of the Indian Journal of Economics, Vol. IV Part I, under the caption "A Deccan village at the time of the Peishwas". The unit of administration in India in pre-British days centred round the village and it is the pride of all Indians that the village, as the unit, has for several centuries stood the onslaught of successive waves of invasion and suffered little from the aftermath of such invasions. The records that Dr. Mann has been able to rescue from oblivion, disclose a state of affairs in the time of the later Mahratta rulers which will bear very favourable comparison with the twentieth century notions of administration in any country and bring us closer to them in spite of the unsavoury incidents that have been

associated with the Hindu and Mohamadan sovereigns. We fancy that Jategaon Budruk in the Poona district which Dr. Mann has chosen for his subject was only one of several typical villages with which the country was studded and which were enjoying local autonomy in administration which we hope it is the ultimate aim of the British administration to re-introduce. We have no doubt that their recent efforts in this direction have more than justified the reasonableness of the steps taken.

It is therefore very interesting in this connection to know what the Peishwas did in their day to secure contentment amongst the unlettered, simple, toiling countryfolk.

We make no apology to quote Dr. Mann's words. "There is no sign of any over-lord, zamindar or authority intervening between the owners of land in the village with their *patil* or headman and the Government in Poona, and the land tax paid by the latter is paid in money direct. The land actually cultivated is charged with land assessment. x x x x x".

"The principle of charging *land assessment on the area actually under cultivation* had two effects. It would *make the revenue exceedingly variable* and it would tend to *reduce cultivation when either physical or political conditions were unfavourable to the success of the crops.*" [In a year of plenty, the cultivator would not feel it a hardship to pay the assessment even though it might be high and in a year of scarcity, he would not be coerced into paying it by the underlings. This would lead to a natural adjustment of his conditions.]

"x x x x In one essential particular the village system of accounts differed completely from that now in vogue. *Then the whole of the village's expenses were incurred by the village officers and the cost deducted from the money sent to the Treasury* and it is easy to find out the proportion of income to the expenditure which is practically impossible now." The expenses included such claims as those connected with the visit of the Peishwa or some high official, contributions to temples, festivals, *mohurram*, charity and most curious of all, contributions or bribes paid to raiders or hostile army leaders to leave

the village are also charged against the Peishwa's revenue for the year. We commend a perusal of this very thought-provoking contribution from Dr. Mann to every well-wisher of India. V. M. A.

Correspondence.

Coimbatore Diplomates in Travancore.—I perused with considerable interest the letter of a gentleman from Bangalore written under the pseudonym of "Hope for the best" and published in the July issue of the Madras Agricultural Students' Union Journal. The letter contained a list of Coimbatore Agricultural Diplomates in Mysore Service and conveyed the writer's intense desire to know how their brethren were getting on in Travancore and other Native States. I furnish herewith a list of Coimbatore Diplomates working in the Travancore State. I hope that lists of those employed in Cochin, Pudukottah, Hyderabad and other Native States will be prepared and sent up by members, who take a deep and abiding interest in their welfare.

1. George M. Eappen, L.Ag., (Passed out in 1911)
Agricultural Inspector, Alleppy Circle, in the grade of Rs. 60-150.
2. M. C. George, L.Ag., (Passed out in 1912)
Agricultural Sub-Inspector, Demonstration Farm, Alwaye, in the grade of Rs. 50-60.
3. P. Samuel, L.Ag., (passed out in 1911), Headmaster,
Agricultural School, Alwaye, in the grade of Rs. 60-150.
4. P. Padmanabha Ayyar, Proficiency Certificate Holder (1919),
Agricultural Sub-Inspector, Attungal, in the grade of Rs. 35-80.

The list unmistakably shows that the lot of Coimbatore Diplomates is decidedly worse in Travancore than in the sister state of Mysore. "PADMAN."

Students' Corner.

The Government Fruit Preserving Institute, Coonoor.

The Nilgiri Hills grow all kinds of fruits, both tropical and temperate. This is a great advantage which rarely obtains in other place; and enables fruit preservations to be made both from indigenous and European varieties. The necessity and importance of fruits as an adjunct to our diet cannot be overrated.

Besides other components there is, in fruits, a substance called 'pectin.' It may be present in smaller or larger quantities. This is a complex Polysaccharide allied to gums and in all probability contributes to the successful gelatinisation of boiled fruit-products such as jams and jellies. Up to this time, as far as we know, no 'fruit factory' has been attempted in India.

The Government Fruit Preserving Institute at Coonoor has been opened with the express object of preparing and catering to the public, pure and high class fruit preparations such as jam, jelly and preserved fruits. The process of manufacture is simple. (a) Jam is prepared in the following way. Whole fruits are put in a large wooden tub and boiled by allowing steam to play upon it. In fact, all the heating is done through steam at 300° F and under great pressure. After boiling, the pulp is forced by a hand pump on to an apparatus, which essentially consists of a revolving sieve and a cleaning brush. Passing through the sieve, the pulp gets separated from seeds and foreign matter. It is now transferred to a big copper basin fixed on its horizontal axis in such a way that it can be tilted through 90°. It has an outer jacket enveloping it to half its depth and into this jacket steam is again pumped to heat the pulp. Now to the pulp, a sufficient quantity of a special kind of sugar, containing 100 percent sucrose, is added. At a particular temperature, which is known by experience, the requisite consistency of the jam is obtained, when the steam is turned off and the basin tilted so that the jam is made to flow into another basin. From this, in a hot state, the jam is poured into tins or bottles by means of 'transfer vessels'. In this manner, in about six minutes 55 lbs. of jam is prepared.

In the preparation of jelly the process is almost the same, but the essential difference lies in the fact that jelly is made from the juice of fruits, it being more or less an essence of fruits. The fruit juice is filtered through special cloths to obtain more transparency. Whole fruits are preserved, often without seeds or stones in sugar solutions in well corked bottles. The sugar solution may be boiled or cold according to personal taste.

It is interesting to note the processes by which tin-containers are made ready for use. The inside is carefully coated with golden varnish and then dried in a special oven. After the jam or jelly is poured into them they are at once covered with the lids, sealed and kept inverted for a time testing them for leakage. They are then varnished outside, labelled and kept ready for the market. Bottles are kept absolutely clean and fitted with metal covers with rubber washers making them air-tight. These bottles, however, are imported from England.

No kind of preservative is used in this institute, because there is no necessity for it. The fruits, as soon as they are received from the gardens, are made use of. But in cold countries like England jam cannot be made all round the year and so there is a necessity to preserve the pulp until the suitable season comes on i.e., the warm months. The common preservative there seems to be sulphur, which when the fruit is boiled passes away as vapour and does not interfere with the process.

In fact any kind of fruit can be used for these preparations, but the most common ones used in this institute are pears, apples, tomatoes, raspberries, strawberries, oranges, plantains and mangoes. The opening of such a factory encourages the growing of fruit gardens on a commercial scale and this means that many families will be able to make a decent living out of this industry alone. Incidentally, we have also got the advantage of eating all kinds of fruits at all seasons and that too in a very tasteful, agreeable and healthy form. We Indians have been known to be lovers of fruits more than any other nation of the world, from the earliest times,

and as such it is but fitting that we should encourage the establishment of such factories and cultivation of large areas of fruit gardens all over the country. And this institute we owe to Sir Frederick Nicholson, who has almost made India his home.

S. V. DURAISWAMI, B.Sc., II.

Questionnaires of the Lee Royal Services Commission.

ORGANISATION OF SERVICES.

Question No. 1:—In the light of the experience now gained of the operation of the system of Government established by the Government of India Act and in view of the avowed policy of Parliament as contained in the preamble of that Act do you consider possible any readjustment of the position, in particular the possibility of transferring immediately or gradually any of their present duties and functions to services constituted on a provincial basis? If in your opinion any readjustment is necessary, what in your view should be the place and functions of these services and in particular of the Indian Civil Service in the Government of India?

The European element.

Question No. 2:—The tables annexed set out the principal classes of superior appointments at present held by members of the All India Services. To what extent in each of these classes do you consider that European personnel must at present be retained for the maintenance of a standard of administration in accordance with the responsibilities of the Crown for the Government of India and do you consider, that any progressive reduction of this European element will be practicable within say the next 20 years.

Question No. 3:—Do you consider that the European element in the Services should be appointed and controlled by the Secretary of State in Council as members of services organised on an All-India basis with the safeguards and conditions at present attaching to that

organisation or should it be appointed and controlled by the Government of India or where the duties concerned are under a Local Government by the Local Government?

Short-term Contracts.

Question No. 4:—Having regard to the declared policy of Parliament in respect of increasing the association of Indians in every branch of the administration and to the provision in section 84-A of the Government of India Act for the appointment of a statutory commission in 1929 to report on the extent to which it is desirable to extend, modify or restrict the degree of responsibility of Government then existing in India and having regard also to the importance of offering to recruits a career of adequate security and opportunity, on what conditions do you consider that the European element in the services should be recruited? In particular do you consider that engagements on short term contracts would be suitable as a substitute for permanent appointments and if so to what extent, and in what branches of the services?

Secretary of State's control.

Question No. 5:—Do you consider that the Secretary of State in Council should continue to appoint and control the Indians required for duties and functions of the kind at present performed by the All-India Services or should they be appointed by the Government of India or by Local Government? If you hold the former view do you consider that any alterations are necessary in the methods adopted for recruitment of Indians for the All-India Services?

Question No. 6:—Do you consider that the existing rates of pay for the All-India Services are suitable (A) for Europeans; (B) for Indians? If not what redjustment do you suggest?

Question No. 7:—If Local Governments should appoint the personnel required for the duties and functions referred to in Q.5, would it be preferable to organise them as separate superior Provincial services or to amalgamate them with the existing provincial services? In the latter what alternative scales of pay would in your opinion be necessary to obtain recruits of the required standard?

SERVICE CONDITIONS.

Pay and Pensions.

“Question No. 1:—Taking into consideration the provisions of the Government of India Act, do you consider that the position of members of the Services is adequately safe-guarded as regards (a) pay (b) allowances (c) prospects and (d) pensions? If not, and bearing in mind the existing constitutional position in India, have you any proposals to make?

Question No. 2:—Have you any observations to offer on the scheme for retirement on proportionate pension announced in the Government of India Home Department Resolution, dated November 8th 1921, No. F-149-1 (Establishment), as subsequently amended?

Question No. 3:—What are your views with regard to the present rates of pay? Give any figures available to you e. g. family budgets, distinguished between expenditure in India and expenditure involving remittance to the United Kingdom. If a new scale of remuneration were fixed now, how would you provide for its adjustment to meet future variation in prices and exchange?

Allowances.

Question No. 4:—What are your views with regard to the question of passage allowances for officers in the services and their families? If such allowances were granted would you prefer they should take the form of an increase of overseas pay to all officers or the grant of a certain number of passages during an officer's service to himself, his wife and family?

Question No. 5:—Have you any criticism to make regarding the allowances payable to the services?

Question No. 6:—Have you any observations to offer regarding the withdrawal of exchange compensation allowance?

Accommodation and leave.

Question No. 7:—Do you consider that any grievance exists in respect of house accommodation, the rent chargeable for official

residences or the house rent allowances granted when no official residence is available?

Question No. 8:—Have you any criticism to make regarding the leave rules?

Pension or Provident Fund.

Question No. 9:—Do you consider that the pension rules and scales are satisfactory? If not give reasons in detail for any proposals you may have to make. Do you consider that subscription to Provident Funds by Government in lieu of pensions should be adopted for (1) Officers now in the services and (2) Future recruits? Have you any observations to make on the rules governing commutation of pensions and in particular the existing one-third restriction on the proportion of pension which may be commuted?

Question No. 10:—What is your opinion of the comparative merits of Family Pensions and Provident Funds as provision for the families of deceased officers? Have you any observations to offer regarding the existing I. C. S. Family Pension Fund?

Question No. 11:—Do you consider that suitable provision is made for medical attendance for officers and their families? If not have you any proposals to make?

Editorial Notes.

Agriculture and the Madras University.

The Madras University was established in 1858. The constitution of its governing body, the temper of the age and the outlook of the educated classes were then such that the agricultural profession on which more than 85 percent of the population has depended did not receive an iota of attention. It was left to that far-seeing Englishman, Mr. (now Sir) Frederick Nicholson, to make an appropriate reference to agriculture as an honourable career in his convocation address in 1900. The late Rev. C. Patterson as Registrar

desired to include 'agriculture' amongst the subjects for the University examination, but this suggestion met with serious opposition at the time and the matter dropped out from public view. Even the reorganization of the agricultural departments in India during the Viceroyalty of that energetic and masterful personality—Lord Curzon—failed in Madras to secure for 'agriculture' an honoured place in the University curriculum and it was reserved for a cultured Indian—the present President of the Local Legislative Council—Dewan Bahadur L. D. Swamikannu Pillai, c. I. E. to press the matter home and make it possible for the affiliation of the Coimbatore Agricultural College to the University of Madras. It would certainly have been a matter of extreme surprise if for long the basic profession in India were left unrecognised under the Britisher, with whom an examination in domestic science is considered a desideratum as would appear from the recommendations of the Committee appointed to enquire into the conditions of domestic service.

The first examination after the affiliation of the local college to the University was held in April last and we are glad to note that, at a convocation held on 4th December—the first convocation under the Patro Reformed University Act,—Mr. R D. Anstead, the Director of Agriculture, as a member of the Senate, presented the following candidates to His Excellency the Governor, the Chancellor of the University, who conferred on them the degree of Bachelor of Science in Agriculture and authorised them to wear the hood ordained as the insignia of that degree:—

R. Balasubrahmanyam,
N. Parathasarathy,
T. Rangabrahma Rao,
G. Venkatanarayana,
M. Manavaludu.

In his Convocation address, Dewan Bahadur T. Venkataratnam Naidu Garu, M.A. referred to this happy event as follows:—

"Before conclusion, a word of special welcome is due to the Bachelors of Agricultural Science—the pioneers, as we trust, of a steadily increasing corps of trained and willing workers in a field of vast possibilities. A great world-classic widely honoured in South India, defines the cultivators as "the pivot of the world"; and upon the intelligence and the industry of the recipients of the new degree will largely depend the sustaining power of that pivot. This faculty, perhaps, more than any other, demands that devotion to duty which has accepted hard labour as a privilege. It will be your good fortune, "to scatter plenty over a smiling land". May yours be the joy of benevolent duties zealously discharged!"

We may add that students S. M. Kalyanaraman, G. Venkatasubba Rao and S. N. Venkataramanan could not attend the convocation.

We hope and pray that in future years bigger streams of agricultural graduates will flow through the portals of the University, fully equipped with knowledge, and marked by a sense of duty and patriotism to shed lustre on the achievements of the land in which they were born.

British Association Meeting 1923.

'Science and the agricultural crisis' which formed the subject of an excellent address by Dr. Charles Crowther as President of the Agricultural Section at the Liverpool meeting on September 13; has very many lessons for us in India. In Dr. Crowther's opinion the present difficulties of British Agriculture the primary causes of which are generally held to be economic in character afford a favourable opportunity for a forward movement in agricultural education. Of the three divisions into which all work in agriculture can be legitimately classified, viz., Research, advisory work and teaching, research is full of promise for the future, as all agricultural progress is and must necessarily be dependent upon it and as it ensures an attractive career for really capable young men with laudable ambitions to realise. Dr. Crowther however rightly

feels that 'a due measure of proportion should be maintained between research and the organization behind it, designed to translate the findings of research into economic practice and to secure that each advance of knowledge shall be made known quickly and effectively throughout the industry'. This aspect has not been quite appreciated in this country yet. Disproportionately larger attention to demonstration is as suicidal to progress and uneconomical in the long run as blind or lip homage to research that does not take note of the rigorous devotion which science demands of the worker. The root difficulties in agricultural progress have certainly been to secure a sufficiently intimate and widespread contact with the ryot, but all demonstration will become sterile unless a steady never-failing stream of research is made to flow to fertilise the barren sands of rule-of-thumb farming. All this implies increasing resources in men and money and very efficient means of bringing home to the farmer in an understandable manner the rigorously tested truths of Science evolved not in lecture halls, drawing rooms or market places but in secluded, perhaps dingy, corners of an uncared for laboratory or study.

So long as individual interest in land continues, the cultivator has it in his power to render all aid to agricultural progress and by his action to exert more good in one year than is attainable by very many years of propaganda not always based on latest research. It is therefore the primary concern of the nation to encourage, guide and develop research along lines most economical and beneficial to the country.

Agriculture and the People's Representatives.

Of late there has been all over the world a wide-spread movement of revolt of labour against capital and of tenancy against Landlordism, and synchronising with this there has been in our own country since 1920, the year of inauguration of the Reforms a ferment at work in the people's thoughts causing the ryot to come out of his shell of conservatism and take interest in public life. It

is therefore but proper that we should take stock of the work of the First Reformed Council during the three years of its existence, with special reference to Agricultural and allied problems concerning the welfare of ryot. His Royal Highness, the Duke of Connaught, in inaugurating the Local Council on 12th January, 1921, uttered the following pregnant words. "In India, as elsewhere, *political development is only a vehicle* for human life and human progress. Its function is to provide a nation with the means of increasing the happiness of the people. The form has an importance of its own; but *the spirit is vital; for liberty, unless human brotherhood follows in its steps, may easily become a greater tyranny*". It is satisfactory to note that on the whole the people's representatives have amply justified the faith placed in them, though on certain occasions people have had to resent their attitude inside the Council Chamber. In this connection one has to remember that these representatives worked under great handicaps, and elections were not fought out on agricultural issues. In the first year Agriculture and subsidiary subjects had to their credit 158 out of a total of 589 questions, in the second and the third, 248 and 158 out of 1393 and 943 questions respectively. They were not all of a stereo-typed kind but on the other hand embraced an agreeable variety of subjects, though some of them betrayed a want of acquaintance of the questioners as to the essential particulars and were not pursued with a pertinacity usual elsewhere. Several Council Members really evinced a keen desire to obtain information and their anxiety to see progress made in the Agricultural development of the Province was manifest in their general readiness to sanction grants for 'Agriculture' during the past three years.

We hope that future Councils will be equally discerning in respect of agricultural advance. Of course, no one can expect that for several decades to come there will be an 'Agricultural party' formed as such to protect and promote agricultural interests in the

Council in this country, considering that in England even after the lapse of 600 years, there are only 22 members interested in 'Land'—and all of different political hue—in an Assembly of over 500 members in the House of Commons.

Union Activities.

During the quarter ending 31st Dec., 1923, owing to students' tours and the examinations almost up to the middle of December, only one meeting of the working committee could be held. (1) The questions of approaching the authorities regarding the reorganization of salaries of lower subordinates in the local agricultural department and the restoration of the privilege of "Free Quarters" for agricultural staff on Government Farms abrogated in G. O. No. 1010, Press, Development Department, dated 18th July 1923 were discussed and referred to members of council for their views so as to enable the committee to take steps immediately. Replies are still due from two inflexible members. The draft is under scrutiny. (2) Possession of the site for constructing the Union Building was given by the Principal, Mr. F. R. Parnell on 6th November 1923 and the work was commenced and concrete foundation is now over. As the committee feels it its duty to complete its construction before the close of the official year, it appeals to all members of the Union to remit their contributions to the Building Fund as early as possible.

Departmental Notes.

Appointments, and Transfers :—

1. Mr. John Muliyl, Assistant IV grade to III grade (provisional).
2. Mr. K. M. Thomas, Assistant V grade to IV grade (provisional).

3. Mr. K. Rama Rao, Farm Manager, Hagari to look after the work of the Agricultural Demonstrator, Bellary, also, during the absence of Mr. V. N. Subbanacharya.

4. Mr. L. Sankarakumara Pillai, Agricultural Demonstrator, to be Farm Manager.

5. Mr. V. D. Kenchiab Gownder, Assistant Farm Manager on probation, Palur Agricultural Station, to be Sub-Assistant in Mycology.

6. Mr. M. Krishnaswami Ayyangar, Assistant Farm Manager, Hagari, to Cattle Farm, Chintaladevi.

7. Mr. P. Kannan Nambiyar, to be on probation as a lower subordinate, in the IV circle.

8. Mr. C. Chenchayya, a lower subordinate, to be on probation in the IV circle.

9. Mr. K. Govindan Nambiyar, offg. Assistant Farm Manager, to be Lower Subordinate V Grade on probation for two years in a permanent vacancy with effect from 2-11-23.

Leave.

1. Mr. D. Marudarajan, Assistant in Mycology, leave on average pay for one month from 23-11-23 with permission to avail the Christmas holidays from the 23rd December to 2nd January 1924.

2. Mr. V. S. Ramaswami Ayyar, Agricultural Demonstrator, leave on half average pay for 1½ years from the date of relief.

3. Mr. K. Govindan Nambiyar, Farm Manager, extension of leave by one month and eight days with permission to avail the ensuing Christmas holidays.

4. Mr. C. S. Madayya, Farm Manager, extension of leave by two months on medical certificate.

5. Mr. M. Baghavulu Nayudu, Agricultural Demonstrator extension of leave by two months on medical certificate.

6. Mr. S. Kappaswami Ayyangar, Agricultural Demonstrator, leave on average pay for six months, on medical certificate.

7. Mr. V. N. Subbanacharya, Agricultural Demonstrator, leave on average pay for 21 days from 1-12-23 with permission to suffix the holidays on the 22nd and 23rd December 1923 and the ensuing Christmas holidays from the 24th December 1923.

8. Mr. P. S. Venguswami Ayyar, Assistant Farm Manager, leave on average pay for three months from or after 3rd January 1924 with permission to prefix Christmas holidays.

9. Mr. L. Sankarakumara Pillai, cancellation of unexpired portion of leave granted.

10. Mr. M. L. Narayana Reddi, Assistant Farm Manager, leave on average pay for 13 days from 17-11-23.

11. Mr. V. Narasimhamurti, Assistant Farm Manager, extension of leave not due, on half average pay for two days.

12. Mr. O. Rangaswami Ayyangar, Sub-Assistant in Mycology, leave on average pay for 26 days from 27-11-23 with permission to avail the Christmas holidays from 24-12-23 to 2-1-1924.

13. Mr. K. Krishna Menon, Sub Assistant in Entomology, leave on average pay for one month with permission to avail Christmas holidays.

14. Mr. S. Venkataraman, Sub Assistant, Aduturai, leave on average pay for 15 days from 17-11-23.

15. Mr. J. Sunder Rao Bhutgoswami, Artist, leave on average pay for 6 days from 19-11-23.

16. Mr. T. A. Rangasami Ayyangar, Assistant Farm Manager, Sugarcane-breeding Station leave on average pay for one month from 3-1-24 with permission to prefix Christmas holidays.

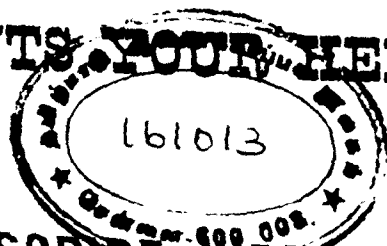
17. Mr. P. A. Kunhi Raman Nambiyar, Assistant Agricultural Demonstrator leave on average salary for 12 days from 10th December.

Building for the Union.

THE UNION

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